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ABSTRACT

Can Economic Crises Be Good for Your Diet?*

With fortuitously timed data – collected before, during and after a major macro-financial crisis in Bulgaria – we revisit several hypotheses in the economics and nutritional literature related to the tendency of households to smooth their nutritional status over time. We explore the dietary impact of both falling real incomes in the context of hyperinflation and crisis and changing relative prices and the changing responsiveness of different groups of people to these incomes and prices over six year of fundamental structural reforms of the economy. Our results highlight large and dramatically changing food and nutrient elasticities, which challenge the perception of household ability to smooth their nutrient stream during economic crises and transitions.

JEL Classification: E320, I120, P230, P240, P360

Keywords: crisis, diet, fluctuation, health, nutrition

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1. Introduction

One of the most challenging areas of economic research is the unexpected recurrence of economic crises around the world. Crises take many different forms, from collapse in financial systems and production relations to hyperinflation and dramatic shifts in relative prices of key consumption items and staple foods. The implications of such shifts for the welfare of affected vulnerable groups of people can be devastating. However, it also presents the challenging question of whether economic crises can be beneficial, judged by key health-related economic indicators, such as diet and nutrition.

The literature provides neither an unambiguous analytical framework to study this issue nor a concrete answer to this question. While dietary changes associated with major economic changes have been studied in many different contexts, most of the studies have focused on transformations that follow long periods of improved economic growth in the process of economic development. On the one hand, such periods of prolonged improvement in aggregate economic welfare are found to reduce the incidence of malnutrition (Berhman and Deolalikar, 1990). On the other hand, they introduce a dietary downside, commonly referred to as the "nutrition transition" – a change in food marketing and production systems that is associated with increased availability of processed foods, a lower intake of fruits, vegetables and fibre and an increased intake of fat, especially in the middle-income urban strata of the developing countries' populations (Popkin, 1993; Behrman and Deolalikar, 1987). One could argue that a reversal of the process of economic growth and welfare amelioration during an economic crisis, could lead to an improvement of the nutritional status of people who have launched upon what Popkin (1993) calls a *degenerative disease* pattern of the nutrition transition.

This argument clashes, at least partly, with the stylized logic of the permanent income hypotheses or the ability of individuals and households to smooth their consumption and/or nutrition across temporary economic shocks. Duncan and Stillman (2008) have found that during the 1998 economic crisis in Russia, the nutritional status of people, measured by their gross energy intake, adult weight and child structure was very resilient to short-term fluctuations in financial resources. Their finding is akin to that of Berhman and Deolalikar (1987) who argue that the income elasticities of nutrients are smaller than the corresponding food elasticities and hence households are more willing to compromise on tastes than nutritional value over short enough periods of time.

Still, do people always find it possible to smooth consumption and nutrition during periods of dramatic declines in income, hyperinflation and changes in relative prices of food items? The literature on consumption smoothing has explored various ways of smoothing out the effects of various shocks, from spending down accumulated wealth to re-allocating resources, transfers and sharing risk within a community (Cox and Jimenez, 1990; Rosenzweig and Wolpin, 1993; Lim and Townsend, 1994). However, the usual finding is that in the context of missing markets and significant financial constraint, complete smoothing of the consumption stream is almost never possible (Paxton, 1992; Deaton, 1997; Townsend, 1995).

Using three unique cross-sections of household data on Bulgaria from the time when little structural reform had taken place (1995), through one of the most dramatic macro-financial crises in the history of the former Soviet Block economies (1997), till the time when major structural reform concluded (2001), we explore the impact of major shifts in macro-economic conditions and the associated dramatic changes in aggregate incomes, aggregate price levels and relative prices of key consumption goods on the diet of different groups in the Bulgarian population. We explore not only the changes in food demand and nutrition across dramatically changing conditions, but also the relative role of not only the changing real incomes, but also of relative prices and the changing responsiveness (or elasticity) of different groups of people to these changing incomes and prices. Our results highlight large and dramatically changing food and nutrient elasticities, which challenge the perception of household ability to smooth their nutrient stream during economic crises and transitions. These changes are generally consistent with the logic of the nutrition transition and are reversed during the macro-financial crisis.

The remainder of this paper is organized as follows: In section two we outline the general economic background of this study on Bulgaria and positions our study within the related literature on nutrition in Eastern Europe. In section three we describe the data and look at some changes in food consumption and nutrition in Bulgaria over time. In section four we discuss our results on the income and price elasticities of key food groups, while in section five we discuss the corresponding results on nutrient price and income elasticities. Section six contains our final conclusions.

2. Economic background and nutrition

While the Central and East European (CEE) region has never been considered a classical case for the discussion of the nutrition transition, food balance sheet data indicates that as early as 1961-1988, average calories, proteins and fats rose substantially and generally exceeded the World Health Organization (WHO) requirements (Cornea, 1994). Interestingly, when the real average incomes declined between 18% and 39% in the early 1990s, the response of different parts of the region to the shock varied significantly (Stillman, 2006). In certain countries, such as Poland, the poor and very poor experienced a second nutrition transition and a deformed diet structure favouring animal fats and starches and shying away from milk, animal proteins, vegetable oils and micronutrients (Cornea, 1994). In other countries, e.g. Russia, lower income families were able to adopt more effective behavioural strategies in favour of lower fat diets than high income families (Dore, Adair and Popkin, 2003).

Almost nowhere was the shock of structural reform and crisis as severe as in Bulgaria. The dissolution of the CMEA, the war in former Yugoslavia, and policy stalemates all led to a greater drop in output and higher inflation than in the majority of the CEE countries, which culminated in the crisis of 1996-1997. While the crisis in Russia led to a 40% increase in inflation, from 20% to 60%, between 1996 and 1997, inflation in Bulgaria increased by 827% from the already high base of 122.9%. Lifetime savings were lost. The incidence of poverty increased by 77% (Sahn, Younger and Mayerhoefer, 2002), while the drop in food consumption exceeded that of the majority of the CEE countries (Elsner and Hartmann, 1998). The aggregate drop in consumption since the early 1990s was highest for meat and commercially produced bread, possibly on account of both income decline and agricultural sector problems which made the production of grains and livestock especially problematic (Ivanova et al, 2006).

The Bulgarian government reacted to the crisis of 1996-97 with sweeping reforms that targeted both macroeconomic stability and structural changes. Among the immediate consequences of the reform was the steady rise in productivity and incomes and a significant foreign direct investment (FDI) inflow. During 1997-99 the FDI inflow exceeded by 80% the entire inflow of FDI attracted during the 1991-96 period (World Bank, 2001). Importantly for our study, Bulgaria was one of the CEE countries where the food industry became one of the most prominent FDI targets (Elsner and Hartmann, 1998). Taken together, all post-crisis developments set a basis for both significant diversification of the food basket and increasing ability of a large proportion of the

population to select a basket of its choice.

To the best of our knowledge, only Ivanova et al (2006) have thus far attempted to explore the determinants of food consumption and nutrition during Bulgaria's transition. Using aggregate pooled data on food consumption for 1985-2002, this study established that aggregate income (i.e. GNP) had no significant impact on nutrition, measured by total calories consumed. The study's conclusion was that changing prices (captured by the consumer price index) may have been the primary determinant of nutrition. The use of aggregate data over the whole transition period paints a fairly unsatisfactory picture of Bulgaria's nutrition transition due to its inability to account for important factors such as substitutability of goods of different nutritional qualities, crucial household and occupational characteristics and the structural break of the crisis period of 1996-97. One of the purposes of our study is to fill these gaps in the literature.

3. The story of consumption and nutrition in Bulgaria

The main data sources for our analysis are the Living Standards Measurement Surveys (LSMS) for 1995, 1997 and 2001, provided by the World Bank[1]. The surveys provide detailed information on monthly food consumption and expenditures, total expenditures and incomes, demographic and other characteristics of interest from approximately 2500 randomly selected households in each of the three cross-sections[2]. We supplement these data with data on the nutrient composition of all food groups consumed, collected by the National Centre of Public Health Protection in Bulgaria[3].

A preliminary analysis of the data shows that average monthly real incomes declined dramatically from 120.8 levs to 86.68 levs between 1995 and 1997 and then went back to approximately their original levels by 2001. There is evidence that the dramatic changes in incomes may have influenced food expenditures significantly (Ivanova et al, 2006), and we would like to explore this possibility as a first step in our descriptive analysis. Table 1 highlights the percentage changes in the food baskets of households belonging to different segments of the 1995 income distribution between 1995 and 1997 and between 1997 and 2001.

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[1] While a survey for 2003 is now also available, it differs significantly from the other three surveys and thus makes comparisons across four cross-sections difficult. At the same time, the Bulgarian economy stabilized significantly after 2000 and we do not expect major changes to have taken place between 2001 and 2003 in the phenomena and indicators we are interested in.

[2] Specifically, the surveys include information on 2468 households in 1995, 2323 households in 1997 and 2633 households in 2001.

[3] We thank Ludmila Ivanova and Plamen Dimitrov for making these data available to us.

Table 1: Changes in the budget share of key food groups, 1995-1997-2001

Variable	1995	1997	2001
10th percentile			
Bread	0.15 (0.10)	0.26 (0.13)	0.22 (0.12)
Starches	0.15 (0.08)	0.14 (0.10)	0.16 (0.08)
Meat	0.21 (0.11)	0.19 (0.12)	0.18 (0.11)
Fruit-vegetables	0.18 (0.10)	0.14 (0.10)	0.14 (0.10)
Oil-fat	0.05 (0.03)	0.04 (0.03)	0.06 (0.04)
Dairies	0.22 (0.11)	0.18 (0.12)	0.19 (0.11)
Sweets	0.04 (0.03)	0.05 (0.06)	0.04 (0.04)
25-50th percentile			
Bread	0.10 (0.07)	0.16 (0.08)	0.16 (0.09)
Starches	0.12 (0.06)	0.11 (0.06)	0.13 (0.06)
Meat	0.24 (0.11)	0.28 (0.13)	0.23 (0.11)
Fruit-vegetables	0.22 (0.12)	0.20 (0.13)	0.18 (0.10)
Oil-fat	0.05 (0.05)	0.04 (0.03)	0.05 (0.03)
Dairies	0.20 (0.12)	0.16 (0.09)	0.19 (0.10)
Sweets	0.06 (0.04)	0.06 (0.05)	0.06 (0.04)
90th percentile			
Bread	0.06 (0.08)	0.08 (0.05)	0.11 (0.10)
Starches	0.08 (0.04)	0.08 (0.05)	0.11 (0.09)
Meat	0.32 (0.12)	0.41 (0.15)	0.28 (0.15)
Fruit-vegetables	0.26 (0.11)	0.21 (0.11)	0.19 (0.10)
Oil-fat	0.04 (0.05)	0.04 (0.02)	0.04 (0.03)
Dairies	0.17 (0.10)	0.15 (0.05)	0.18 (0.10)
Sweets	0.08 (0.05)	0.05 (0.04)	0.08 (0.07)

Source: Own calculations based on the LSMS data set. Notes: shares (standard errors). See the text for a description of percentiles determination. Briefly, for 1995 we use actual percentiles, for 1997 and 2001 the division between the reported "percentiles" refers to the 1995 boundaries for these percentiles, appropriately adjusted for inflation.

To keep our terms of reference broadly the same over time, we follow a procedure similar to that used by the LSMS team in constructing comparable poverty lines over time. Specifically, we allocate households in different income percentiles in 1995. We then adjust the reference income of households for inflation and define the percentile distribution of households in 1997 and 2001 accordingly. For instance, let the 10th percentile in 1995 include households whose incomes lie between 0 and X levs. In defining the 10th percentile in 1997, we adjust X for inflation and include in the 10th percentile of the 1997 distribution households whose incomes lie between 0 and X/CPI

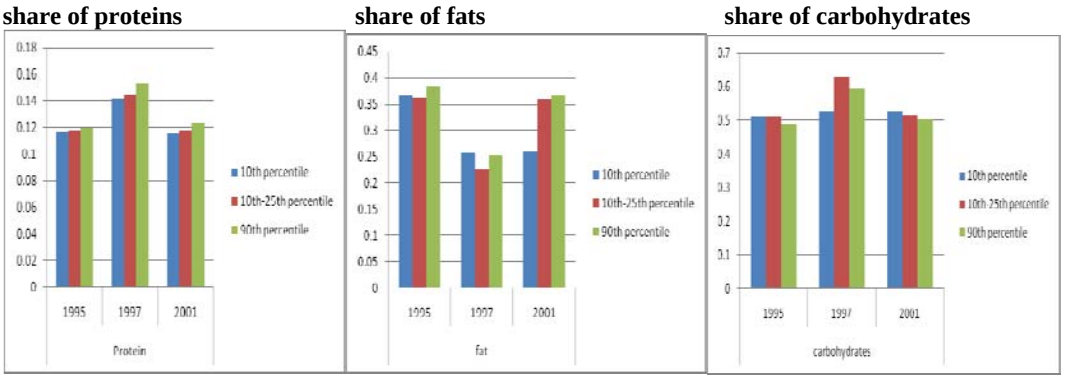
levs. Hence, while for 1995 we are dealing with the actual percentiles as stated, for 1997 and 2001 the division between the reported "percentiles" in fact refers to the 1995 boundaries for these percentiles, appropriately adjusted for inflation. In this way we are looking at "absolute" as opposed to "relative" welfare measures and their real changes over time.

Perhaps the most striking observation in this table is the significantly larger proportion of bread and starches in the food basket of the poorer percentiles and the significantly larger proportion of meat in the food basket of the richest percentiles throughout the period. During the crisis, the proportion of bread in the food basket of all groups of consumers went up, while the proportion of meat decreased slightly for the poorest percentiles and went up significantly for the richest percentiles. After the crisis, the consumption patterns shifted back towards the original positions, but never returned to the pre-crisis levels.

The fact that the food basket changed significantly during a period of dramatic reduction in the purchasing power of households is not surprising and is well documented in the literature. Numerous authors (e.g. Cornea, 1994; Zahoori et al, 2001; Popkin et al, 1996) find significant changes in the food baskets of households in the process of structural reform and crises. The interesting characteristic of the Bulgarian experience is that in contrast to the reported absence of association between household resources and calorie and/or other nutrient intakes in these studies, changing real resources did appear to affect significantly the nutrient intake of Bulgarian households during the crisis. On the one hand, the average caloric intake decreased significantly during the crisis for all income percentiles and started recovering afterwards, though never returning to the pre-crisis levels (Ivanova et al, 2006). Furthermore, the nutrient composition of the diet shifted with a lower intake of fats and a higher intake of proteins and carbohydrates, reversing the nutritional transition (Figure 1). The pattern was characteristic of all income groups.

Given the complexity of the economic situation during the focus period, it is difficult to attribute changes in consumption and nutrition to one particular factor. Thus, the changes could have been driven by either the reduction of purchasing power alone, or changing relative prices of key food items or change in the responsiveness of households to these incomes and prices. From a policy making perspective, it is instructive to disentangle the implications of all of these influences.

Figure 1: Changes in nutrient consumption



Source: Own calculations based on the LSMS and data on the nutrient composition of all food groups consumed, collected by the National Centre of Public Health Protection in Bulgaria. Notes: The figure highlights the ratio of calories consumed of each nutrient to the total monthly calories averaged across percentiles defined on the basis of per adult equivalent expenditures. See text and Table 1 for a description of percentiles determination.

Unfortunately, we do not have access to reliable prices at either at the household or regional level. Hence, we are forced to extract price related information from the available information on unit values – total expenditures, divided by total quantities of food items - a problem that we will discuss and try to resolve rigorously in our empirical analysis. However, as a first attempt at making price related sense of the information available, it is useful to look at the changes in unit values of key food groups.

The information on unit values reported in Table 2 is consistent with the observed consumption patterns and provides some tentative explanation of these patterns that goes beyond that of shifting real incomes over time. In particular, we see that in each of the years, the unit values of meat significantly exceed the unit values of staple foods, which is consistent with the apparent greater ability of the richer strata of the population to afford meat compared to those belonging to the poorer percentiles[4]. In addition, the significant increase in the unit value of bread between 1995 and 1997 and the corresponding rise of the share of bread in the food basket of all income percentiles possibly indicates low elasticity of bread – Bulgaria's main staple food - to price changes. Given that meat and staple foods (bread and starches) are the main items in Bulgaria's food basket and that some of the most noticeable results in both our descriptive and subsequent empirical analysis are related to these food items, we will

[4] Note that this information is consistent with information on aggregate yearly prices of food items, provided by the National Statistical Institute of Bulgaria.

focus on them in the description of our empirical results.

Table 2: Unit values of key food groups, 1995-1997-2001

Variable	1995	1997	2001
10th percentile			
Bread	0.62 (2.57)	0.86 (0.44)	0.63 (0.15)
Starches	1.33 (0.41)	1.13 (3.13)	0.89 (0.29)
Meat	5.03 (1.08)	5.30 (2.81)	3.69 (0.97)
Fruit-vegetables	1.17 (0.46)	1.02 (0.61)	1.08 (0.61)
Oil-fat	1.98 (0.41)	1.38 (1.01)	1.60 (0.31)
Dairies	1.60 (1.45)	1.73 (1.69)	1.52 (0.74)
Sweets	1.34 (0.56)	1.29 (0.80)	1.14 (0.94)
25-50th percentile			
Bread	0.62 (2.57)	0.89 (0.59)	0.67 (0.60)
Starches	1.29 (0.36)	0.99 (0.47)	0.92 (0.28)
Meat	5.66 (1.25)	6.11 (2.37)	4.23 (1.18)
Fruit-vegetables	1.28 (0.48)	1.21 (0.68)	1.03 (0.46)
Oil-fat	2.31 (1.19)	1.71 (0.93)	1.71 (0.52)
Dairies	1.78 (2.64)	1.63 (0.94)	1.86 (3.07)
Sweets	1.30 (0.71)	1.40 (0.95)	1.14 (0.62)
90th percentile			
Bread	0.71 (2.44)	0.87 (0.15)	0.75 (0.83)
Starches	1.40 (0.38)	0.95 (0.27)	0.99 (0.49)
Meat	6.42 (1.38)	6.78 (1.51)	4.68 (1.72)
Fruit-vegetables	1.53 (0.45)	1.19 (0.59)	1.17 (0.60)
Oil-fat	2.56 (0.89)	2.24 (1.16)	1.82 (0.62)
Dairies	2.10 (2.62)	1.98 (1.13)	2.33 (3.42)
Sweets	1.44 (0.70)	1.10 (0.67)	1.26 (0.82)

Source: Own calculations based on the LSMS data set. Notes: The values are expressed in real 2001 terms. The numbers in brackets are standard deviations. See text and Table 1 for a description of percentiles determination.

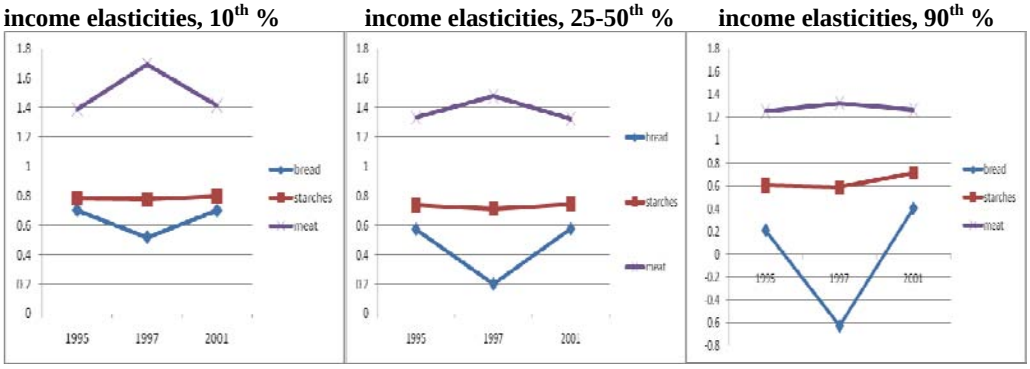
4. Income and price elasticities of food groups

The consumption of specific food items is shaped by both what is happening to relative prices and incomes. The more price and income elastic a food item, the greater the impact of price and income changes on quantities consumed. As we discussed above, in our context the economic crisis sharply lowered incomes between 1995 and 1997 at a time of rapidly changing relative prices, with some return to the pre-crisis

levels by 2001. To grasp the impact of the crisis on diet we need to examine the changing price and income elasticities over the course of Bulgaria's economic transition.

The main shortcoming of our surveys is the absence of information on prices and hence the need to infer responses of households to price changes on the basis of information on unit values. For instance, we are likely to observe higher unit values for households whose basket consists of higher quality items. Unlike the market price, over which an individual household does not have any control, the unit value represents a choice variable, which is under the control of households. If we are to therefore infer price elasticities on the basis of unit value data, our results are likely to be tarnished by a simultaneity bias: households choose both the quantity and the quality of a good and better off households would tend to buy higher quality goods, whose unit value is positively related to total financial outlays.

Figure 2: Income elasticities



Source: Own calculations based on the LSMS data set. Notes: The figure highlights the income elasticities of bread, starches and meat for each percentile of total expenditure and year. See text and Table 1 for a description of percentiles determination.

To correct for the potential simultaneity bias, we use the Crawford et al (2003) methodology of inferring price effects from unit value information. The method is outlined in Appendix A along with our step-by-step estimations and the full set of price and income elasticity results. As indicated earlier in this section, we report in our main text the income and price elasticities of bread, starches and meat, calculated at the real expenditure levels of the 10th, 25-50th and 90th percentiles of the population in each of the available years, where, as indicated earlier, percentiles are fixed at 1995 real terms.

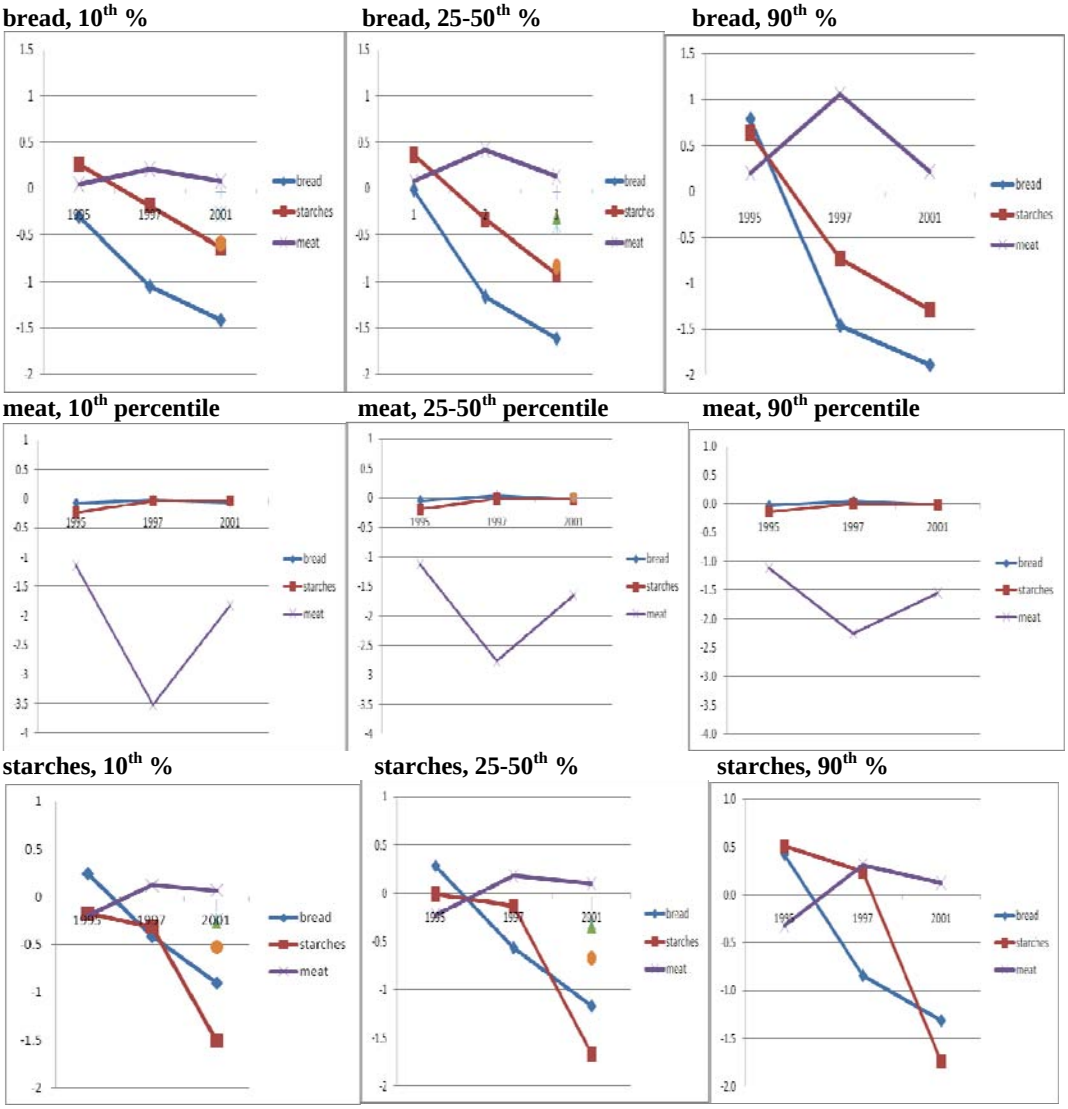
The unbiased income elasticities for each of the key food groups in the sample are presented in Figure 2, for each of the years and income percentiles of interest. We

see that during all years and across all income percentiles, meat was a luxury good, while bread and starches were normal goods. However, during the crisis, the positive elasticity of meat increased significantly in the case of the 10^{th} percentile, increased only slightly in the case of the middle percentile and remained almost unchanged for the 90^{th} percentile. At the same time, the income elasticity of bread decreased across all income percentiles and decreased most dramatically for the 90^{th} percentile, for which bread became an inferior good in 1997.

These results are consistent with our observations on changes in the broad consumption patterns across the income percentiles. Meat is a luxury good; this accounts for our observation from Table 1 that lower income households during the economic crisis reduce their share of household expenses spent on meat. Likewise, the share of bread in the household expenditures for all income levels falls, as we expect, given that bread shows up in our estimates as a normal-to-inferior good. However, the increase by households in the higher income percentiles of their consumption of meat – a luxury good – in the face of falling incomes must be influenced to a larger extent by either changing relative prices or different responsiveness to prices. This is not obvious when looking at the unit values in Table 2, but becomes much clearer using our estimates.

The own price and cross-price elasticities of the key food groups over time and across income percentiles are summarized in Figure 3. We observe that the own price elasticities of each of the food groups increased dramatically over time. We also observe that the substitutability (i.e. the positive cross-price elasticity) between staple foods and meat increased significantly during the crisis. The consumer behaviour of those belonging to the higher income percentiles was characterised by greater own-price elasticity of staple foods and lower own-price elasticity of meat. The lower price elasticity of meat in the basket of the better off households provides a trustworthy explanation of their ability to sustain and even increase the consumption of meat during the crisis, when the consumption of meat by the poor went down.

Figure 3: Selected price elasticities



Source: Own calculations based on the LSMS data set. Notes: The figure highlights the price elasticities of bread, meat and starches for each year and percentile defined on the basis of per adult equivalent expenditures See text and Table 1 for a description of percentiles determination.

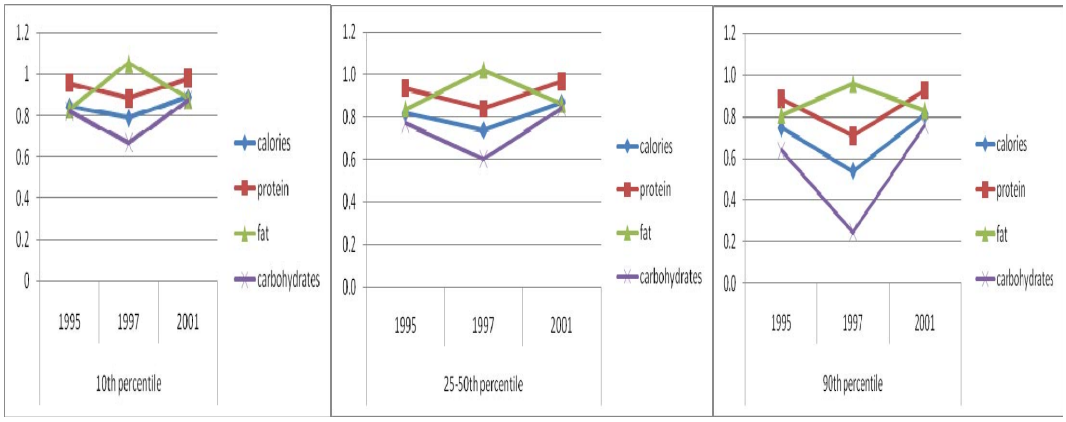
5. Selected income and price elasticities of nutrients

The preceding analysis indicated that the food composition of the Bulgarian diet changed significantly during the crisis. The changes differed across income percentiles and were driven by a complex interplay of changing real incomes and relative prices, as well as changing responses to these incomes and prices. Despite the differences in the changing food composition across income percentiles, different groups of households experienced similar changes in nutrient intakes, which were marked by an increase in the consumption of protein and carbohydrates and a decrease in the consumption of fats

across income groups. Since these changes may be indicative of changing responsiveness of nutrients to prices and incomes, we address this possibility in the next and last step of our analysis. The price and income elasticities of nutrients are calculated with the use of the Huang (1996) methodology, which uses the nutrient components of different food groups to convert the estimated price and income elasticities into respective nutrient elasticities. The methodology and the corresponding full set of nutrient elasticities are reported in Appendix B.

The income elasticities of all macronutrients, highlighted in Figure 4, are large and significant. These elasticities changed significantly during the crisis, when the elasticity of fat increased and the elasticity of other macronutrients decreased substantially. The elasticity of protein, carbohydrates and calories decreased the most in the case of the richest percentiles, undoubtedly due to the better ability of households belonging to this group to afford preserving their nutrient status. These income elasticities provide a convincing explanation of the pattern of nutrient changes that we observe in Figure 1.

Figure 4: Income elasticity of nutrients

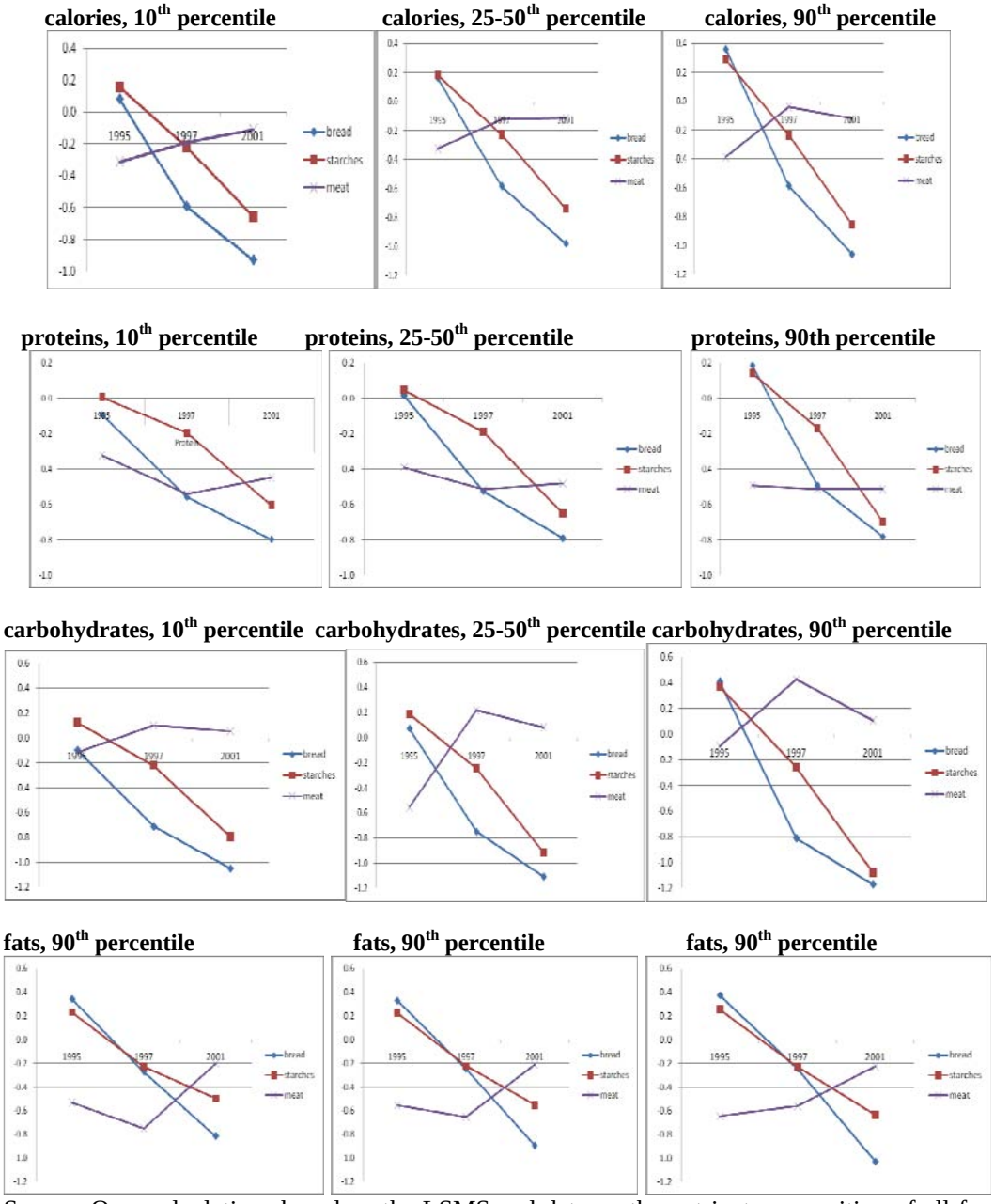


Source: Own calculations based on the LSMS and data on the nutrient composition of all food groups consumed, collected by the National Centre of Public Health Protection in Bulgaria. Notes: The figure highlights the income elasticities of calories, protein, fat and carbohydrates for each year and percentile defined on the basis of per adult equivalent expenditures. See text and Table 1 for a description of percentiles determination.

The pattern of price elasticities of nutrients, highlighted in Figure 5, is also consistent with the rest of our descriptive statistics and empirical results. We see that, over time, the staple food price elasticity of all macronutrients increased significantly, while the meat price elasticity of calories and fats went down between 1995 and 2001. This long-term pattern is consistent with the logic of nutritional transition, characterised by a permanent shift out of staple foods and carbohydrates into meat and the related

proteins and fats. However, the change of direction of the meat price elasticity of carbohydrates during the crisis highlights the tendency to of households to shift out of fats/proteins into carbohydrates in the face of dramatically increasing meat prices (and vice versa) in periods of economic shocks.

Figure 5: Selected price elasticities of nutrients



Source: Own calculations based on the LSMS and data on the nutrient composition of all food groups consumed, collected by the National Centre of Public Health Protection in Bulgaria. Notes: The figure highlights the elasticities of calories, carbohydrates, fat and proteins with respect to the prices of bread, meat and starches for each year and percentiles defined on the basis of per adult equivalent expenditures. See text and Table 1 for a description of percentiles determination.

6. Conclusion

One of the most challenging research areas of economic and nutrition science research is the ability of individuals and households to smooth their consumption stream during natural disasters and economic shocks. While a few nutrition science studies in the literature witness major changes in nutritional behaviour during crises, changes that have potentially important epidemiological consequences (Ivanova et al, 2006), supporters of the permanent income hypothesis postulate an ability of individuals and households to smooth their nutrient stream even during crises (Duncan and Stillman, 2008). Moreover, the economics literature tends to report lower nutrient elasticities than the corresponding food elasticities, highlighting greater willingness of households to compromise on tastes than nutritional value over short enough periods of time (Berhman and Deolalikar, 1987).

Using data collected with fortuitous timing – before, during and after a major macro-financial crisis in Bulgaria – we revisited several hypotheses in the economics and nutritional literature related to the tendency of households to smooth their nutritional status over time. We explored the dietary impact of not only falling real incomes in the context of hyperinflation and crisis, but also of changing relative prices and the changing responsiveness of different groups of people to these incomes and prices over six years of fundamental structural reforms of the economy. Our results highlight large and dramatically changing food and nutrient elasticities, which challenge the perception of household ability to smooth their nutrient stream during economic crises and transitions. The trend of these changes is generally consistent with the logic nutritional transition and is reversed during the macro-financial crisis.

Our analysis has several potential limitations related to the data used. While a rigorous econometric methodology helps us overcome the problem of absence of reliable price data, this methodology restricts our ability to focus on detailed food items, as opposed to broad food groups. In particular, due to the need of dividing food expenditures by the corresponding food quantities to obtain unit value observations; we obtain missing values each time a household does not consume a particular food item. To avoid this problem, we group items into seven broad food groups, though this prevents us from getting potentially interesting information on the possible reshuffling of household consumption across narrow food categories. Furthermore, the availability

of consumption data only on a monthly basis prevents us from getting a potentially more valuable story that daily food diaries could highlight.

Despite these shortcomings, which plague the large part of the economics literature on nutrition, our paper is a significant contribution to the both the academic literature and related policy debate for several important reasons. First, we challenge a common perception among economists that households are able to smooth their consumption and nutrient status over extended periods of time and during crises. In particular, we argue that it is important to obtain information on household demand responses to not only changing real incomes, but also changing aggregate and relative prices, in order to fully understand household consumer behaviour. Second, our results on dramatic changes in price and income elasticities of both food groups and nutrients, highlight the limitations of assuming stable elasticities and basing policy advice on simulations that use household behaviour during a specific past period of time as a point of departure.

References

Behrman, J. and Deolalikar, A. (1987). "Will developing country nutrition improve with income? A case study for rural south India" *Journal of Political Economy*, 95(3), 492-507.

Behrman, J. and Deolalikar, A. (1990). "Health and nutrition" In Chenery, H. and Srinivasan, T. Eds. *Handbook of Development Economics*.

Cornia, G. (1994). "Poverty, food consumption, and nutrition during the transition to market economy in Eastern Europe" *The American Economic Review*, 84(2), Papers and Proceedings of the Hundred and Sixth Annual Meeting of the American Economic Association, 297-302.

Cox, D and Jimenez, E. (1990). Achieving social objectives through private transfers: a review, *World Bank Research Observer*, 5(2), 205-218.

Crawford, I., Laisney, F., Preston, I. (2003). Estimation of household demand systems with theoretically compatible Engel curves and unit value specifications, *Journal of Econometrics*, 114, 221-241.

Deaton, A. (1987). Estimation of own and cross-price elasticities from household survey data. *Journal of Econometrics* 36, 3-7.

Deaton, A. (1988). Quality, quantity and spatial variation of price: estimating price elasticities from cross-sectional data. *American Economic Review*, 78(3),418-430.

Deaton, A. (1990). Prices elasticities from survey data: extension and Indonesian results. *Journal of Econometrics* 44, 281-309.

Deaton, A. (1997). *The Analysis of Household Surveys. A Microeconometric Approach to Development Policy*. The International Bank for Reconstruction and Development.

Deaton, A. Mullbauer, J. (1980). Economics and consumer behavior. Cambridge University Press.

Dore, A., Adair, L. and Popkin, B. (2003). "Low income Russian families adopt effective behavioral strategies to maintain dietary stability in times of economic crisis" *The Journal of Nutrition*, 133, 3469-3475.

Huang, K. (1996). Nutrient elasticities in a complete demand system, *American Journal of Agricultural Economics*, 78(1), 21-29.

Ivanova, L. et al. (2006). "Dietary changes during the transition from communism to capitalism in Bulgaria" *Economics and Human Biology*, 4(1), 383-397.

Kodde, D., Palm F., and Pfann, G. (1990). Asymptotic least-squares estimation efficiency considerations and applications, *Journal of Applied Econometrics*, 5, 229-243.

Lewbel, A. (1993). Stochastic Hicksian Aggregation with an Application to grouping goods without separable utility, *Annales d'Economie et de Statistique*, 29, 17-42.

Lewbel, A. (1996). Aggregation without separability: a generalized composite commodity theorem. *American Economic Review* 86, 524-543.

Lim, Y and Townsend, R (1994). Currency, transaction patterns and consumption smoothing: theory and measurement in ICRISAT villages. *Mimeo, Department of Economics, University of Chicago*.

Paxson, C. (1992). Using weather variability to estimate the response of savings to transitory income in Thailand, *American Economic Review*, 82, 15-33.

Popkin, B. (1993). "Nutritional patterns and transitions", *Population and Development Review*, 19(1), 138-197.

Popkin, B., Zahoori, N and Baturin, A. (1996). The nutritional status of the elderly in Russia 1992 through 1994, *American Journal of Public Health*, 86(3), 355-60.

Rosenzweig, M. and Wolpin, K (1985). Consumption smoothing and the accumulation

of durable production assets in low-income countries: investment in bullocks in India. *Journal of Political Economy* 101, 223-244.

Sahn, D. Younger, S. and Meyerhoefer, C. (2002). "Rural poverty in Bulgaria: characteristics and trends" Mimeo, College of Human Ecology, Cornell University Ithaca.

Stillman, S. (2006). Health and nutrition in East Europe and the former Soviet Union during a decade of transition. A review of the literature. *Economics and Human Biology*, 4(1). 104-146.

Stillman, S. and Thomas, D. (2008). Nutritional status during an economic crisis: evidence from Russia, *Economic Journal*, 118(531), 1385-1417.

Townsend, R. (1995). Consumption insurance: an evaluation of risk-bearing systems in low-income economies, *Journal of Economic Perspectives*, 9, 83-102.

Zahoori, N., Gleiter, K. and Popkin, K. (2001). Monitoring health conditions in the Russian longitudinal monitoring survey 1992-2000. *Report submitted to the US agency for international development. Carolina Population Center, University of North Carolina at Chapel Hill.*

Appendix A: Econometric methodology

A.1. Brief description of Crawford et al's (2003) methodology

The main advantage of the Crawford et al (2003) model that we use to infer price elasticities from unit value information is that unlike in previous studies it allows us to exploit the explicit links between quantity and unit value in a way that is consistent with the latest advances in demand theory, namely the Almost Ideal Demand System (AIDS) approach. For example, previous attempts to explore the simultaneous choice of quantity and unit value (Deaton, 1987, 1988, 1990, 1997) relied on approximations that were only compatible with the theoretically unappealing loglinear demand specification.

In keeping with the rest of the literature, foods are organized in m groups (bread, starches, meat, etc.). Under the assumptions of separability of preferences and homogeneity, we can define the following relationship:

$$V_G = \pi_G h_G\left(V_G Q_G / \pi_G\right) \qquad [1]$$

where V_G is the unit value for each group, Q_G is the corresponding quantity index and homogeneous price index π_G (e.g. a Paasche price index), constructed based on the assumption of having a constant structure of relative prices within group G. Taking a double logarithm of [1] and given a functional form ϕ_G for the budget shares w_G, we therefore have to estimate a consistent system:

$$\ln V_G = \ln \pi_G + \ln h_G\left[\frac{X}{\pi_G}\phi_G\left(X, \pi\right)\right] \qquad [2]$$

$$w_G = \phi_G\left(X, \pi\right) \qquad [3]$$

where X is total expenditures, and π is a vector of group price levels (the omission of G indicates that these parameters refer to all groups). To make the estimation computationally tractable, a special functional form for h_G is adopted such that

$$\ln V_G = a_G + b_G \ln Q_G + \ln \pi_G \qquad [4]$$

As for the functional form of the demand function ϕ_G, the model uses the approximate Almost Ideal Demand (AID) model with a loglinear approximation of the log index price (LA/AID). While the full AID specification or its quadratic extension

would be preferable, the non-linear form would not be tractable by the within-cluster estimation adopted in this method. We attempt to extract at least some of the information that non-linear income specification would give by estimating price and income elasticities for households belonging to different percentiles of total expenditures.

Assuming fixed prices for households located within a cluster c, the demand function for group G by household h is:

$$w_G^h = \alpha_{0G} + \mathbf{Z}^h \boldsymbol{\alpha}_G + \sum_H \gamma_{GH} \ln \pi_H^c + \beta_G \ln \breve{x}^h + u_G^h \qquad [5]$$

where $\breve{x}^h$ is deflated expenditure, $\ln \breve{x}^h \equiv \ln X^h - \ln P^C \equiv \ln X^h - \sum_H \lambda_H \ln \pi_H^c$, P^c is a cluster price index with suitably chosen weights, π_H^c is the price of group H in cluster c.

Equation (5) can be re-written as:

$$w_G^h = \alpha_{0G} + \mathbf{Z}^h \boldsymbol{\alpha}_G + \sum_H \delta_{GH} \ln \pi_H^c + \beta_G \ln X^h + u_G^h \qquad [6]$$

where $\delta_{GH} = \gamma_{GH} - \beta_G \lambda_H$. Vector $\mathbf{Z}^h$ includes socio-demographic characteristics and other conditioning variables.

Following the same logic, the unit value equation becomes:

$$\ln V_G^h = a_{0G} + \mathbf{Z}^h \mathbf{a}_G + \ln \pi_G^c + b_G \ln Q_G^h + v_G^h \cdot \qquad [7]$$

The estimation proceeds under the assumption of independence between observations, which is restrictive, given that the households are grouped by cluster and hence by construction common factors affect the demand for commodities within the cluster. However, under Lewbel's (1993, 1996) assumption of stochastic independence between relative good prices that are allowed to vary across clusters and the cluster price index, this cluster effect can be shown to be innocuous (Crawford et al, 2003).

The estimation proceeds in three stages. In the first stage, we compute the within-cluster estimates, which allow the cancelling of the unobserved price effects and retrieving the estimated vectors $\hat{\boldsymbol{\alpha}}_G$ and $\hat{\mathbf{a}}_G$, and the estimated scalars $\hat{\beta}_G$ and $\hat{b}_G$.

$$\left(w_G^h - \overline{w}_G^c\right) = \left(\mathbf{Z}^h - \overline{\mathbf{Z}}^c\right)\boldsymbol{\alpha}_G + \beta_G\left(\ln X^h - \overline{\ln X}^c\right) + \left(u_G^h - \overline{u}_G^c\right) \qquad [8]$$

$$\left(\ln V_G^h - \overline{\ln V_G}^c\right) = \left(\mathbf{Z}^h - \overline{\mathbf{Z}}^c\right)\mathbf{a}_G + b_G\left(\ln Q_G^h - \overline{\ln Q_G}^c\right) + \left(v_G^h - \overline{v}_G^c\right) \qquad [9]$$

2SLS estimation can be used to correct for the potential endogeneity of the variables in $\mathbf{Z}^h$.

The second stage consists of estimating the price coefficients γ_{GH} using between-cluster information because the fixed nature of the within cluster price effects has already been used in the first stage. At this stage, we impose the standard homogeneity restriction in demand theory $\sum_H \gamma_{GH} = 0$ (which implies also an adding-up restriction). Vector $\boldsymbol{\lambda}$ is subject to positive linear homogeneity of the price index restrictions $\lambda_G > 0$ and $\sum_H \lambda_H = 1$. Since this is not sufficient to identify the parameters of interest, $\boldsymbol{\lambda}$ arbitrarily set equal to $\overline{\mathbf{w}}$, the vector of average budget shares. The estimation of $\hat{\gamma}_G$ (the price effects in the budget equation for group G) also assumes homoscedasticity of the variance of $\left(\mathbf{u}^{h'}, \mathbf{v}^{h'}\right)$ and takes into account the measurement errors in the unit values. The resulting relationship is:

$$\hat{\gamma}_G = \left[\sum_{c=1}^{C} n_c \zeta^c \zeta^{c'} - \hat{\boldsymbol{\Omega}}_v\right]^{-1} \left[\sum_{c=1}^{C} n_c \left(\eta_G^c \, \zeta^c + \beta_G \, \zeta^c \zeta^{c'} \boldsymbol{\lambda}\right) - \hat{\boldsymbol{\Omega}}_{vu_G} - \hat{\boldsymbol{\Omega}}_{\mathbf{v}} \boldsymbol{\lambda}\right] \qquad [10]$$

where

n_c is the size of each cluster c

$$\eta_G^c \equiv \overline{w}_G^c - \overline{\mathbf{Z}}^c \hat{\boldsymbol{\alpha}}_G - \hat{\beta}_G \overline{\ln X}^c$$
$$= \alpha_{0G} + \sum \left(\gamma_{GH} - \beta_G \lambda_H^c\right) \ln \pi_H^c + \overline{u}_G^c$$

$\zeta^c = \left(\zeta_1^c, \ldots \zeta_m^1\right)'$, with

$$\zeta_G^c \equiv \overline{\ln V_G}^c - \overline{\mathbf{Z}}^c \hat{\mathbf{a}}_G - \hat{b}_G \overline{\ln Q_G}^c$$
$$= a_{0G} + \ln \pi_G^c + \overline{v}_G^c \qquad G = 1, \ldots m$$

$\hat{V}\begin{pmatrix} \overline{u}_G^c \\ \overline{\mathbf{v}}^c \end{pmatrix} = \frac{1}{n_c} \begin{bmatrix} \hat{\boldsymbol{\Omega}}_{u_G} & \hat{\boldsymbol{\Omega}}_{u_G \mathbf{v}} \\ \hat{\boldsymbol{\Omega}}_{\mathbf{v} u_G} & \hat{\boldsymbol{\Omega}}_{\mathbf{v}} \end{bmatrix}$ where each term of $\hat{\boldsymbol{\Omega}}$ is obtained from the first stage residuals.

The variance of price coefficients (without imposing symmetry) is obtained by the bootstrap procedure.

In the third stage, we impose the symmetry, $\gamma_{GH} = \gamma_{HG}$, by minimum distance estimation. By using the efficiency arguments of Kodde et al (1990, theorem 5), we

minimise only over γ rather than over γ and β.

Price elasticities are computed for household belonging to the 10th, 25-50th and 90th expenditure percentiles using the formula $e_{GH} = (\gamma_{GH} - \beta_G \tilde{w}_H)/\tilde{w}_G - 1_{[G=H]}$.; where $\tilde{w}_G$ and $\tilde{w}_H$ represent the budget shares of group G and group H respectively. Total expenditure elasticities are also computed using the formula $e_G = 1 + \beta_G / \tilde{w}_G$.

A2. Brief description of our Crawford et al (2003) estimates

The set of variables used in our analysis is described in table A1. Our specifications are almost identical (to the extent it is possible for us to compare the two data sets) to the specifications used by Crawford et al (2003). We also attempted using the types of instruments suggested by these authors in trying to to account for the potential endogeneity of total expenditures, conditioning expenditures and durable goods. However, since the Durbin-Wu-Hausman test rejected the endogeneity hypothesis for any set of conceivable instruments, we estimate the budget share and unit value regression by OLS.

In Tables A2-A4, we report the budget share estimates from the first stage of the methodology described in A.1. We see that during all years, total expenditures have a negative impact on the shares consumed of bread, starches, fats and oils and dairy products and a positive impact on the shares consumed of meat, fruit and vegetables and sweets. These results are consistent with our descriptive statistics on the greater proportions of the latter types of food items in the baskets of richer households. The rest of our results are consistent with any conventional assumptions. In so far as the unit value results (Tables A5-A7) are concerned, the most valid result in our case is the significant effect of the food quantity variable in the unit value regression. This significant effect confirms the validity of our choice of methodology. The rest of the appendix highlights our elasticity results, the most interesting of which we have discussed in the main body of the paper.

Table A1: definition of variables and description of goods

Variables	Definition
Mother tongue of head	Mother tongue of the head; 1 if Bulgarian, 0 otherwise
Age of head	Age of the head in years
Age of head^2/100	Age of the head square divided by 100
Male head	Sex of he head: 1 if Male , 0 otherwise
No school/elementary education of head	No studies, day-care, elementary or preschool of the head: 1 if yes; 0 otherwise
Secondary / middle general education of head	Middle school or general secondary education of the head: 1 if yes; 0 otherwise
Technical /vocational education of head	Technical or vocational secondary education, or other occupation-specific education after secondary of the head, include college (e.g. nurses, police): 1 if yes; 0 otherwise
University of head	University education of the head: 1 if yes; 0 otherwise
Married head	Marital situation of the head: 1 if married, 0 otherwise
Urban	Residence location; 1 if urban, 0 otherwise
Household size	Total number of household members
Owner-occupier	Owner occupies the house: 1 if yes, 0 otherwise
Space per person	Area of the dwelling in sqm/ divided by total number of persons occupying the dwelling
Car or motorcycle	Have a car or motorcycle: 1 if yes; 0 otherwise
Freezer	Have a freezer: 1 if yes; 0 otherwise
Automatic washing machine	Have an automatic washing machine : 1 if yes; 0 otherwise
Total number of leisure durables	Total number of leisure durables (colour TV, video recorder, parabolic antenna, stereo, radio, personal computer)
ln(total expenditures)	log total expenditures of food
ln(tobacco)	log expenditures of tobacco (cigarettes and tobacco)
ln(hygiene)	log expenditures of hygiene products and service and personal products (toilet soap, luxury toilette soap, shampoo, conditioner, shampoo and conditioner, hand cream, hydrating lotion, face cream, cleansing cream, deodorant, tooth paste, hair cut, hygienic services, purchased wash soaps, value of made soaps, washing powder, bleach, dishwashing soap, other washers, other cleaners, child care-baby sitting)
ln(energy)	log expenditures of energy (district heating, electricity, gas, coal, oil, wood, other energy sources)
ln(transport and communication)	log expenditures of transport and communication (gas and oil, car service, maintenance, taxi, tram and buses, trains-outside city, mail service, telephone)
ln(recreation)	log expenditures of recreation (cultural activities, books, newspapers, stationery, membership fees, pet food and expenses)
ln(housing)	log expenditures of housing (water and rent)
ln(cloths and shoes)	log expenditures of cloths and shoes (textile, cloths, and shoes)
ln(furniture)	log expenditures of furniture (kitchen equipment, home repairs, furniture, bedding, sheets, others)
ln(health)	log expenditures of health (dentist, doctor, hospital/sanatorium, medicines, medications, optical equipment, cosmetics, others)
No tobac	No expenditures of cigarettes and tobacco: 1 if no expenditures, 0 otherwise
No hygiene	No expenditures of hygiene and personal products: 1 if no expenditures, 0 otherwise
No energy	No expenditures of energy: 1 if no expenditures, 0 otherwise
No transport and communication	No expenditures of transport and communication: 1 if no expenditures, 0 otherwise
No recreation	No expenditures of recreation: 1 if no expenditures, 0 otherwise
No housing	No expenditures of housing: 1 if no expenditures, 0 otherwise
No cloths and shoes	No expenditures of cloths and shoes: 1 if no expenditures, 0 otherwise
No furniture	No expenditures of furniture: 1 if no expenditures, 0 otherwise
No health	No expenditures of health: 1 if no expenditures, 0 otherwise
Share bread	Share of expenditures of bread
Share starches	Share of expenditures of starches (maize flour, wheat flour, pasta, rice, beans, potatoes, carrots, lentils, sweet peas)
Share vegetables and fruits	Share of expenditures of vegetables and fruits (tomatoes, eggplants, onions, squash vegetables, leafy vegetables, peppers, cabbage, cucumbers, oranges, apples, pears, bananas, nuts, grapes, watermelon, melon, strawberries, cherries, canned fruits, and canned vegetables)
Share meat	Share of expenditures of meat (veal and beef, pork, lamb, chicken/birds, sausages/sala, bacon , canned meat, ground meat)
Share fats and oils	Share of expenditures of fats and oils (butter, margarine, lard, olive oil, vegetable oil,)
Share dairy	Share of expenditures of dairy (fresh milk, white cheese, yellow cheese, yogurt, powder milk, eggs)
Share sweets	Share of expenditures of sweets (sugar, jam, honey)
ln(Quantity)	log quantity (of each food)
Other foods	Fresh fish, frozen fish, canned fish, condiments and spices (salt, spices, coffee, tea, others), drinks (water, wine, beer, Bulgarian liquor, hard liquors, other drinks), prepared food (not at home)

Table A2: Engel curves in 1995

Variable	1995													
	Bread		**Starches**		**Veget -and-fruits**		**Meat**		**Fats and oils**		**Dairy**		**Sweets**	
	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err
Household characteristics														
Mother tongue of head	-0.8129	0.6888	-0.9421	0.6116	-1.1374	1.0914	**2.6703**	1.1565	-0.2530	0.3650	0.0141	1.1021	0.4609	0.4428
Age of head	**0.2202**	0.0729	0.0423	0.0647	**-0.3158**	0.1156	**0.3170**	0.1224	-0.0030	0.0386	-0.0995	0.1167	**-0.1613**	0.0469
Age of head square/100	**-0.2404**	0.0665	-0.0470	0.0590	**0.3044**	0.1054	**-0.3003**	0.1117	-0.0021	0.0352	0.1498	0.1064	**0.1356**	0.0428
Sex of head	**1.4475**	0.5457	**-0.9885**	0.4845	**-2.7422**	0.8646	**5.3859**	0.9162	**-0.7036**	0.2892	-1.2657	0.8731	**-1.1333**	0.3508
Married head	-0.5807	0.5157	**0.9146**	0.4578	0.5774	0.8171	**-3.6929**	0.8658	0.3277	0.2733	**1.9603**	0.8251	0.4935	0.3315
Secondary and middle general education of head	-0.6820	0.5209	0.1169	0.4625	-0.0071	0.8253	-0.6909	0.8745	0.4047	0.2760	0.7520	0.8334	0.1063	0.3349
Technical and vocational education of head	-0.9710	0.6195	-0.4070	0.5500	0.5968	0.9816	-0.5632	1.0401	0.6225	0.3283	-0.0489	0.9912	0.7708	0.3983
University of head	**-1.4626**	0.7121	-0.7128	0.6323	-0.7560	1.1284	0.1049	1.1956	0.3539	0.3774	1.5780	1.1395	0.8946	0.4578
Urban	-0.6504	1.0322	-0.2597	0.9165	2.7398	1.6356	-1.1720	1.7330	-0.6580	0.5470	-0.5745	1.6516	0.5748	0.6636
Household size	**1.4546**	0.1541	**0.6035**	0.1368	**-0.9463**	0.2441	**-1.2695**	0.2587	**0.2273**	0.0816	0.0031	0.2465	-0.0726	0.0991
Owner-occupier	0.8970	0.7076	-0.8807	0.6282	2.1663	1.1212	-1.8054	1.1880	-0.2417	0.3750	0.0568	1.1322	-0.1924	0.4549
Space per person	**-0.0134**	0.0064	-0.0104	0.0057	0.0085	0.0101	0.0190	0.0107	-0.0064	0.0034	0.0001	0.0102	0.0035	0.0041
Durable ownership														
Car or motorcycle	-0.6087	0.3945	-0.4380	0.3502	0.0039	0.6251	0.1826	0.6623	0.3546	0.2091	-0.3167	0.6312	**0.8223**	0.2536
Freezer	-0.3725	0.4584	**-0.9789**	0.4070	1.2948	0.7264	0.8456	0.7697	0.2479	0.2429	-0.5404	0.7335	-0.4965	0.2947
Automatic washing machine	-0.6643	0.3894	-0.4542	0.3457	-0.6134	0.6170	0.5675	0.6537	0.2595	0.2064	0.4148	0.6230	**0.4901**	0.2503
Total number of leisure durables	-0.1159	0.1587	0.0827	0.1409	0.0347	0.2515	0.0984	0.2665	**-0.2355**	0.0841	-0.1953	0.254	**0.3309**	0.1021
Conditioning expenditures														
ln(tobac)	0.0252	0.1744	0.0466	0.1549	-0.2037	0.2764	-0.1364	0.2929	-0.1747	0.9245	0.2790	0.2791	0.1640	0.1122
ln(hygiene)	**-0.8499**	0.2203	**-0.5857**	0.1956	0.6446	0.3491	0.3741	0.3699	-0.1880	0.1168	0.3154	0.3526	**0.2894**	0.1417
ln(energy)	**0.4310**	0.2032	0.1311	0.1804	-0.3310	0.3220	-0.0353	0.3412	-0.0040	0.1077	-0.0632	0.3252	-0.1286	0.1307
ln(transport and communication)	**0.3206**	0.1369	0.0147	0.1216	0.2834	0.2169	-0.4339	0.2299	**0.1627**	0.0726	-0.1074	0.2191	**-0.2401**	0.0880
ln(recreation)	0.0768	0.1632	-0.0680	0.1449	-0.4114	0.0026	-0.0089	0.2740	**0.2009**	0.0865	0.3407	0.2611	-0.1301	0.1049
ln(housing)	0.1286	0.2194	**0.5709**	0.1948	**-0.7834**	0.3476	0.3078	0.3683	-0.0105	0.1163	-0.0034	0.3510	**-0.2101**	0.1410
ln(cloths and shoes)	0.1023	0.1430	-0.0174	0.1270	0.1446	0.2266	0.0236	0.2401	-0.4922	0.0758	-0.2878	0.2288	0.0838	0.0919
ln(furniture)	-0.1401	0.1675	0.1697	0.1488	-0.2254	0.2655	0.0826	0.2813	0.0695	0.0888	-0.0298	0.2681	0.0735	0.1077
ln(health)	-0.0312	0.1133	0.1256	0.1006	**0.5709**	0.1796	**-0.6969**	0.1903	0.0728	0.0601	-0.0123	0.1813	-0.0289	0.0729
No tobac	-0.2124	0.3367	-0.4090	0.2990	0.0598	0.5336	-0.4524	0.5654	-0.1560	0.1785	**1.2513**	0.5388	-0.0811	0.2165
No hygiene	-2.4900	1.4152	0.5766	1.2565	0.9599	2.2423	1.3192	2.3760	-0.0220	0.750	-0.6354	2.2644	0.2917	0.9098
No energy	1.6181	1.8039	-0.0044	1.6016	0.1498	2.8583	-1.0922	3.0286	0.8328	0.9560	-1.4365	2.8864	-0.0676	1.1598
No transport and communication	0.3463	0.4601	**-1.1879**	0.4085	-0.2964	0.7290	**2.1901**	0.7725	-0.3229	0.2438	-0.5016	0.7362	-0.2276	0.2958
No recreation	0.3941	0.4230	**0.7644**	0.3755	-0.2973	0.6702	0.5219	0.7101	**-0.5081**	0.2241	-0.8224	0.6768	-0.0527	0.2719
No housing	-1.6761	1.0942	-0.5245	0.9715	0.6924	1.7338	0.1450	1.8371	-0.1709	0.5799	2.2590	1.7508	-0.7248	0.7035
No cloths and shoes	0.2473	0.4227	-0.6506	0.3753	0.1754	0.6698	1.2717	0.7097	**0.5598**	0.2240	-1.0504	0.6764	**-0.5532**	0.2718
No furniture	0.0341	0.4203	-0.5491	0.3731	**1.5575**	0.6659	0.2687	0.7056	-0.2235	0.2227	0.1038	0.6724	**-1.1914**	0.2702
No health	-0.1248	0.3988	-0.4427	0.3541	**-2.0987**	0.6319	**3.1748**	0.6696	-0.3627	0.2114	-0.0478	0.6382	-0.0982	0.2564
ln(total expenditures)	**-4.3734**	0.4777	**-3.2203**	0.4241	**3.3302**	0.7569	**8.0066**	0.8020	**-1.635**	0.2531	**-2.4024**	0.7643	0.2944	0.3071
R-square	14.03		12.42		5.34		15.24		6.09		5.69		13.02	

Notes:
All coefficients , standard errors and R-square are multiplied by 100. Bold entries correspond to 5% or 1% significance level.

Table A3: Engel curves in 1997

Variable	1997													
	Bread		Starches		Veget -and-fruits		Meat		Fats and oils		Dairy		Sweets	
	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err
Household characteristics														
Mother tongue of head	**-4.6101**	1.2719	-1.9813	1.0313	1.2884	1.4917	2.5498	1.6358	0.1915	0.4301	2.4386	1.3125	0.1231	0.6404
Age of head	**0.2787**	0.1407	0.1198	0.1141	-0.1644	0.1650	-0.0945	0.1809	0.0862	0.0476	-0.1217	0.1452	-0.1041	0.0708
Age of head square/100	**-0.2771**	0.1281	-0.0684	0.1039	0.0842	0.1503	0.0890	0.1648	**-0.0923**	0.0433	0.1741	0.1322	0.0905	0.0645
Sex of head	-0.4381	1.0773	-0.0815	0.8735	-0.6962	1.2634	**4.3208**	1.3855	-0.5931	0.3643	-2.0337	1.1112	-0.4781	0.5424
Married head	1.9934	1.0403	1.0223	0.8435	-0.0061	1.2200	**-4.6244**	1.3379	0.5601	0.3518	1.8322	1.0735	-0.7775	0.5238
Secondary and middle general education of head	1.2477	1.0858	**-4.6528**	0.8804	0.0696	1.2734	-0.8042	1.3964	-0.0941	0.3672	**3.4416**	1.1205	0.7921	0.5467
Technical and vocational education of head	-0.0172	1.2575	**-4.6568**	1.0197	0.4527	1.4748	-1.5984	1.6173	0.1158	0.4253	**4.5504**	1.2977	1.1535	0.6332
University of head	0.4667	1.4396	**-4.3629**	1.1674	-0.0614	1.6884	-0.2445	1.8515	-0.4797	0.4869	**2.9415**	1.4856	**1.7402**	0.7249
Urban	2.8241	1.6674	-1.9841	1.3521	2.4098	1.9556	-3.8818	2.1445	0.7005	0.5639	-1.9867	1.7207	**1.9180**	0.8396
Household size	**3.1712**	0.2769	**0.5876**	0.2245	**-1.4576**	0.3247	**-2.5618**	0.3561	0.0822	0.0936	0.1651	0.2857	0.0133	0.1394
Owner-occupier	1.5991	1.4027	-0.8105	1.1374	1.9135	1.6451	**-4.2200**	1.8041	0.6089	0.4744	1.3769	1.4475	-0.4680	0.7063
Space per person	-0.0228	0.0143	-0.0145	0.0116	0.0148	0.0167	0.0167	0.0183	0.0005	0.0048	0.0051	0.0147	0.0001	0.0072
Durable ownership														
Car or motorcycle	0.4749	0.6991	-0.2182	0.5669	-0.8820	0.8200	-0.0832	0.8992	-0.0333	0.2364	0.5086	0.7215	0.2333	0.3520
Freezer	-0.6076	0.6949	-0.0257	0.5635	**-1.4160**	0.8150	1.0387	0.8937	0.0801	0.2350	0.4499	0.7171	0.4806	0.3499
Automatic washing machine	**-2.0559**	0.7011	0.6427	0.5685	0.3796	0.8223	0.3275	0.9017	0.0848	0.2371	0.1797	0.7235	0.4416	0.3530
Total number of leisure durables	-0.0934	0.2746	0.0026	0.2227	-0.078	0.3221	0.1935	0.3532	-0.0941	0.0929	0.0662	0.2834	0.0033	0.1383
Conditioning expenditures														
ln(tobac)	**0.6752**	0.3071	0.0608	0.2490	0.3428	0.3602	0.2419	0.3950	-0.1595	0.1039	**-0.9281**	0.3169	-0.2332	0.1546
ln(hygiene)	0.0407	0.3626	0.4550	0.294	0.0201	0.4252	**-0.9559**	0.4663	0.0121	0.1226	0.2716	0.3741	0.1563	0.1826
ln(energy)	-0.1016	0.3326	0.0650	0.2697	**-0.8681**	0.3901	0.4310	0.4278	0.0391	0.1125	0.4099	0.3433	0.0246	0.1675
ln(transport and communication)	0.3234	0.2410	-0.0291	0.1955	-0.0068	0.2827	-0.1075	0.3100	-0.0178	0.0815	-0.2695	0.2487	0.1074	0.1214
ln(recreation)	0.2404	0.2781	-0.3636	0.2255	-0.0748	0.3261	0.1108	0.3577	-0.0818	0.0940	0.3111	0.2870	-0.1421	0.1400
ln(housing)	-0.1655	0.3038	-0.1801	0.2463	**0.9526**	0.3563	0.0165	0.3907	0.1447	0.1027	-0.5401	0.3135	-0.2280	0.1530
ln(cloths and shoes)	-0.1984	0.2615	-0.2181	0.2120	0.0365	0.3067	0.1417	0.3363	0.0471	0.0884	0.3426	0.2699	-0.1514	0.1317
ln(furniture)	0.3296	0.4402	-0.2143	0.3570	-0.8655	0.5163	0.8148	0.5662	0.0177	0.1489	-0.3687	0.4543	0.2864	0.2217
ln(health)	-0.1908	0.2061	-0.0142	0.1671	**0.5106**	0.2417	-0.3280	0.2650	-0.0250	0.0697	0.0372	0.2127	0.0103	0.1038
No tobac	**-2.1521**	0.6298	0.5853	0.5107	0.7053	0.7386	1.1138	0.8099	-0.3097	0.2130	-0.0787	0.6499	0.1360	0.3171
No hygiene	-2.2775	1.7057	-0.2958	1.3831	-3.2688	2.0000	3.530	2.1937	-0.2687	0.5769	2.0128	1.7602	0.5681	0.8589
No energy	-5.3098	3.1614	0.3676	2.5635	-0.0703	3.7077	1.8079	4.0659	-0.8375	1.0692	2.3429	3.2624	1.6991	1.5919
No transport and communication	-1.0418	0.9383	-0.8016	0.7608	-0.2373	1.1004	-0.5227	1.2067	0.2247	0.3173	1.8793	0.9683	0.4993	0.4725
No recreation	0.0206	0.7656	0.0223	0.6208	-1.2466	0.8979	1.3793	0.9846	-0.0714	0.2589	0.0707	0.7900	-0.1749	0.3855
No housing	0.6071	1.5480	-0.0200	1.2552	-1.1050	1.8155	-1.0763	1.9909	0.8259	0.5235	2.1019	1.5975	-1.3336	0.7795
No cloths and shoes	-0.3164	0.7536	0.8588	0.6110	1.1653	0.8838	0.1514	0.9692	-0.2546	0.2548	-1.4573	0.7776	-0.1472	0.3794
No furniture	-1.2202	1.3140	1.1371	1.0655	**4.1874**	1.5411	-1.7827	1.690	-0.1190	0.4444	-1.4607	1.3560	-0.7419	0.6616
No health	0.4771	0.7468	-0.7124	0.6056	**-1.5171**	0.8759	1.0102	0.9605	**0.5793**	0.2526	0.7843	0.7707	-0.6215	0.3761
ln(total expenditures)	**-12.505**	0.8206	**-3.0969**	0.6654	**4.8016**	0.9624	**13.301**	1.0554	**-0.7675**	0.2775	**-2.3120**	0.8468	0.5795	0.4132
R-square	29.70		10.72		6.75		21.86		4.56		7.01		7.52	

Notes:
All coefficients, standard errors and R-square are multiplied by 100. Bold entries correspond to 5% or 1% significance level.

Table A4: Engel curves in 2001

Variable	2001													
	Bread		Starches		Veget -and-fruits		Meat		Fats and oils		Dairy		Sweets	
	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err
Household characteristics														
Mother tongue of head	-0.1651	0.7589	**-2.2815**	0.6403	0.0296	0.9305	1.0957	1.1303	-0.2197	0.2925	1.3261	0.9292	0.2148	0.4826
Age of head	**0.3211**	0.0778	0.0571	0.0657	-0.0809	0.0954	0.0554	0.1159	-0.0265	0.03	-0.1324	0.0953	**-0.1939**	0.0495
Age of head square/100	**-0.2850**	0.0721	-0.0950	0.0608	0.0753	0.0884	-0.0500	0.1073	0.0289	0.0278	0.1561	0.0882	**0.1698**	0.0458
Sex of head	0.5344	0.5826	0.3083	0.4916	-0.3395	0.7144	0.4479	0.8677	-0.1690	0.2246	-1.0417	0.7134	0.2595	0.3705
Married head	-0.7994	0.5696	-0.7473	0.4806	0.1362	0.6984	-0.4640	0.8483	-0.0221	0.2196	**2.0809**	0.6974	-0.1842	0.3622
Secondary and middle general education of head	-0.3251	0.7187	-0.9778	0.6064	-0.162	0.8813	1.0489	1.0705	**0.5749**	0.2771	0.3105	0.8801	-0.4694	0.4571
Technical and vocational education of head	0.0157	0.7937	**-1.3830**	0.6696	-0.2579	0.9732	1.8285	1.1821	0.5135	0.3059	-0.1571	0.9718	-0.5598	0.5048
University of head	-0.6410	0.9096	-1.0536	0.7675	0.0466	1.1154	1.1798	1.3547	0.4974	0.3506	0.5498	1.1138	-0.5791	0.5785
Urban	**-3.5872**	0.7338	**-1.6679**	0.6192	**2.2535**	0.8998	**2.5417**	1.0930	**-0.8233**	0.2829	0.9922	0.8985	0.2909	0.4667
Household size	**2.3993**	0.1826	**1.0152**	0.1541	**-1.3874**	0.2240	**-1.8905**	0.2720	**0.3169**	0.0704	-0.1286	0.2236	**-0.3249**	0.1162
Owner-occupier	-0.2855	0.6701	**1.2252**	0.5654	-0.9235	0.8217	0.6419	0.9981	-0.0162	0.2583	-0.5985	0.8206	-0.0434	0.4262
Space per person	-0.0099	0.0099	0.0009	0.0083	0.0056	0.0121	-0.0067	0.0147	**-0.0088**	0.0038	0.0037	0.0121	**0.0152**	0.0063
Durable ownership														
Car or motorcycle	-0.2004	0.4403	-0.5621	0.3715	0.5281	0.5398	0.8948	0.6557	-0.2714	0.1697	-0.4626	0.5391	0.0736	0.28
Freezer	-0.1595	0.4315	-0.2496	0.3641	-0.3083	0.5291	0.0541	0.6426	-0.1961	0.1663	0.9163	0.5283	-0.0569	0.2744
Automatic washing machine	-0.3199	0.4425	-0.4682	0.3734	-0.6455	0.5426	-0.3437	0.6591	-0.021	0.1706	**1.6218**	0.5419	0.1765	0.2814
Total number of leisure durables	**-0.4369**	0.1774	**-0.4591**	0.1497	0.1470	0.2176	0.4985	0.2643	0.0859	0.0684	-0.0567	0.2173	**0.2214**	0.1129
Conditioning expenditures														
ln(tobac)	**0.7328**	0.1994	0.0813	0.1682	-0.3376	0.2445	-0.3857	0.2970	-0.0448	0.0769	-0.3106	0.2442	**0.2645**	0.1268
ln(hygiene)	-0.2799	0.2395	-0.2746	0.2020	0.3544	0.2936	-0.1147	0.3567	0.1101	0.0923	-0.0633	0.2932	0.2680	0.1523
ln(energy)	0.8145	0.2316	0.2603	0.1954	-0.2328	0.2840	-0.2918	0.3449	**-0.2110**	0.0893	0.0941	0.2836	**-0.4333**	0.1473
ln(transport and communication)	**0.5295**	0.1901	-0.0424	0.1604	-0.1957	0.2331	-0.3578	0.2831	**0.1510**	0.0733	-0.2529	0.2327	0.1683	0.1209
ln(recreation)	**-0.5555**	0.1886	-0.2526	0.1591	0.1714	0.2312	**0.7448**	0.2808	-0.0905	0.0727	0.2251	0.2309	**-0.2427**	0.1199
ln(housing)	**-0.5536**	0.2127	-0.0339	0.1795	0.2393	0.2608	0.2528	0.3168	0.0936	0.0820	0.1658	0.2604	**-0.1641**	0.1353
ln(cloths and shoes)	-0.2064	0.1862	0.1745	0.1571	0.0116	0.2283	0.0538	0.2773	-0.1138	0.0718	0.0566	0.228	0.0238	0.1184
ln(furniture)	-0.0691	0.2762	-0.0143	0.2330	-0.1393	0.3387	-0.1414	0.4114	0.0611	0.1065	0.4288	0.3382	-0.1258	0.1757
ln(health)	**0.3576**	0.1338	**0.3310**	0.1129	-0.3001	0.1640	-0.3873	0.1992	**0.1033**	0.0516	-0.0830	0.1638	-0.0214	0.0851
No tobac	**-0.7830**	0.3977	**-0.7850**	0.3355	0.4865	0.4876	-1.0510	0.5923	-0.0557	0.1533	**2.2250**	0.4869	-0.0368	0.2529
No hygiene	-0.4027	2.7465	0.5657	2.3173	-5.5272	3.3678	-0.0717	4.0906	-1.6266	1.0587	**6.9945**	3.3630	0.0680	1.7468
No energy	0.4386	1.0823	-1.4598	0.9132	0.3558	1.3271	1.9097	1.6120	0.2773	0.4172	-0.6750	1.3253	-0.8465	0.6883
No transport and communication	0.3201	0.6966	-0.8391	0.5878	-0.4003	0.8542	0.6767	1.0375	-0.2218	0.2685	0.1393	0.8530	0.3250	0.4430
No recreation	0.3578	0.4575	0.5308	0.3860	-0.7492	0.5609	-0.0002	0.6813	0.1460	0.1763	0.1845	0.5601	-0.4697	0.2909
No housing	0.1342	0.8211	**1.6579**	0.6928	-0.477	1.0068	-0.8708	1.2229	**-0.7557**	0.3165	-0.0243	1.0054	0.3356	0.5222
No cloths and shoes	0.4151	0.4931	0.0212	0.4160	0.5909	0.6046	0.3984	0.7344	0.0277	0.1901	**-1.2760**	0.6037	-0.1772	0.3136
No furniture	0.0607	0.5790	0.5601	0.4885	0.4140	0.7099	0.5946	0.8623	-0.1514	0.2232	-0.7084	0.7089	**-0.7696**	0.3682
No health	0.4545	0.4992	**-1.3411**	0.4212	0.1076	0.6121	1.2016	0.7434	-0.2755	0.1924	-0.1008	0.6112	-0.0464	0.3175
ln(total expenditures)	**-6.5945**	0.5423	**-3.2044**	0.4576	**3.8576**	0.6650	**7.5393**	0.8077	**-1.5564**	0.2091	**-1.6208**	0.6641	**1.5791**	0.3449
R-square	26.29		15.43		6.33		15.07		9.93		5.91		10.55	

Notes:
All coefficients, standard errors and R-square are multiplied by 100. Bold entries correspond to 5% or 1% significance level.

Table A5: Unit values equations in 1995

Variable	1995													
	Bread		Starches		Veget -and-fruits		Meat		Fats and oils		Dairy		Sweets	
	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err
Household characteristics														
Mother tongue of head	1.4869	3.0723	0.4806	2.9498	-0.2679	3.9516	-1.3195	3.1509	**-6.5028**	2.7287	4.8653	5.2929	2.2377	4.5496
Age of head	0.2006	0.3314	0.3966	0.3166	-0.6381	0.4227	0.4634	0.3363	0.2226	0.2920	0.924	0.5672	**-1.0666**	0.4864
Age of head square/100	-0.2440	0.3009	-0.3816	0.2875	0.6136	0.3837	-0.4372	0.3057	-0.2589	0.2650	-0.8855	0.5150	**1.0175**	0.4415
Sex of head	4.2271	2.4333	2.2914	2.3370	-1.4335	3.1221	**7.5215**	2.4921	-2.4624	2.1566	4.4175	4.1927	-6.5715	3.5912
Married head	**-4.9073**	2.3330	-0.8477	2.2535	0.1950	2.9934	-3.8292	2.3673	-0.5366	2.0722	3.8657	4.0260	**11.233**	3.4341
Secondary and middle general education of head	0.6186	2.3369	1.0042	2.2429	0.7176	3.0000	-2.5266	2.3814	**4.3063**	2.0712	-0.6620	4.030	-0.2346	3.4564
Technical and vocational education of head	3.3857	2.7789	-1.8287	2.6610	2.7931	3.5605	0.8186	2.8253	**5.5536**	2.4583	1.9213	4.7738	5.7571	4.1051
University of head	2.3519	3.2043	-4.6809	3.0598	0.2645	4.0941	5.0203	3.2498	**9.9235**	2.8246	**10.845**	5.4941	**15.960**	4.7141
Urban	6.4554	4.7022	-1.1388	4.5131	6.6775	6.0358	-2.6055	4.7938	**-15.712**	4.1671	11.170	8.1041	**-21.563**	6.9530
Household size	-0.4174	0.6784	1.1879	0.6174	1.0061	0.7959	1.0906	0.6347	**1.3474**	0.5655	**4.6817**	1.0600	**4.1568**	0.9172
Owner-occupier	3.8696	3.1472	-0.5569	3.0204	1.6501	4.0410	-2.8994	3.2080	-3.1236	2.7888	-4.5110	5.4212	-4.0851	4.6476
Space per person	-0.0257	0.0290	0.0001	0.0278	0.0331	0.0372	**0.0870**	0.0295	-0.0209	0.0257	0.0253	0.050	**0.1072**	0.0428
Durable ownership														
Car or motorcycle	0.6138	1.6740	-1.7612	1.6071	0.9785	2.1532	0.3272	1.7094	**3.4505**	1.4866	0.5207	2.8842	**1.7498**	2.4860
Freezer	-0.9486	2.0681	0.6301	1.9857	5.0720	2.6689	2.8037	2.1181	1.6817	1.8357	4.0780	3.568	-0.6970	3.0588
Automatic washing machine	-1.1921	1.7604	-0.6517	1.6884	2.4500	2.2579	1.0464	1.7959	2.6104	1.5599	2.2595	3.0295	**5.7578**	2.6063
Total number of leisure durables	0.2394	0.6888	**2.5650**	0.6615	**3.4621**	0.8895	**2.1318**	0.7081	0.4685	0.6105	**4.3729**	1.1859	**2.0754**	1.0328
ln(Qunatity)	1.4779	1.3697	**-9.7208**	1.2075	**-2.9061**	1.3538	0.6557	1.0625	**-4.1848**	1.1778	**-32.030**	1.7208	**-22.285**	1.1371
R-square	1.91		4.29		2.34		3.85		4.53		16.99		19.16	

Notes:
All coefficients, standard errors and R-square are multiplied by 100. Bold entries correspond to 5% or 1% significance level.

Table A6: Unit values equations in 1997

Variable	1997													
	Bread		**Starches**		**Veget -and-fruits**		**Meat**		**Fats and oils**		**Dairy**		**Sweets**	
	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err
Household characteristics														
Mother tongue of head	-6.2981	3.2686	-9.178	5.1050	-14.613	10.256	-4.3360	5.8849	-3.8083	6.0273	4.9125	6.3476	-4.4921	7.6174
Age of head	-0.6469	0.3667	1.0262	0.5682	0.4061	1.1364	1.0020	0.6529	-0.8973	0.6746	0.6708	0.7045	1.3574	0.8456
Age of head square/100	0.4339	0.3334	-0.8904	0.5160	-1.0159	1.0325	-0.9124	0.5935	0.3298	0.6128	-0.6963	0.6402	-1.2888	0.7683
Sex of head	-3.2237	2.7392	-1.3835	4.2760	8.0367	8.5607	4.3689	4.9414	-1.7720	5.0482	0.9199	5.3074	11.690	6.3827
Married head	4.4192	2.6488	1.1000	4.1554	-2.3985	8.2914	-5.1009	4.7518	-3.4663	4.9173	9.6878	5.1384	**-16.418**	6.1760
Secondary and middle general education of head	3.9563	2.7722	0.3573	4.3584	4.476	8.6652	6.0664	4.9772	9.5057	5.1116	**13.292**	5.3735	7.3086	6.4542
Technical and vocational education of head	0.2632	3.1932	0.5402	5.0076	5.2415	9.9987	11.133	5.7373	**16.177**	5.8906	**19.186**	6.2025	**18.605**	7.4392
University of head	3.0914	3.6566	0.3580	5.7275	-3.6772	11.453	5.9423	6.5739	4.4659	6.7444	12.122	7.0988	12.857	8.5338
Urban	5.9672	4.3092	-1.1796	6.7418	-1.2409	13.470	**-15.208**	7.7484	-10.451	7.9659	-8.1000	8.4200	**25.004**	10.025
Household size	**2.0866**	0.7416	1.9420	1.0830	-0.9899	2.0734	-1.5170	1.1925	**5.0842**	1.2356	2.4007	1.3088	**5.4562**	1.5474
Owner-occupier	4.7295	3.6362	-5.7606	5.6784	-14.051	11.373	**-19.717**	6.5306	10.146	6.7052	5.1833	7.0507	**-20.873**	8.4656
Space per person	0.0413	0.0370	0.0167	0.0578	0.2178	0.1157	-0.0013	0.0664	0.0796	0.0682	0.0994	0.0717	0.1399	0.0862
Durable ownership														
Car or motorcycle	-0.4986	1.7481	-1.9506	2.7310	-4.3910	5.4715	1.6704	3.1435	-4.4555	3.2269	3.4952	3.3902	-5.1980	4.0949
Freezer	3.3301	1.8021	2.8838	2.8213	2.4831	5.6442	0.4749	3.2654	4.2222	3.3318	**7.6435**	3.5005	0.5053	4.2177
Automatic washing machine	-3.1418	1.8210	0.1157	2.8409	4.2545	5.6885	-1.0140	3.2703	1.8040	3.3644	2.2038	3.5267	**8.7059**	4.2339
Total number of leisure durables	0.2094	0.6865	0.1616	1.0767	**4.4024**	2.1655	**3.0156**	1.2507	**3.1618**	1.2666	**3.8748**	1.3364	0.8080	1.6191
ln(Qunatity)	**-6.9119**	1.5837	**-13.801**	1.9770	**-18.913**	2.9778	0.7808	1.6788	**-6.4881**	2.4030	**-35.239**	1.7766	**-23.043**	1.9056
R-square	4.36		5.16		6.21		2.54		8.93		28.00		15.70	

Notes:
All coefficients, standard errors and R-square are multiplied by 100. Bold entries correspond to 5% or 1% significance level.

Table A7: Unit values equations in 2001

Variable	2001													
	Bread		Starches		Veget -and-fruits		Meat		Fats and oils		Dairy		Sweets	
	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err	Coef	Std-err
Household characteristics														
Mother tongue of head	2.0147	2.4031	-0.9740	3.0316	5.0072	5.3094	-1.4689	3.8616	-0.9565	2.4536	6.6875	4.3406	0.2578	4.8593
Age of head	0.2336	0.2509	0.4861	0.3146	**-1.3481**	0.5512	**0.9358**	0.3993	-0.2281	0.2551	-0.1615	0.4500	-0.4294	0.5028
Age of head square/100	-0.1856	0.2309	-0.5537	0.2899	0.9398	0.5079	**-0.8690**	0.3680	0.2633	0.2350	-0.0763	0.4145	0.4259	0.4631
Sex of head	2.5102	1.8535	4.0611	2.3333	6.9269	4.0843	2.3856	2.9672	-0.6669	1.8906	1.4876	3.3380	**-7.3569**	3.7422
Married head	**-3.9829**	1.8155	**-5.2533**	2.2944	-3.8285	4.0197	4.5313	2.9054	0.3592	1.8564	2.5165	3.2947	**9.4739**	3.6576
Secondary and middle general education of head	-3.6978	2.3083	-1.9741	2.9040	-1.0314	5.0853	1.7357	3.6873	4.0504	2.3549	2.4364	4.1551	-3.3241	4.6426
Technical and vocational education of head	-1.6650	2.5320	-2.5603	3.1910	-1.9999	5.5858	2.3752	4.0522	4.3775	2.5863	1.0954	4.5638	-4.9130	5.0996
University of head	-1.1304	2.8986	-0.7753	3.6542	5.4629	6.4015	**11.553**	4.6396	**11.376**	2.9596	5.9601	5.2304	8.1620	5.8408
Urban	-2.9884	2.3547	4.6099	2.9565	**23.499**	5.1627	**10.554**	3.7456	-2.6495	2.3903	**21.997**	4.2296	-4.9277	4.7152
Household size	0.6813	0.5829	**2.4230**	0.6992	-0.6055	1.1606	-1.5609	0.8491	0.6759	0.5705	**3.0561**	0.9526	-0.1986	1.0642
Owner-occupier	-0.4630	2.1035	4.4648	2.6507	-3.0126	4.6401	-3.7159	3.3646	-3.8984	2.1474	-2.4393	3.7916	**11.049**	4.2398
Space per person	-0.0051	0.0316	0.0311	0.0397	0.0182	0.0695	0.0763	0.0504	-0.0019	0.0322	0.0381	0.0568	0.0153	0.0635
Durable ownership														
Car or motorcycle	-0.0772	1.3639	1.6675	1.7189	**7.0696**	3.0171	**5.1438**	2.1882	-0.1487	1.3926	4.1523	2.4597	**5.6874**	2.7583
Freezer	0.8059	1.3836	-1.0797	1.7442	-1.1158	3.0620	-3.4862	2.2228	-2.2025	1.4135	**5.0052**	2.4979	0.2339	2.7915
Automatic washing machine	2.0505	1.4143	0.5373	1.7822	2.5445	3.1228	2.4890	2.2658	2.4117	1.444	**8.3276**	2.5568	3.1909	2.8609
Total number of leisure durables	0.3096	0.5465	-0.3970	0.6892	**3.2061**	1.2232	**2.2935**	0.8892	**2.9423**	0.5588	**2.5342**	0.9904	**2.8945**	1.1151
ln(Qunatity)	**-3.0175**	1.1208	**-7.5268**	1.3981	**-3.9477**	1.8453	-0.8106	1.3129	0.3979	1.220	**-29.866**	1.4406	**-11.213**	1.2311
R-square	1.42		2.89		4.56		4.25		4.29		22.45		6.89	

Notes:
All coefficients, standard errors and R-square are multiplied by 100. Bold entries correspond to 5% or 1% significance level.

Table A8: symmetry restricted estimates of coefficients of prices in 1995

	1995						
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets
Bread	**9.6927**						
	(1.1968)						
Starches	**3.2116**	**11.915**					
	(0.6970)	(1.0554)					
Veget-and-fruits	**-1.6583**	**-2.6903**	**10.616**				
	(0.7040)	(0.735)	(1.2590)				
Meat	-0.2808	**-3.6230**	**3.1944**	**-1.1780**			
	(0.9068)	(0.8841)	(0.9918)	(1.5949)			
Fats-and- oils	**2.6333**	**1.7832**	**-1.2876**	**-3.0224**	**4.7355**		
	(0.4911)	(0.4878)	(0.4295)	(0.5956)	(0.7315)		
Dairy	-0.5668	**1.4908**	**-7.0143**	**-4.0321**	**1.2144**	**18.753**	
	(0.5268)	(0.5869)	(0.7704)	(0.9080)	(0.3454)	(1.1200)	
Sweets	**1.3555**	**1.3731**	**-1.2005**	**-4.4595**	**0.5876**	**0.0821**	**5.4575**
	(0.4452)	(0.4607)	(0.4724)	(0.5551)	(0.3332)	(0.3611)	(0.4608)

Notes:
All coefficients and standard errors are multiplied by 100. Standard errors are in brackets and below the coefficients. Bold entries correspond to 5% or 1% significance level. Chi squared test of symmetry restriction validity , $\chi^2_{21} = 710.27$

Table A9: symmetry restricted estimates of coefficients of prices in 1997

	1997						
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets
Bread	**-4.4893**						
	(2.2453)						
Starches	**-6.5600**	**9.0895**					
	(1.1806)	(1.4833)					
Veget-and-fruits	**1.8888**	-0.3315	**6.9636**				
	(0.9196)	(0.5832)	(0.9435)				
Meat	3.0491	1.0914	**-10.005**	**-45.468**			
	(1.8188)	(0.9743)	(0.8965)	(2.0984)			
Fats-and- oils	**-1.2668**	**-1.5277**	0.1238	**1.2215**	**2.9256**		
	(0.5129)	(0.4243)	(0.2435)	(0.4575)	(0.5374)		
Dairy	**-5.6380**	**-5.2568**	**-1.9798**	**7.6328**	-0.1030	**10.818**	
	(1.1713)	(0.8685)	(0.6787)	(1.0761)	(0.3839)	(1.3969)	
Sweets	**2.5696**	**-1.1301**	-0.1098	**-2.6015**	0.0705	**-1.9309**	**3.9945**
	(0.7632)	(0.5523)	(0.3724)	(0.7430)	(0.3192)	(0.5452)	(0.6105)

Notes:
All coefficients and standard errors are multiplied by 100. Standard errors are in brackets and below the coefficients. Bold entries correspond to 5% or 1% significance level.
. Chi squared test of symmetry restriction validity , $\chi^2_{21} = 1378.6$

Table A10: symmetry restricted estimates of coefficients of prices in 2001

	2001						
	Bread	Starches	Veget -and-fruits	Meat	Fats-and- oils	Dairy	Sweets
Bread	**-10.604**						
	(1.5402)						
Starches	**-15.114**	**-8.6970**					
	(1.0615)	(1.3970)					
Veget-and-fruits	**-5.9688**	**-4.8932**	**10.183**				
	(0.7578)	(0.6847)	(0.7697)				
Meat	0.5149	0.5098	**-0.4093**	**-13.487**			
	(0.8813)	(0.7508)	(0.5499)	(0.8567)			
Fats -and -oils	**-6.569**	**-3.9847**	**-1.7414**	0.5875	**3.2038**		
	(0.5873)	(0.6401)	(0.3499)	(0.4419)	(0.7827)		
Dairy	**-14.267**	**-9.0443**	**-3.1456**	1.6044	**-2.8575**	**13.912**	
	(0.9428)	(0.8295)	(0.6215)	(0.8203)	(0.4222)	(1.0533)	
Sweets	-1.0258	**-1.5156**	**-0.9967**	0.5913	**-0.8228**	**-1.5402**	**1.3528**
	(0.5856)	(0.5854)	(0.3694)	(0.4357)	(0.3520)	(0.4495)	(0.5522)

Notes:

All coefficients and standard errors are multiplied by 100. Standard errors are in brackets and below the coefficients. Bold entries correspond to 5% or 1% significance level.

. Chi squared test of symmetry restriction validity , $\chi^2_{21} = 636.76$

Set of tables A11: Marshallian demand elasticities by percentiles of per adult expenditures

Table 1995a: Marshallian good demand elasticities in 1995 with per adult expenditure<= 10th per adult expenditure

	1995							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	**-0.3022**	**0.2609**	-0.0592	0.0415	**0.1937**	0.0270	**0.1043**	**0.7049**
	(0.0809)	(0.0473)	(0.0478)	(0.0615)	(0.0332)	(0.0362)	(0.0301)	(0.0322)
Starches	**0.2466**	**-0.1714**	**-0.1414**	-0.198	**0.1309**	**0.1472**	**0.1011**	**0.7847**
	(0.0468)	(0.0707)	(0.0494)	(0.0594)	(0.0326)	(0.0397)	(0.0308)	(0.0283)
Veget-and-fruits	**-0.1205**	**-0.1786**	**-0.4386**	**0.1407**	**-0.0823**	**-0.4341**	**-0.0753**	**1.1865**
	(0.0399)	(0.0417)	(0.0709)	(0.0562)	(0.0242)	(0.0442)	(0.0265)	(0.0424)
Meat	-0.0716	**-0.2353**	0.0861	**-1.1375**	**-0.1688**	**-0.2831**	**-0.2346**	**1.3907**
	(0.0446)	(0.0435)	(0.0489)	(0.0782)	(0.0291)	(0.0451)	(0.0271)	(0.0391)
Fats and oils	**0.5285**	**0.3727**	**-0.1830**	**-0.4939**	-0.1132	**0.2896**	**0.1210**	**0.6995**
	(0.0905)	(0.0899)	(0.0794)	(0.1099)	(0.1345)	(0.0643)	(0.0613)	(0.0465)
Dairy	-0.0095	**0.0837**	**-0.2980**	**-0.1602**	**0.0609**	**-0.1273**	0.0084	**0.8913**
	(0.0244)	(0.0271)	(0.0354)	(0.0417)	(0.0157)	(0.0513)	(0.0164)	(0.0346)
Sweets	**0.3022**	**0.3062**	**-0.2887**	**-1.0412**	0.1317	0.0039	**0.2543**	1.0678
	(0.1031)	(0.1067)	(0.1095)	(0.1287)	(0.0768)	(0.846)	(0.1062)	(0.0707)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.

Table 1995b: Marshallian good demand elasticities in 1995 with per adult expenditure between 10th and 25th per adult expenditure

	1995							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	-0.1296	**0.3253**	-0.0611	0.0555	**0.2439**	0.0335	**0.1326**	**0.6270**
	(0.1022)	(0.0597)	(0.0607)	(0.0778)	(0.0419)	(0.0458)	(0.0380)	(0.0407)
Starches	**0.2604**	-0.1033	**-0.1449**	**-0.2131**	**0.1415**	**0.1594**	**0.1103**	**0.7663**
	(0.0507)	(0.0767)	(0.0537)	(0.0645)	(0.0354)	(0.0431)	(0.0335)	(0.0308)
Veget-and-fruits	**-0.0952**	**-0.1463**	**-0.5402**	**0.1154**	**-0.0678**	**-0.3597**	**-0.0628**	**1.1547**
	(0.0329)	(0.0345)	(0.0590)	(0.0467)	(0.0200)	(0.0366)	(0.0220)	(0.0351)
Meat	-0.0573	**-0.222**	0.0691	**-1.1354**	**-0.1614**	**-0.2719**	**-0.2266**	**1.3761**
	(0.0428)	(0.0418)	(0.0473)	(0.0753)	(0.0280)	(0.0434)	(0.0262)	(0.0379)
Fats and oils	**0.5464**	**0.3885**	**-0.1810**	**-0.5173**	-0.0676	**0.3043**	**0.1280**	**0.6837**
	(0.0952)	(0.0946)	(0.0837)	(0.1157)	(0.1415)	(0.0677)	(0.0645)	(0.0490)
Dairy	-0.0130	**0.0830**	**-0.2960**	**-0.1604**	**0.0610**	**-0.1217**	0.0087	**0.8905**
	(0.0243)	(0.0272)	(0.0359)	(0.0420)	(0.0158)	(0.0516)	(0.0165)	(0.0348)
Sweets	**0.2902**	**0.2927**	**-0.2777**	**-0.9935**	0.1257	0.0038	0.1960	1.0647
	(0.0981)	(0.1016)	(0.1048)	(0.1228)	(0.0733)	(0.0807)	(0.1013)	(0.0675)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.

Table 1995c: Marshallian good demand elasticities in 1995 with per adult expenditure between 25th and 50th per adult expenditure

	1995							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	-0.0132	**0.3651**	-0.0672	0.0751	**0.2782**	0.0307	**0.1566**	**0.5745**
	(0.1165)	(0.0681)	(0.0693)	(0.0889)	(0.0478)	(0.0521)	(0.0434)	(0.0465)
Starches	**0.2864**	-0.0046	-0.1599	**-0.2302**	**0.1576**	**0.1731**	**0.1261**	**0.7397**
	(0.0564)	(0.0854)	(0.0599)	(0.0719)	(0.0395)	(0.0479)	(0.0373)	(0.0343)
Veget-and-fruits	**-0.0904**	**-0.1402**	-0.5536	**0.1081**	**-0.0660**	**-0.3473**	**-0.0630**	**1.1505**
	(0.0320)	(0.0335)	(0.0574)	(0.0456)	(0.0195)	(0.0355)	(0.0214)	(0.0342)
Meat	-0.0459	**-0.1917**	0.0591	**-1.1290**	**-0.1428**	**-0.2347**	**-0.2046**	**1.3327**
	(0.0378)	(0.0370)	(0.0419)	(0.0667)	(0.0248)	(0.0383)	(0.0231)	(0.0333)
Fats and oils	**0.5416**	**0.3839**	-0.1790	**-0.5083**	-0.0681	**0.2986**	**0.1319**	**0.6839**
	(0.0951)	(0.0945)	(0.0837)	(0.1158)	(0.1414)	(0.0675)	(0.0645)	(0.0489)
Dairy	-0.0158	**0.0886**	-0.3212	**-0.1711**	**0.0663**	-0.0468	0.0110	**0.8810**
	(0.0264)	(0.0294)	(0.0391)	(0.0459)	(0.0172)	(0.0560)	(0.0180)	(0.0379)
Sweets	**0.2285**	**0.2305**	-0.2182	**-0.7812**	0.0987	0.0039	-0.0619	1.0508
	(0.0769)	(0.0797)	(0.0823)	(0.0966)	(0.0575)	(0.0632)	(0.0795)	(0.0529)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.

Table 1995d: Marshallian good demand elasticities in 1995 with per adult expenditure between 50th and 75th per adult expenditure

	1995							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	0.2645	**0.4687**	-0.0800	0.1190	**0.3559**	0.0309	**0.2040**	**0.4492**
	(0.1508)	(0.0881)	(0.0898)	(0.1154)	(0.0619)	(0.0673)	(0.0562)	(0.0602)
Starches	**0.2975**	0.0547	**-0.1662**	**-0.2335**	**0.1652**	**0.1792**	**0.1345**	**0.7236**
	(0.0599)	(0.0907)	(0.0636)	(0.0765)	(0.042)	(0.0508)	(0.0396)	(0.0364)
Veget-and-fruits	**-0.0822**	**-0.1316**	**-0.5794**	**0.0967**	**-0.0613**	**-0.3264**	**-0.0599**	**1.1424**
	(0.0302)	(0.0316)	(0.0544)	(0.0434)	(0.0184)	(0.0335)	(0.0203)	(0.0324)
Meat	-0.0327	**-0.1626**	0.0472	**-1.1221**	**-0.1204**	**-0.1970**	**-0.1764**	**1.2858**
	(0.0324)	(0.0317)	(0.0360)	(0.0575)	(0.0213)	(0.0328)	(0.0199)	(0.0286)
Fats and oils	**0.6287**	**0.4491**	**-0.2060**	**-0.5835**	0.0939	**0.3454**	**0.1562**	**0.6279**
	(0.1118)	(0.1112)	(0.0986)	(0.1365)	(0.1665)	(0.0793)	(0.0759)	(0.0576)
Dairy	-0.0202	**0.0953**	**-0.3474**	**-0.1809**	**0.0711**	0.0338	0.0122	**0.8706**
	(0.0285)	(0.0320)	(0.0426)	(0.0502)	(0.0187)	(0.0608)	(0.0196)	(0.0411)
Sweets	**0.2206**	**0.2217**	**-0.2102**	**-0.7522**	0.0952	0.0045	-0.0991	1.0487
	(0.0738)	(0.0765)	(0.0791)	(0.0930)	(0.0552)	(0.0605)	(0.0764)	(0.0509)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.

Table 1995e: Marshallian good demand elasticities in 1995 with per adult expenditure >90th per adult expenditure

	1995							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats-and-oils	Dairy	Sweets	
Bread	**0.7904**	**0.6423**	-0.0926	0.1984	**0.5063**	0.0310	**0.3048**	**0.2119**
	(0.2157)	(0.1258)	(0.1288)	(0.1656)	(0.0886)	(0.0960)	(0.0805)	(0.0861)
Starches	**0.4202**	**0.5090**	**-0.2290**	**-0.3229**	**0.2371**	**0.2522**	**0.2009**	**0.6008**
	(0.0864)	(0.1309)	(0.0921)	(0.1108)	(0.0605)	(0.0733)	(0.0572)	(0.0526)
Veget-and-fruits	**-0.0704**	**-0.1131**	**-0.6276**	**0.0818**	**-0.0543**	**-0.2895**	**-0.0557**	**1.1273**
	(0.0269)	(0.0282)	(0.0487)	(0.0390)	(0.0164)	(0.0298)	(0.0182)	(0.0289)
Meat	-0.0229	**-0.1351**	0.0348	**-1.1173**	**-0.1059**	**-0.1704**	**-0.1606**	**1.2534**
	(0.0287)	(0.0280)	(0.0321)	(0.0511)	(0.0189)	(0.0290)	(0.0177)	(0.0254)
Fats-and-oils	**0.6752**	**0.4747**	**-0.2131**	**-0.6211**	0.1902	**0.3695**	**0.1768**	**0.5947**
	(0.1218)	(0.1210)	(0.1077)	(0.1490)	(0.1813)	(0.0863)	(0.0827)	(0.0627)
Dairy	-0.0257	**0.0997**	**-0.3780**	**-0.1937**	**0.0776**	**0.1340**	0.0158	**0.8578**
	(0.0313)	(0.0349)	(0.0471)	(0.0556)	(0.0205)	(0.0667)	(0.0216)	(0.0452)
Sweets	**0.1742**	**0.1755**	**-0.1662**	**-0.5923**	0.0749	0.0042	**-0.2929**	1.0383
	(0.0580)	(0.0600)	(0.0623)	(0.0733)	(0.0434)	(0.0475)	(0.0600)	(0.0399)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.

Table 1997a: Marshallian good demand elasticities in 1997 with per adult expenditure in 1997 <= 10th per adult real expenditure in 1995

	1997							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	**-1.0474**	**-0.1850**	**0.1408**	**0.2087**	-0.0294	**-0.1288**	**0.1201**	**0.5197**
	(0.0866)	(0.0455)	(0.0356)	(0.0701)	(0.0197)	(0.0453)	(0.0293)	(0.0315)
Starches	**-0.4129**	**-0.3167**	0.0078	0.1207	**-0.1007**	**-0.3367**	-0.0712	**0.7777**
	(0.0856)	(0.1067))	(0.0424)	(0.0705)	(0.0305)	(0.0629)	(0.0397)	(0.0477)
Veget-and-fruits	0.0449	-0.0704	**-0.5583**	**-0.7680**	-0.0048	**-0.2009**	-0.0228	**1.3377**
	(0.0670)	(0.0421)	(0.0670)	(0.0644)	(0.0173)	(0.0493)	(0.0264)	(0.0677)
Meat	-0.0217	-0.0399	**-0.6237**	**-3.5168**	0.0360	**0.2728**	**-0.1675**	**1.6973**
	(0.0964)	(0.0517)	(0.0476)	(0.1105)	(0.0241)	(0.0573)	(0.0390)	(0.0553)
Fats and oils	**-0.2657**	**-0.354**	0.0580	**0.3406**	**-0.2638**	0.0093	0.0261	**0.8089**
	(0.1290)	(0.1061)	(0.0614)	(0.1147)	(0.1338)	(0.0964)	(0.0795)	(0.0691)
Dairy	**-0.2757**	**-0.2702**	**-0.0904**	**0.4421**	-0.0005	**-0.3845**	**-0.1001**	**0.8734**
	(0.0653)	(0.0480)	(0.0377)	(0.0596)	(0.0211)	(0.0769)	(0.0299)	(0.0463)
Sweets	**0.5424**	**-0.2715**	-0.0431	**-0.6081**	0.0106	**-0.4567**	-0.1100	1.1299
	(0.1728)	(0.1245)	(0.0845)	(0.1675)	(0.0717)	(0.1234)	(0.1370)	(0.0927)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.
Percentiles of per adult expenditure in 1995 have been converted in real term by using CPI in 1997 (1995=100).

Table 1997b: Marshallian good demand elasticities in 1997 with per adult expenditure in 1997 between 10th and 25th per adult real expenditure in 1995

	1997							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	**-1.0940**	**-0.2432**	**0.2026**	**0.2882**	-0.0360	**-0.1699**	**0.1527**	**0.3899**
	(0.1098)	(0.0578)	(0.0454)	(0.0892)	(0.0251)	(0.0575)	(0.0373)	(0.0400)
Starches	**-0.4706**	**-0.2470**	0.0182	0.1429	**-0.1110**	**-0.3751**	-0.0787	**0.7540**
	(0.0944)	(0.1180)	(0.0473)	(0.0783)	(0.0338)	(0.0696)	(0.0439)	(0.0528)
Veget-and-fruits	0.0499	-0.0517	**-0.6635**	**-0.6130**	-0.0043	**-0.1550**	-0.0179	**1.2651**
	(0.0519)	(0.0329)	(0.0530)	(0.0510)	(0.0136)	(0.0386)	(0.0207)	(0.0531)
Meat	0.0141	-0.0255	**-0.5429**	**-3.1216**	0.0289	**0.2335**	**-0.1398**	**1.5817**
	(0.0801)	(0.0430)	(0.0401)	(0.0924)	(0.0201)	(0.0477)	(0.0326)	(0.0461)
Fats and oils	**-0.2628**	**-0.3390**	0.0623	**0.3309**	**-0.2993**	0.0069	0.0248	**0.8182**
	(0.1222)	(0.1008)	(0.0589)	(0.1094)	(0.1273)	(0.0916)	(0.0757)	(0.0657)
Dairy	**-0.2995**	**-0.2880**	**-0.0905**	**0.4734**	-0.0003	**-0.3494**	**-0.106**	**0.8659**
	(0.0687)	(0.0507)	(0.0404)	(0.0634)	(0.0224)	(0.0815)	(0.0317)	(0.0491)
Sweets	**0.5475**	**-0.2688**	-0.0480	**-0.6108**	0.0103	**-0.4537**	-0.1134	1.1294
	(0.1715)	(0.1239)	(0.0849)	(0.1673)	(0.0714)	(0.1228)	(0.1364)	(0.0923)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.
Percentiles of per adult expenditure in 1995 have been converted in real term by using CPI in 1997 (1995=100)..

Table 1997c: Marshallian good demand elasticities in 1997 with per adult expenditure in 1997 between 25th and 50th per adult real expenditure in 1995

	1997							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	**-1.1607**	**-0.3315**	**0.2765**	**0.4154**	-0.0493	**-0.2275**	**0.2082**	**0.2039**
	(0.1432)	(0.0754)	(0.0594)	(0.1167)	(0.0327)	(0.0751)	(0.0487)	(0.0522)
Starches	**-0.5612**	-0.1292	0.0255	**0.1804**	**-0.1299**	**-0.4385**	-0.0884	**0.7138**
	(0.1095)	(0.1372)	(0.0552)	(0.0916)	(0.0393)	(0.0809)	(0.0511)	(0.0615)
Veget-and-fruits	0.0578	-0.0434	**-0.6931**	**-0.5779**	-0.0033	**-0.1413**	-0.0193	**1.2447**
	(0.0475)	(0.0302)	(0.0490)	(0.0477)	(0.0126)	(0.0355)	(0.0192)	(0.0490)
Meat	0.0345	-0.0125	**-0.4538**	**-2.7686**	0.0251	**0.1956**	**-0.1204**	**1.4784**
	(0.0657)	(0.0353)	(0.0331)	(0.0762)	(0.0165)	(0.0392)	(0.0268)	(0.0380)
Fats and oils	**-0.2912**	**-0.3670**	0.0697	**0.3645**	-0.2492	0.0060	0.0288	**0.8050**
	(0.1308)	(0.1080)	(0.0634)	(0.1179)	(0.1365)	(0.0982)	(0.0812)	(0.0705)
Dairy	**-0.3196**	**-0.3033**	**-0.0924**	**0.5013**	-0.0007	**-0.3215**	**-0.1091**	**0.8599**
	(0.0714)	(0.0529)	(0.0423)	(0.0667)	(0.0233)	(0.0850)	(0.0331)	(0.0513)
Sweets	**0.4423**	**-0.2129**	-0.0399	**-0.4930**	0.0085	**-0.3617**	**-0.2929**	1.1034
	(0.1367)	(0.0989)	(0.0680)	(0.1342)	(0.0570)	(0.0980)	(0.1090)	(0.0737)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.
Percentiles of per adult expenditure in 1995 have been converted in real term by using CPI in 1997 (1995=100)...

Table 1997d: Marshallian good demand elasticities in 1997 with per adult expenditure in 1997 between 50th and 75th per adult real expenditure in 1995

	1997							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	**-1.2351**	**-0.4307**	**0.3594**	**0.5414**	-0.0641	**-0.2824**	**0.2768**	**-0.0033**
	(0.1803)	(0.0949)	(0.0750)	(0.1472)	(0.0412)	(0.0946)	(0.0614)	(0.0658)
Starches	**-0.6481**	-0.0149	0.0325	**0.2107**	**-0.1482**	**-0.4967**	-0.0957	**0.6749**
	(0.1242)	(0.1558)	(0.0629)	(0.1043)	(0.0446)	(0.0919)	(0.0582)	(0.0698)
Veget-and-fruits	0.0623	-0.0381	**-0.7119**	**-0.5515**	-0.0027	**-0.1348**	-0.0216	**1.2318**
	(0.0448)	(0.0285)	(0.0465)	(0.0454)	(0.0119)	(0.0337)	(0.0183)	(0.0464)
Meat	0.0470	-0.0059	**-0.4314**	**-2.6703**	0.0245	**0.1819**	**-0.1196**	**1.4497**
	(0.0616)	(0.0331)	(0.0312)	(0.0717)	(0.0155)	(0.0369)	(0.0252)	(0.0357)
Fats and oils	**-0.3133**	**-0.3891**	0.0756	**0.3874**	-0.2098	0.0072	0.0333	**0.7947**
	(0.1375)	(0.1137)	(0.0669)	(0.1243)	(0.1438)	(0.1034)	(0.0855)	(0.0742)
Dairy	**-0.3159**	**-0.2974**	**-0.0886**	**0.4911**	-0.0010	**-0.3380**	**-0.1044**	**0.8635**
	(0.0694)	(0.0515)	(0.0414)	(0.0652)	(0.0227)	(0.0829)	(0.0324)	(0.0500)
Sweets	**0.3545**	**-0.1683**	-0.0326	**-0.3937**	0.0069	**-0.2881**	**-0.4387**	1.0823
	(0.1086)	(0.0786)	(0.0542)	(0.1069)	(0.0454)	(0.0780)	(0.0868)	(0.0587)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.
Percentiles of per adult expenditure in 1995 have been converted in real term by using CPI in 1997 (1995=100).

Table 1997e: Marshallian good demand elasticities in 1997 with per adult expenditure in 1997 >90th per adult real expenditure in 1995

	1997							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	**-1.4600**	**-0.7326**	**0.5804**	**1.0596**	-0.1074	**-0.4961**	**0.4244**	**-0.6298**
	(0.2927)	(0.1541)	(0.1218)	(0.2410)	(0.0669)	(0.1534)	(0.0996)	(0.1069)
Starches	**-0.8421**	0.2416	0.0404	**0.3130**	**-0.1889**	**-0.6398**	-0.1279	**0.5875**
	(0.1574)	(0.1977)	(0.0798)	(0.1347)	(0.0566)	(0.1164)	(0.0737)	(0.0886)
Veget-and-fruits	0.0741	-0.0337	**-0.7085**	**-0.5829**	-0.0022	**-0.1308**	-0.0182	**1.2341**
	(0.0450)	(0.0286)	(0.0470)	(0.0477)	(0.0120)	(0.0338)	(0.0183)	(0.0469)
Meat	0.0499	0.0023	**-0.3134**	**-2.2520**	0.0185	**0.1399**	**-0.082**	**1.3273**
	(0.0448)	(0.0240)	(0.0227)	(0.0527)	(0.0113)	(0.0267)	(0.0183)	(0.0260)
Fats and oils	**-0.3412**	**-0.4152**	0.0794	**0.4331**	-0.166	0.0027	0.0318	**0.7832**
	(0.1450)	(0.1200)	(0.0706)	(0.1331)	(0.1518)	(0.1090)	(0.0903)	(0.0784)
Dairy	**-0.3729**	**-0.3471**	**-0.1028**	**0.5854**	-0.0014	**-0.2381**	**-0.1232**	**0.8421**
	(0.0801)	(0.0595)	(0.0478)	(0.0771)	(0.0263)	(0.0958)	(0.0374)	(0.0578)
Sweets	**0.4598**	**-0.2137**	-0.0416	**-0.5166**	0.0091	**-0.3671**	**-0.2784**	1.1055
	(0.1391)	(0.1007)	(0.0695)	(0.1387)	(0.0582)	(0.0999)	(0.1112)	(0.0752)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.
Percentiles of per adult expenditure in 1995 have been converted in real term by using CPI in 1997 (1995=100).

Table 2001a: Marshallian good demand elasticities in 2001 with per adult expenditure in 2001 <= 10th per adult real expenditure in 1995

	2001							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	**-1.4117**	**-0.6333**	**-0.2262**	0.0770	**-0.2771**	**-0.5854**	-0.0352	**0.7029**
	(0.0696)	(0.0480)	(0.0343)	(0.0399)	(0.0265)	(0.0427)	(0.0264)	(0.0244)
Starches	**-0.9001**	**-1.5115**	**-0.2770**	0.0681	**-0.2364**	**-0.5266**	**-0.0873**	**0.7997**
	(0.0666)	(0.0874)	(0.0430)	(0.0472)	(0.0400)	(0.0521)	(0.0366)	(0.0286)
Veget-and-fruits	**-0.4752**	**-0.3837**	**-0.3295**	**-0.0771**	**-0.1383**	**-0.2709**	**-0.0793**	**1.2686**
	(0.0537)	(0.0482)	(0.0540)	(0.0392)	(0.0245)	(0.0442)	(0.0258)	(0.0463)
Meat	-0.0640	-0.0385	**-0.0824**	**-1.8202**	0.0061	0.0082	0.0172	**1.4164**
	(0.0497)	(0.0421)	(0.0310)	(0.0480)	(0.0246)	(0.0461)	(0.0241)	(0.0446)
Fats and oils	**-0.9833**	**-0.5902**	**-0.2398**	**0.1373**	**-0.4782**	**-0.4040**	**-0.1209**	**0.7541**
	(0.0931)	(0.1013)	(0.0555)	(0.0701)	(0.1237)	(0.0670)	(0.0556)	(0.0330)
Dairy	**-0.7205**	**-0.4552**	**-0.1509**	**0.0983**	**-0.1427**	**-0.2630**	**-0.0767**	**0.9160**
	(0.0494)	(0.0433)	(0.0326)	(0.0429)	(0.0220)	(0.0550)	(0.0233)	(0.0344)
Sweets	**-0.3717**	**-0.4776**	**-0.3305**	0.0825	**-0.2492**	**-0.4983**	**-0.6504**	**1.4265**
	(0.1595)	(0.1588)	(0.1007)	(0.1189)	(0.0953)	(0.1227)	(0.1492)	(0.0932)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.
Percentiles of per adult expenditure in 1995 have been converted in real term by using CPI in 2001 (1995=100).

Table 2001b: Marshallian good demand elasticities in 2001 with per adult expenditure in 2001 between 10th and 25th per adult real expenditure in 1995

	2001							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	**-1.5177**	**-0.7799**	**-0.2654**	**0.0998**	**-0.3413**	**-0.7134**	-0.0381	**0.6370**
	(0.0849)	(0.0586)	(0.0420)	(0.0488)	(0.0324)	(0.0522)	(0.0323)	(0.0298)
Starches	**-1.0157**	**-1.5758**	**-0.3030**	0.0797	**-0.266**	**-0.5878**	**-0.0946**	**0.7760**
	(0.0744)	(0.0977)	(0.0482)	(0.0528)	(0.0448)	(0.0583)	(0.0409)	(0.0320)
Veget-and-fruits	**-0.3833**	**-0.3129**	**-0.4534**	**-0.0672**	**-0.1125**	**-0.2246**	**-0.0685**	**1.2217**
	(0.0441)	(0.0397)	(0.0447)	(0.0325)	(0.0202)	(0.0365)	(0.0213)	(0.0382)
Meat	-0.0434	-0.0289	**-0.0874**	**-1.7604**	0.0084	0.0057	0.0106	**1.3829**
	(0.0454)	(0.0386)	(0.0288)	(0.0442)	(0.0226)	(0.0424)	(0.0222)	(0.0410)
Fats and oils	**-1.1253**	**-0.6734**	**-0.2632**	**0.1600**	**-0.4109**	**-0.4564**	**-0.1332**	**0.7214**
	(0.1053)	(0.1147)	(0.0630)	(0.0794)	(0.1401)	(0.0759)	(0.0630)	(0.0374)
Dairy	**-0.7062**	**-0.4454**	**-0.1447**	**0.0972**	**-0.1398**	**-0.2807**	**-0.0737**	**0.9181**
	(0.0480)	(0.0422)	(0.0319)	(0.0420)	(0.0214)	(0.0536)	(0.0228)	(0.0336)
Sweets	**-0.2593**	**-0.3440**	**-0.2512**	0.0554	**-0.1800**	**-0.366**	**-0.7485**	**1.3120**
	(0.1163)	(0.1160)	(0.0739)	(0.0871)	(0.0696)	(0.0898)	(0.1091)	(0.0681)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.
Percentiles of per adult expenditure in 1995 have been converted in real term by using CPI in 2001 (1995=100)..

Table 2001c: Marshallian good demand elasticities in 2001 with per adult expenditure in 2001between 25th and 50th per adult real expenditure in 1995

	2001							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	**-1.6129**	**-0.9146**	**-0.3067**	**0.1315**	**-0.3977**	**-0.8313**	-0.0411	**0.5778**
	(0.0987)	(0.0681)	(0.0489)	(0.0570)	(0.0376)	(0.0607)	(0.0375)	(0.0347)
Starches	**-1.1660**	**-1.6619**	**-0.3448**	0.1003	**-0.3041**	**-0.6720**	**-0.1060**	**0.7443**
	(0.0849)	(0.1116)	(0.0550)	(0.0605)	(0.0511)	(0.0666)	(0.0467)	(0.0365)
Veget-and-fruits	**-0.3679**	**-0.301**	**-0.4685**	**-0.0733**	**-0.1091**	**-0.2180**	**-0.0684**	**1.2160**
	(0.0428)	(0.0386)	(0.0436)	(0.0320)	(0.0197)	(0.0355)	(0.0208)	(0.0372)
Meat	-0.0284	-0.0186	**-0.0752**	**-1.6533**	0.0077	0.0060	0.0065	**1.3230**
	(0.0381)	(0.0325)	(0.0243)	(0.0376)	(0.0190)	(0.0358)	(0.0188)	(0.0346)
Fats and oils	**-1.1716**	**-0.7019**	**-0.2710**	**0.1761**	**-0.3910**	**-0.4733**	**-0.1356**	**0.7117**
	(0.1089)	(0.1186)	(0.0652)	(0.0823)	(0.1450)	(0.0786)	(0.0652)	(0.0387)
Dairy	**-0.7215**	**-0.4552**	**-0.1471**	**0.1021**	**-0.1426**	**-0.2675**	**-0.0744**	**0.9165**
	(0.0488)	(0.0429)	(0.0326)	(0.0430)	(0.0218)	(0.0546)	(0.0232)	(0.0341)
Sweets	**-0.2185**	**-0.2942**	**-0.2196**	0.0382	**-0.1559**	**-0.3171**	**-0.7835**	**1.2711**
	(0.1010)	(0.1008)	(0.0643)	(0.0761)	(0.0605)	(0.0780)	(0.0949)	(0.0592)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.
Percentiles of per adult expenditure in 1995 have been converted in real term by using CPI in 2001 (1995=100)...

Table 2001d: Marshallian good demand elasticities in 2001 with per adult expenditure in 2001 between 50th and 75th per adult real expenditure in 1995

	2001							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	**-1.7874**	**-1.1543**	**-0.3785**	**0.1808**	**-0.5039**	**-1.0472**	-0.0467	**0.4693**
	(0.1241)	(0.0856)	(0.0615)	(0.0718)	(0.0473)	(0.0763)	(0.0472)	(0.0436)
Starches	**-1.2596**	**-1.7124**	**-0.3662**	0.1156	**-0.328**	**-0.7220**	**-0.1112**	**0.7257**
	(0.0910)	(0.1197)	(0.0591)	(0.0651)	(0.0548)	(0.0714)	(0.0502)	(0.0392)
Veget-and-fruits	**-0.3359**	**-0.2784**	**-0.5080**	**-0.0741**	**-0.1001**	**-0.2021**	**-0.0655**	**1.2010**
	(0.0397)	(0.0359)	(0.0406)	(0.0300)	(0.0183)	(0.0330)	(0.0194)	(0.0346)
Meat	-0.0161	-0.0141	**-0.0707**	**-1.5890**	0.0090	0.0065	0.0031	**1.2871**
	(0.0338)	(0.0288)	(0.0217)	(0.0336)	(0.0169)	(0.0318)	(0.0167)	(0.0308)
Fats and oils	**-1.3653**	**-0.8143**	**-0.3089**	**0.2133**	-0.2984	**-0.5485**	**-0.1537**	**0.6667**
	(0.1259)	(0.1372)	(0.0754)	(0.0953)	(0.1676)	(0.0908)	(0.0754)	(0.0448)
Dairy	**-0.7394**	**-0.4655**	**-0.1490**	**0.1067**	**-0.1462**	**-0.2525**	**-0.0752**	**0.9148**
	(0.0497)	(0.0438)	(0.0333)	(0.0441)	(0.0222)	(0.0558)	(0.0237)	(0.0349)
Sweets	**-0.1811**	**-0.2520**	**-0.1927**	0.0262	**-0.1329**	**-0.2728**	**-0.8153**	**1.2341**
	(0.0870)	(0.0870)	(0.0556)	(0.0660)	(0.0522)	(0.0673)	(0.0819)	(0.0511)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.
Percentiles of per adult expenditure in 1995 have been converted in real term by using CPI in 2001 (1995=100).

Table 2001e: Marshallian good demand elasticities in 2001 with per adult expenditure in 2001 >90th per adult real expenditure in 1995

	2001							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Bread	**-1.8893**	**-1.2945**	**-0.4261**	**0.2149**	**-0.5662**	**-1.1790**	-0.0430	**0.4060**
	(0.1388)	(0.0958)	(0.0689)	(0.0806)	(0.0529)	(0.0854)	(0.0529)	(0.0488)
Starches	**-1.3096**	**-1.7397**	**-0.3808**	0.1259	**-0.3414**	**-0.7518**	**-0.1109**	**0.7156**
	(0.0943)	(0.1240)	(0.0612)	(0.0676)	(0.0568)	(0.0740)	(0.0520)	(0.0406)
Veget-and-fruits	**-0.3406**	**-0.2837**	**-0.4963**	**-0.0801**	**-0.1015**	**-0.2042**	**-0.0701**	**1.2054**
	(0.0405)	(0.0367)	(0.0415)	(0.0309)	(0.0187)	(0.0337)	(0.0199)	(0.0354)
Meat	-0.0113	-0.0120	**-0.0643**	**-1.5507**	0.0093	0.0090	-0.0012	**1.2657**
	(0.0312)	(0.0266)	(0.0201)	(0.0312)	(0.0156)	(0.0293)	(0.0155)	(0.0285)
Fats and oils	**-1.4892**	**-0.8869**	**-0.3374**	**0.2396**	-0.2385	**-0.6005**	**-0.1614**	**0.6376**
	(0.1368)	(0.1491)	(0.0820)	(0.1038)	(0.1822)	(0.0987)	(0.0820)	(0.0487)
Dairy	**-0.7883**	**-0.4959**	**-0.1590**	**0.1155**	**-0.156**	**-0.2053**	**-0.0786**	**0.9093**
	(0.0529)	(0.0466)	(0.0355)	(0.0471)	(0.0237)	(0.0593)	(0.0253)	(0.0371)
Sweets	**-0.1445**	**-0.2038**	**-0.1556**	0.0172	**-0.1072**	**-0.2193**	**-0.853**	**1.1900**
	(0.0706)	(0.0706)	(0.0451)	(0.0537)	(0.0424)	(0.0546)	(0.0665)	(0.0415)

Notes:
Standard errors are in brackets and below the elasticities. Bold entries correspond to rejection of Ho: e=0 for price elasticities and rejection of Ho: e=1 for expenditure elasticities.
Percentiles of per adult expenditure in 1995 have been converted in real term by using CPI in 2001 (1995=100).

Appendix B: Estimation of nutrient elastisities

To derive nutrient elasticities, we apply of Huang's (1996) method, which uses demand elasticities from the standard demand analysis to estimate elasticities of changes in the nutritional content of consumer diets. On the basis of the demand structure of food and the bundle of corresponding nutrient attributes it is possible to derive the implied relationship between nutrient availability and changes in food prices incomes. The advantage of Huang's methodology vis-à-vis preceding attempts by Pitt, Sahn, Gould, Cox and Perali) is that it provides information on how to derive the formula from an underlying demand model.

Let a_{ki} be the quantity of the k^{th} nutrient obtained from a unit of the G^{th} food group. The total quantity of that nutrient, ψ_k, obtained from various food groups can be expressed as:

$$\psi_k = \sum_G a_{kG} Q_G \qquad \text{[B1]}$$

Equation (B1) represents the consumption technology in the sense of Lancaster (1966). It is straightforward to show that :

$$\begin{aligned} d\psi_k/\psi_k &= \sum_H \left(\sum_G e_{GH} a_{kG} Q_G/\psi_k\right)\left(d\pi_H/\pi_H\right) + \left(\sum_G e_G a_{kG} Q_G/\psi_k\right)\left(dX/X\right) \\ &= \sum_H D_{kH}\left(d\pi_H/\pi_H\right) + \rho_k\, dX/X \end{aligned} \qquad \text{[B2]}$$

where $D_{kH} = \sum_G e_{GH} a_{kG} Q_G/\psi_k$ is a price elasticity measure capturing the effect of the H^{th} food group price on the availability of the k^{th} nutrient; $\rho_k = \sum_G e_G a_{kG} Q_G/\psi_k$ is an income (or total expenditure) elasticity measure relating the effect of a change in income on the availability of that nutrient. In other words, the measurement of D_{kH} represents the weighted average of all own- and cross-price elasticities $\left(e_{GH}{}'s\right)$ in response to a change in the H^{th} price, with each weight expressed as the share of each food group's contribution to the k^{th} nutrient $\left(a_{kG} Q_G/\psi_k{}'s\right)$. Similarly, ρ_k represents the weighted average of all income elasticities $\left(e_G{}'s\right)$, with each weight expressed as the share of each food's contribution to the k^{th} nutrient. The matrix of nutrient elasticities is thus obtained as the product of nutrient shares of food groups S, and food demand elasticities:

$$N = S \times E. \qquad \text{[B3]}$$

Table B1: Nutrient elasticities in 1995 when per adult equivalent expenditure<= 10th per adult equivalent expenditure

	1995							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	0.08002	0.1538	-0.14389	-0.31156	0.033932	0.04091	0.064344	0.8432
Protein	-0.09412	0.004511	-0.10043	-0.32215	0.049947	-0.08951	-0.01023	0.95675
Fat	0.34152	0.23272	-0.15136	-0.53087	-0.09107	0.13891	0.05118	0.83362
Carbohydrate	-0.09774	0.12345	-0.15216	-0.1174	0.13804	-0.01037	0.0957	0.82178
Niacin	-0.07006	-0.03719	-0.09443	-0.38455	0.028495	-0.10469	-0.02813	0.99751
Iron	-0.06575	-0.02522	-0.17077	-0.1685	0.056169	-0.10265	0.013464	0.94306
Calcium	-0.0352	0.01938	-0.27912	-0.10043	0.046423	-0.14773	0.007227	0.93082
Thiamine	-0.04091	-0.06039	-0.1562	-0.25102	0.036297	-0.11058	-0.00842	0.97687
Riboflavin	-0.04638	-0.01902	-0.22882	-0.2192	0.020505	-0.16511	-0.0215	0.99029
Notes:								

Table B2: Nutrient elasticities when per adult equivalent expenditure between 10th and 25th per adult equivalent expenditure in 1995

	1995							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	0.13686	0.17121	-0.16086	-0.3219	0.061013	0.03967	0.068797	0.82779
Protein	-0.02501	0.027021	-0.11937	-0.34444	0.058931	-0.08979	-0.00665	0.94386
Fat	0.34802	0.2368	-0.15465	-0.54679	-0.05632	0.13957	0.052764	0.82846
Carbohydrate	0.008865	0.15768	-0.18248	-0.12388	0.15691	-0.00761	0.10286	0.7943
Niacin	-0.01192	-0.01483	-0.11625	-0.40493	0.035857	-0.10285	-0.02474	0.98668
Iron	-0.00543	0.004716	-0.22266	-0.16467	0.065252	-0.09932	0.019105	0.92843
Calcium	-0.01365	0.033128	-0.3099	-0.10442	0.05062	-0.13609	0.009874	0.92341
Thiamine	0.003686	-0.03641	-0.19351	-0.27439	0.03787	-0.11074	-0.00934	0.9759
Riboflavin	-0.02194	-0.00722	-0.25943	-0.23497	0.021996	-0.15681	-0.02158	0.98827
Notes:								

Table B3: Nutrient elasticities when per adult equivalent expenditure between 25th and 50th per adult equivalent expenditure in 1995

	1995							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	0.1633	0.18225	-0.16303	-0.32491	0.069403	0.040053	0.057481	0.81992
Protein	0.015493	0.047247	-0.12265	-0.39008	0.063447	-0.07561	-0.00419	0.9369
Fat	0.33124	0.22386	-0.15374	-0.5555	-0.05367	0.13359	0.049885	0.83803
Carbohydrate	0.071647	0.18752	-0.18676	-0.11306	0.17073	-0.00084	0.082606	0.76967
Niacin	0.022476	0.008521	-0.11912	-0.45051	0.040173	-0.08782	-0.02178	0.97908
Iron	0.033151	0.034538	-0.2288	-0.19049	0.073109	-0.08892	0.021181	0.91542
Calcium	-0.0036	0.04629	-0.33352	-0.11294	0.054855	-0.09399	0.011437	0.91577
Thiamine	0.031858	-0.00838	-0.19692	-0.31847	0.041493	-0.09815	-0.00768	0.97018
Riboflavin	-0.00943	0.004942	-0.27252	-0.26195	0.024459	-0.12189	-0.02145	0.98361
Notes:								

Table B4: Nutrient elasticities when per adult equivalent expenditure between 50th and 75th per adult equivalent expenditure in 1995

	1995							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	0.25169	0.2176	-0.17863	-0.35269	0.12337	0.055738	0.068654	0.78501
Protein	0.089924	0.072022	-0.13143	-0.4285	0.076901	-0.05673	0.005134	0.91403
Fat	0.37033	0.25155	-0.17031	-0.61778	0.047626	0.16036	0.059869	0.81307
Carbohydrate	0.20265	0.23511	-0.20419	-0.10343	0.20089	0.005676	0.096382	0.72017
Niacin	0.081099	0.032071	-0.12554	-0.49091	0.051223	-0.06928	-0.01314	0.95969
Iron	0.10378	0.063522	-0.24418	-0.21041	0.087544	-0.07556	0.030588	0.89125
Calcium	0.015865	0.062353	-0.35803	-0.12392	0.064122	-0.04134	0.015442	0.90019
Thiamine	0.080123	0.015795	-0.20588	-0.35257	0.050735	-0.08146	-0.00062	0.95407
Riboflavin	0.012621	0.017069	-0.28598	-0.29326	0.030781	-0.08185	-0.01833	0.97354
Notes:								

Table B5: Nutrient elasticities when per adult equivalent expenditure >=90th per adult equivalent expenditure in 1995

	1995							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	0.36282	0.28689	-0.20384	-0.38565	0.16411	0.074344	0.070474	0.74606
Protein	0.18526	0.14121	-0.15616	-0.49092	0.093469	-0.03187	0.015903	0.88679
Fat	0.37459	0.25175	-0.18452	-0.64477	0.098163	0.17066	0.063645	0.80835
Carbohydrate	0.40896	0.36966	-0.24346	-0.09577	0.25082	0.020804	0.096336	0.63807
Niacin	0.15741	0.11123	-0.14856	-0.55688	0.065676	-0.04529	-0.00314	0.93539
Iron	0.21245	0.17839	-0.28696	-0.24987	0.11475	-0.05204	0.047501	0.84621
Calcium	0.041654	0.10259	-0.40098	-0.14044	0.076444	0.030083	0.022469	0.87795
Thiamine	0.13978	0.10453	-0.24684	-0.40888	0.060002	-0.06751	0.005797	0.93939
Riboflavin	0.03821	0.052068	-0.32267	-0.31966	0.037967	-0.0344	-0.01444	0.96049
Notes:								

Table B6: Nutrient elasticities in 1997 when per adult expenditure in 1997 <= 10th per adult real expenditure in 1995

	1997							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	-0.59093	-0.21931	-0.01487	-0.1921	-0.05101	-0.16132	0.012533	0.78846
Protein	-0.55835	-0.19536	-0.09266	-0.53972	-0.0267	-0.13521	-0.01648	0.88502
Fat	-0.27145	-0.22697	-0.16815	-0.74988	-0.08867	-0.03517	-0.05331	1.0516
Carbohydrate	-0.71197	-0.22286	0.059256	0.10146	-0.04339	-0.21482	0.042997	0.66992
Niacin	-0.43162	-0.20918	-0.12966	-0.46954	-0.01966	-0.18209	-0.05232	0.93974
Iron	-0.47701	-0.23798	-0.05546	0.031338	-0.03129	-0.26317	-0.03517	0.82411
Calcium	-0.35149	-0.252	-0.08683	0.26427	-0.01655	-0.33191	-0.06758	0.86031
Thiamine	-0.40365	-0.20769	-0.14914	-0.54869	-0.02819	-0.17781	-0.05409	0.96397
Riboflavin	-0.31227	-0.24546	-0.11728	0.084816	-0.00743	-0.31075	-0.08459	0.91298
Notes:								

Table B7: Nutrient elasticities in 1997 when per adult expenditure in 1997 between 10th and 25th per adult real expenditure in 1995

	1997							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	-0.58078	-0.22907	0.00439	-0.14819	-0.06051	-0.18719	0.017899	0.73934
Protein	-0.54326	-0.19878	-0.07527	-0.49613	-0.03157	-0.1557	-0.01246	0.83966
Fat	-0.25527	-0.2225	-0.14911	-0.66218	-0.10256	-0.03989	-0.04927	1.0235
Carbohydrate	-0.71634	-0.2394	0.08402	0.14505	-0.0508	-0.25435	0.051411	0.603
Niacin	-0.42335	-0.21056	-0.11611	-0.39924	-0.02367	-0.19225	-0.05165	0.90308
Iron	-0.48143	-0.24144	-0.04876	0.08995	-0.03565	-0.27496	-0.03811	0.79034
Calcium	-0.3617	-0.26247	-0.09076	0.31547	-0.01745	-0.31797	-0.0739	0.8425
Thiamine	-0.39288	-0.19498	-0.1466	-0.51396	-0.03206	-0.185	-0.0546	0.93527
Riboflavin	-0.32271	-0.2564	-0.11481	0.1424	-0.00859	-0.29283	-0.08849	0.89418
Notes:								

Table B8: Nutrient elasticities in 1997 when per adult equivalent expenditure in 1997 between 25th and 50th per adult real equivalent expenditure in 1995

	1997							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	-0.58472	-0.23012	0.017516	-0.12256	-0.06307	-0.21304	0.01821	0.68496
Protein	-0.52461	-0.18917	-0.06673	-0.51433	-0.03638	-0.17104	-0.00694	0.80404
Fat	-0.24609	-0.2216	-0.1404	-0.65266	-0.07837	-0.04077	-0.04823	1.0078
Carbohydrate	-0.7463	-0.24492	0.10749	0.21529	-0.06343	-0.29936	0.053384	0.51402
Niacin	-0.412	-0.19398	-0.11483	-0.4407	-0.02692	-0.18913	-0.04889	0.88515
Iron	-0.50024	-0.22861	-0.04694	0.097124	-0.04168	-0.2839	-0.03508	0.75609
Calcium	-0.37194	-0.26671	-0.09825	0.35001	-0.01816	-0.30744	-0.07784	0.83105
Thiamine	-0.38866	-0.16457	-0.14684	-0.53448	-0.03615	-0.18975	-0.05133	0.91306
Riboflavin	-0.32815	-0.25833	-0.12015	0.14593	-0.00924	-0.27222	-0.09066	0.88787
Notes:								

Table B9: Nutrient elasticities in 1997 when per adult equivalent expenditure in 1997 between 50th and 75th per adult real equivalent expenditure in 1995

	1997							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	-0.57418	-0.22608	0.023643	-0.12544	-0.06644	-0.23671	0.013437	0.65012
Protein	-0.50004	-0.17623	-0.0701	-0.56346	-0.04021	-0.18913	-0.00601	0.79056
Fat	-0.23711	-0.2206	-0.13881	-0.65684	-0.06312	-0.05039	-0.0484	1.0036
Carbohydrate	-0.75657	-0.24339	0.12831	0.26176	-0.07542	-0.341	0.048215	0.44019
Niacin	-0.38885	-0.18223	-0.11698	-0.43034	-0.02768	-0.21112	-0.05235	0.88079
Iron	-0.48537	-0.21389	-0.04981	0.1339	-0.04434	-0.31654	-0.04122	0.7474
Calcium	-0.36607	-0.25771	-0.09788	0.35696	-0.01881	-0.32796	-0.07691	0.82852
Thiamine	-0.37269	-0.14106	-0.15219	-0.54766	-0.03746	-0.20724	-0.05517	0.90951
Riboflavin	-0.32009	-0.25089	-0.1166	0.15343	-0.00949	-0.29094	-0.09007	0.88726
Notes:								

Table B10: Nutrient elasticities in 1997 when per adult equivalent expenditure in 1997 >=90th per adult real equivalent expenditure in 1995

	1997							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	-0.58637	-0.23386	0.042555	-0.0394	-0.07808	-0.29752	0.034469	0.53998
Protein	-0.49113	-0.16828	-0.04648	-0.51069	-0.04914	-0.21278	0.003519	0.70827
Fat	-0.24591	-0.22676	-0.11317	-0.5593	-0.04702	-0.04413	-0.04344	0.95792
Carbohydrate	-0.81164	-0.25823	0.15336	0.42448	-0.10351	-0.4738	0.088111	0.24777
Niacin	-0.3927	-0.1662	-0.10816	-0.41633	-0.03408	-0.19345	-0.04894	0.8327
Iron	-0.51803	-0.20552	-0.06162	0.17088	-0.05275	-0.30766	-0.04083	0.68812
Calcium	-0.40306	-0.28596	-0.1202	0.43481	-0.02026	-0.26372	-0.09059	0.80445
Thiamine	-0.38099	-0.10584	-0.14908	-0.49252	-0.04474	-0.21177	-0.04888	0.85797
Riboflavin	-0.34933	-0.27404	-0.13162	0.19607	-0.0107	-0.21502	-0.09948	0.86743
Notes:								

Table B11: Nutrient elasticities in 2001 when per adult expenditure in 2001 <= 10th per adult real expenditure in 1995

	2001							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	-0.92933	-0.65489	-0.23071	-0.11263	-0.27755	-0.4212	-0.09175	0.88894
Protein	-0.79696	-0.60402	-0.19498	-0.44779	-0.16662	-0.35171	-0.03959	0.98048
Fat	-0.81552	-0.49757	-0.20688	-0.20111	-0.35538	-0.32957	-0.09019	0.88307
Carbohydrate	-1.0484	-0.79395	-0.26033	0.054397	-0.24221	-0.51176	-0.10932	0.87423
Niacin	-0.72436	-0.61922	-0.1925	-0.54049	-0.15403	-0.32803	-0.0385	1.0152
Iron	-0.8223	-0.74459	-0.24589	-0.19534	-0.18972	-0.40096	-0.06286	0.97506
Calcium	-0.76069	-0.60182	-0.21772	0.008708	-0.17058	-0.33667	-0.07338	0.96465
Thiamine	-0.76934	-0.75573	-0.22847	-0.30532	-0.17551	-0.37376	-0.05417	0.98528
Riboflavin	-0.68802	-0.55317	-0.20265	-0.23478	-0.15055	-0.30336	-0.06084	1.0162
Notes:								

Table B12: Nutrient elasticities in 2001 when per adult expenditure in 2001 between 10th and 25th per adult real expenditure in 1995

	2001							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	-0.95961	-0.70383	-0.25959	-0.11131	-0.26727	-0.46026	-0.10823	0.86804
Protein	-0.7899	-0.63461	-0.21893	-0.46434	-0.17943	-0.38207	-0.04262	0.96636
Fat	-0.89359	-0.547	-0.22342	-0.19508	-0.30268	-0.36383	-0.09785	0.86258
Carbohydrate	-1.0582	-0.84765	-0.3001	0.063519	-0.26419	-0.55702	-0.13473	0.84384
Niacin	-0.71483	-0.63771	-0.21548	-0.56033	-0.16371	-0.35175	-0.04161	1.0035
Iron	-0.81421	-0.76305	-0.2977	-0.19405	-0.19946	-0.42359	-0.06703	0.95611
Calcium	-0.73911	-0.58954	-0.25083	0.013915	-0.1691	-0.34707	-0.07281	0.95342
Thiamine	-0.74948	-0.75447	-0.26454	-0.34901	-0.18026	-0.38671	-0.05482	0.98055
Riboflavin	-0.65289	-0.53359	-0.23137	-0.257	-0.14751	-0.30773	-0.06081	1.012
Notes:								

Table B13: Nutrient elasticities in 2001 when per adult equivalent expenditure in 2001 between 25th and 50th per adult real equivalent expenditure in 1995

	2001							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	-0.98118	-0.73939	-0.27359	-0.11418	-0.27298	-0.4897	-0.11664	0.85199
Protein	-0.7908	-0.64964	-0.22815	-0.48172	-0.19009	-0.4022	-0.04497	0.94939
Fat	-0.89311	-0.54948	-0.22247	-0.21197	-0.27945	-0.36309	-0.09663	0.86108
Carbohydrate	-1.1069	-0.91701	-0.32797	0.078418	-0.2917	-0.61534	-0.15306	0.81587
Niacin	-0.71676	-0.64458	-0.22335	-0.57286	-0.17281	-0.36913	-0.04426	0.98527
Iron	-0.83894	-0.7868	-0.31954	-0.19851	-0.2142	-0.4543	-0.07175	0.9406
Calcium	-0.75233	-0.59567	-0.26164	0.021053	-0.17444	-0.34889	-0.0755	0.94798
Thiamine	-0.77008	-0.76747	-0.28018	-0.35994	-0.19229	-0.41116	-0.05815	0.96464
Riboflavin	-0.64983	-0.5292	-0.23894	-0.26643	-0.15042	-0.30668	-0.06277	1.0056
Notes:								

Table B14: Nutrient elasticities in 2001 when per adult equivalent expenditure in 2001 between 50th and 75th per adult real equivalent expenditure in 1995

	2001							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	-1.0355	-0.81543	-0.30157	-0.10405	-0.26692	-0.54171	-0.1301	0.82379
Protein	-0.79277	-0.69004	-0.24307	-0.48697	-0.20478	-0.42944	-0.04832	0.93001
Fat	-0.98715	-0.60923	-0.24307	-0.20493	-0.21509	-0.40053	-0.10575	0.83699
Carbohydrate	-1.1462	-1.0143	-0.36579	0.096104	-0.32613	-0.68574	-0.17298	0.7815
Niacin	-0.7162	-0.6744	-0.23539	-0.57803	-0.18384	-0.38987	-0.04731	0.96737
Iron	-0.85912	-0.83894	-0.34807	-0.19122	-0.23126	-0.4894	-0.07667	0.91732
Calcium	-0.76362	-0.60975	-0.27489	0.030182	-0.17938	-0.3483	-0.07782	0.93741
Thiamine	-0.76585	-0.78268	-0.29694	-0.37875	-0.19997	-0.42562	-0.06005	0.95385
Riboflavin	-0.64644	-0.53455	-0.24938	-0.26522	-0.15332	-0.30421	-0.06496	0.99513
Notes:								

Table B15: Nutrient elasticities in 2001 when per adult equivalent expenditure in 2001 >=90th per adult real equivalent expenditure in 1995

	2001							
	Price							Total Budget
	Bread	Starches	Veget -and-fruits	Meat	Fats and oils	Dairy	Sweets	
Calories	-1.0595	-0.85047	-0.31064	-0.11981	-0.25797	-0.55901	-0.13218	0.81209
Protein	-0.78144	-0.69817	-0.24556	-0.51312	-0.20768	-0.42658	-0.04844	0.92852
Fat	-1.0275	-0.63563	-0.25522	-0.22385	-0.17422	-0.41208	-0.10738	0.831
Carbohydrate	-1.1707	-1.0763	-0.37914	0.10654	-0.3423	-0.71994	-0.18369	0.76176
Niacin	-0.71335	-0.6864	-0.23775	-0.59342	-0.18794	-0.39208	-0.04805	0.96155
Iron	-0.86429	-0.85849	-0.35161	-0.20785	-0.23741	-0.49974	-0.07711	0.91418
Calcium	-0.80516	-0.64918	-0.2867	0.034353	-0.19152	-0.34049	-0.08007	0.92976
Thiamine	-0.76161	-0.78546	-0.30297	-0.39061	-0.2031	-0.42787	-0.06073	0.95473
Riboflavin	-0.66242	-0.55738	-0.25758	-0.28572	-0.16036	-0.29677	-0.06593	0.99233
Notes:								