Analysing Food Expenditure Using Demographic Variables: Microdata Evidence from Italy

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Abstract. In this paper, the effects of some sociodemographic variables on food expenditure in Italy are evaluated. To do that, a two-stage demand model is employed, including a first stage where total expenditure allocation is analysed by means of Working's Engel model and a second stage where a complete demand system, the AIDS (Almost Ideal Demand System) model of food demand, is estimated.

The empirical analysis of this paper is based on household data, collected by ISTAT (Italian Central Bureau of Statistics), in the year 2000 (Family Budget Data).

Keywords: Food Consumption, Demographic Variables, Almost Ideal Demand System, Microdata.

1. Introduction

The development of food consumption after the Second World War caused a significant change in consumer habits. In Italy, as in other developed countries, consumption appears increasingly affected not only by the traditional economic variables (income and prices), but also by several non-economic factors, such as the demographic structure of the population and the organization of the household. Indeed, recent empirical studies [3] show evidence of the importance of some of these new variables, for example age, education, income distribution etc., clearly expressing the social and demographic transformations of the country and the cultural level of the population.

The aim of this work is, firstly, to provide an overview of the consumption of Italian households and secondly to present econometric estimates of expenditure and income elasticities taking into account the differences among three Italian geographical zones (1. North, 2. Centre, 3. South and Islands). In this econometric approach, for each of the three territorial repartitions, as a first stage, total expenditure allocation in Food and Non-Food is analysed using Working's Engel model then; then in the second stage, an AIDS model (Almost Ideal Demand System proposed by Deaton and Muellbauer [4]) is econometrically estimated for eight food commodities. The two step of the basic model were augmented by some sociodemographic variables. The information analysed comes from a survey on Italian household monthly expenditures (ISTAT Italian Central Bureau of Statistics) for the year 2000.

In the second part of the paper, the characteristics of Italian household consumptions are described focusing on differences in consumer choices according to various factors: household types, geographical collocation and education. In the third part the methodological framework

is outlined. The fourth part is devoted to the discussion on our main estimation results and conclusions.

2. Descriptive analysis of food consumption

In the nineties the Italian household consumptions were quite constant, particularly those of the major food product categories, whose demand has been in a "satiety phase" since a long time. This phenomenon is typical only of major categories. However, it still remains a significant dynamism within the main aggregates and that is related not only to the traditional explicative variables (price and income) but also to socio-demographic factors.

In Table 1 food consumption in kg per capita over the period 1985-2000 is reported. From these FAO data it is possible to observe the maturity of some sectors, such as cereals (+1%), dairy products (−10%), even, with regard to year 1990, the vegetal oils. Fruit and vegetables presented good performances, often connected with a new interest in a healthy diet. Furthermore, meat consumption exhibits a good upturn starting from 1998, in spite of some reverse tendencies in this sector that cause a sort of compensation at the aggregated level. A slight downturn is in the consumption of alcoholic beverages, where the decreasing wine consumption contrasts the increasing beer consumption.

Table 1. Food Consumption in Italy (kg per capita per year).

	1985	1990	1995	1997	1998	1999	2000	change (00/85)
Bread and Cereals	158	158	157	159	159	160	160	+1%
Vegetables	172	173	177	177	173	184	185	+7%
Fruit	115	129	119	116	122	136	144	+25%
Meat	79	86	84	85	87	90	91	+15%
Animal fats	9	10	11	11	12	11	11	+17%
Milk	279	256	232	248	269	248	250	−10%
Eggs	11,7	11,6	11,9	12,7	12,4	13,4	12,4	+6%
Fish and Seafood	22	23	23	23	25	25	25	+13%
Starchy Roots	38	43	37	38	41	39	41	+8%
Sweeteners	28	30	30	32	32	32	32	+12%
Vegetable Oils	23	26	25	25	26	27	27	+18%
Alcoholic beverages	98	86	82	80	82	82	82	−16%

Source: FAO

In Table 2, the monthly average expenditure in euro is reported. According to the data of the ISTAT survey on household consumption, in the year 2000 the average monthly household expenditure was 2.178 euro, with an increase of 4,3% with respect to the previous year and of 4,9% with respect to 1998. While food and beverage consumptions exhibit an increase of around 1%, non-food consumptions exhibit a major growth rate (5%) in the last year, even with some differences among the categories. The expenditure share of food products out of the total expenditure is decreasing and attesting to around 18,6% in the last year considered.

In 2000 the Italian households spent on average 404 euro per month for food products; the expenditure for meat is the most relevant component, followed by the expenditure for potatoes,

fruit, vegetables, bread and cereals. The non food products expenditure is around 1.174 euro, whose main part consists of expenditures for the house (486 euro), including costs for rent, some domestic needs and maintenance.

In Table 3 consumptions for different Italian geographic zones are reported. As can be seen, according to the zone, household consumptions exhibit many differences in both the level and the structure. In absolute values, the highest levels of expenditure can be observed in the North with a monthly average expenditure equal to 482 euro, while the lowest level of expenditure is in the Centre with 454 euro per month. In relative values, it can be noticed that the incidence of food expenditure is higher in the Islands (25,1%) and in the South (not including islands) (25%).

Observing the specific food categories, we found from the analysis that bread and cereal consumptions are higher in the Islands than in other parts of Italy. South of Italy (excluding islands) households have the most significant expenses for meat (they spend on average 103 euro per month). In general, meat consumption is the most relevant among the other food consumption categories; in the South and in the Islands it is 21% of the total food expenditure. Northern households spend less also on fish purchases. Indeed, fish expenditure in the North is around 27 euro, very different from the 45 euro of the South. The monthly average expenditure for fruit and vegetables does not exhibit differences in the various geographical zones.

Table 2. Monthly average expenditure per typology of commodity category
(euro per capita per month)

	1998		1999		2000	
	euro	%	euro	%	euro	%
Bread and cereals	66,33	3,2	65,66	3,1	67,83	3,1
Meat	94,25	4,5	93,48	4,5	94,12	4,3
Fish	31,33	1,5	32,26	1,5	33,85	1,6
Milk, cheese and eggs	57,00	2,7	55,52	2,7	55,66	2,6
Oil and fats	17,63	0,8	17,49	0,8	15,96	0,7
Potatoes, fruit and vegetables	70,08	3,4	68,86	3,3	69,45	3,2
Sugar, coffee	30,17	1,5	29,40	1,4	30,36	1,4
Beverages	36,83	1,8	36,79	1,8	37,08	1,7
Food and beverage	**403,63**	**19,4**	**399,46**	**19,1**	**404,30**	**18,6**
Tobacco	19,87	1,0	19,65	0,9	19,68	0,9
Clothing and footwear	139,34	6,7	138,86	6,7	144,58	6,6
Lodging	454,31	21,9	467,46	22,4	485,62	22,3
Energy, liquid fuel	98,12	4,7	99,54	4,8	100,16	4,6
Furniture, household appliances	142,42	6,9	146,82	7,0	160,94	7,4
Medical sevices	92,26	4,4	88,85	4,3	86,01	3,9
Trasportation	314,89	15,2	320,00	15,3	334,13	15,3
Communication	44,09	2,1	45,67	2,2	49,95	2,3
Education	27,30	1,3	26,80	1,3	28,50	1,3
Free time, hobbies	109,34	5,3	106,83	5,1	115,78	5,3
Other services	231,08	11,1	228,17	10,9	248,16	11,4
Non food	**1.673,02**	**80,6**	**1.688,65**	**80,9**	**1.773,52**	**81,4**
Monthly Average Expenditure	**2.076,65**	**100,0**	**2.088,11**	**100,0**	**2.177,82**	**100,0**

Source: ISTAT, our elaboration

The new food consumption habits, very connected with work and scholastic activity, frequently push Italian families to have meals away from home. As far as monthly average expenditure is concerned, there is an obvious difference between the North (70 euro) and the South (38 euro).

In Table 4, consumptions for different family structures are reported. In particular, three different family typologies have been considered following the demographic studies of ISTAT [9, 10, 11, 12, 13]. The first group consists of families with only one member, the second of couples without children, the third of the so-called "extended families", including all the families where there is at least one child whose age is between 0 and 5 years and an older member whose age is over 65. The first two typologies have been divided in three classes according to the age of the household head: 0-34 years, 35-65 years, over 65 years. In this way, we want to analyse how the different lifestyle, expressed by the structure of the family and the age of the members, can influence consumption choices.

Table 3. Food consumption per geographical zone (euro per capita per month)

	North		Centre		South*		Islands*	
	euro	%	euro	%	Euro	%	euro	%
Bread and cereals	71,59	14,8	63,30	13,9	66,91	14,0	69,41	15,0
Meat	89,08	18,5	96,44	21,2	103,33	21,6	100,55	21,7
Fish	27,20	5,6	35,32	7,8	45,08	9,4	44,30	9,5
Oil and fats	16,13	3,3	15,13	3,3	17,79	3,7	16,97	3,7
Dairy products, eggs	58,36	12,1	49,63	10,9	62,89	13,1	51,64	11,1
Potatoes, vegetables	35,28	7,3	32,12	7,1	37,00	7,7	34,58	7,5
Fruit	35,65	7,4	35,60	7,8	36,97	7,7	34,00	7,3
Sweets	14,54	3,0	12,59	2,8	15,43	3,2	14,63	3,2
Other food	4,04	0,8	2,79	0,6	3,74	0,8	3,53	0,8
Non-alcoholic beverages	32,71	6,8	30,34	6,7	35,03	7,3	33,07	7,1
Alcoholic beverages	18,25	3,8	16,96	3,7	16,46	3,4	16,71	3,6
Meals away from home	79,30	16,4	64,03	14,1	38,30	8,0	44,53	9,6
Food and beverage	**482,14**	**19,0**	**454**	**20,5**	**478,92**	**25,0**	**463,91**	**25,1**
Non food	**2.053,27**	**81,0**	**1.766**	**79,5**	**1.436,81**	**75,0**	**1385,34**	**74,9**

Source: ISTAT, our elaboration.
* In the third and fourth part we only the expression South is used that includes South Italy, Sardinia and Sicily.

From a general point of view, we can observe in the families with only one member that food consumption is a relevant share of the monthly expenditure of an elderly (24% of the total) but it is less relevant (18%; 20%) for the other two age groups (0-34; 35-65).

As far as the details of food consumption are concerned, there are no big differences between the first two typologies of families when the age of the members belongs to the groups 0-34 and 35-65.

Meat consumption is the most relevant. It is slightly higher in the age-group 35-65 (16,8%, for one-member families and 19% for couples without children). Bread and cereal consumption is around 12,4% and 13,5%, followed by the consumption of dairy products and eggs, fruit and vegetables.

Table 4. Food consumption per family structure in Italy (euro per capita per month).

	One member			Couple without children			Extended family	
	0-34	35-65	over 65	0-34	35-65	over 65	With children of age 0-5	With elderly of age over 65
Food	335,61	337,19	247,90	443,60	462,57	395,49	535,50	447,01
Bread and cereals	41,54	41,95	37,17	61,17	62,68	57,78	82,54	65,58
Meat	47,52	56,54	49,94	70,57	88,29	84,79	105,63	96,62
Fish	16,13	21,31	17,13	30,61	34,01	32,19	38,81	34,63
Oils and fats	7,52	11,05	12,07	10,63	15,54	17,41	15,30	18,53
Dairy products, eggs	31,67	35,31	32,79	43,59	52,89	49,94	72,08	55,25
Potatoes, vegetables	20,18	23,15	21,52	29,33	35,00	32,73	35,04	35,52
Fruit	19,80	23,78	22,88	27,65	35,02	34,80	37,02	37,58
Sweets	8,93	8,85	8,17	13,44	12,08	11,92	17,56	13,36
Other food	2,90	2,80	2,34	2,98	3,61	3,17	4,00	3,48
Non-alcoholic beverages	21,30	22,64	20,21	29,56	31,23	27,97	37,89	31,46
Alcoholic beverages	11,53	14,24	7,33	17,64	20,61	17,62	16,11	19,01
Meals away from home	106,58	75,57	16,35	106,45	71,62	25,18	73,52	36,00
Non food	1.545,11	1.342,86	800,24	2.130,11	1.891,15	1.264,96	2.092,96	1.469,53

Suorce: ISTAT, our elaboration

The consumption of bread and cereal and fruit and vegetables seems to be affected by the presence of a child or an elderly. Indeed, in the "extended family" structure the consumptions of these food products are slightly higher then in the other structures.

Table 5. Share of food consumption for number of family members in Italy, 2000 (in %)

	1	2	3	4	5	>5
Bread and cereals	13,6	14,1	14,4	15,1	15,0	15,3
Meat	18,2	19,7	20,4	20,7	21,4	22,5
Fish	6,4	7,5	7,4	7,5	7,6	7,5
Oils and fats	3,9	3,8	3,3	3,2	3,5	3,4
Dairy products, eggs	11,7	11,9	11,9	12,1	12,5	12,3
Potatoes, vegetables	7,6	7,8	7,3	7,1	7,0	7,3
Fruit	7,9	8,0	7,5	7,2	7,4	7,2
Sweets	2,9	2,9	2,9	3,1	3,2	3,2
Other food	0,9	0,8	0,7	0,7	0,8	0,8
Non-alcoholic beverages	7,3	7,0	6,7	6,8	6,9	6,7
Alcoholic beverages	3,5	4,2	3,7	3,4	3,6	3,6
Food away from home	16,1	12,3	13,8	13,1	11,1	10,2

Source: ISTAT, our elaboration

It can also be observed that the choice of having meals away from home varies significantly according to both the age and the family typology, with a peak of 31,7% for one-member families under 35. Also for couples without children the share of expenditure for meals away

from home is very relevant. This is very different when there is an elderly; in this case the percentage of food away from home is only 6-8% for all three family typologies considered.

Table 6. Food consumption per education level of the household head in Italy, 2000
(euro per capita per month)

	High level	Medium level	Low level
Food	544,00	521,81	449,69
Bread and cereals	73,46	73,57	66,65
Meat	92,16	97,98	96,32
Fish	42,15	38,39	32,76
Oils and fats	14,21	15,84	17,10
Dairy products, eggs	62,58	61,35	54,66
Potatoes, vegetables	39,81	37,59	33,56
Fruit	39,15	37,76	34,99
Sweets	15,11	15,49	13,80
Other food	4,07	3,86	3,52
Non-alcoholic beverages	33,87	35,14	31,91
Alcoholic beverages	18,88	17,81	17,41
Meals away from home	108,55	87,03	47,02
Non food	2759,28	2211,74	1485,71

Source: ISTAT, our elaboration

In Table 5, the differences in the expenditure structure according to the number of family members are reported. The incidence of the expenditure of bread and cereals is between 13,6% and 15,3% with higher percentages for families with a bigger number of members. Also for meat expenditure there is a direct relation between the number of members and expenditure: 18,2% for families with one member and 22,5% for families with more than five members. Moreover, it is interesting to observe the inverse relation between the number of members and the share of expenditure for meals away from home: from 16,1% (for families with one member) to 10,2% (for families with more than five members).

In Table 6, we describe the different consumption choices according to the level of education, expressed by the higher scholastic certification obtained by the household head. We consider three levels of education: high certification, medium certification and low certification. What is evident is that there is an inverse relation between the share of expenditure for food products and the level of education. Indeed, this share is only 16,5% for families whose household head has a high certification, while and it is 23% for families whose household head has a low certification.

As far as the details of the food aggregate are concerned, no evident differences can be noticed apart from meat consumption, which is around 16,9% for "high certification" families, 18,8% for "medium certification" families, 21,4% for "low certification" families.

The share of expenditure for meals away from home is also different. For "high certification"-families the percentage is 20%, close to the percentage for "medium certification" families (17%). For "low certification" families, the percentage is only 10%.

3. The econometric model

As introduced in the first paragraph, for each of the three geographical Italian zones, North, Centre and South (including the islands), an Engel model is used to analyse the allocation of total expenditure on the aggregates Food−Non Food, after which food demand is estimated by applying an AIDS model for eight food categories: 1) meat; 2) fish; 3) dairy products and eggs; 4) oils and fats; 5) vegetables and potatoes; 6) fruit; 7) bread and cereals; 8) beverages.

Data come from the survey on Italian household monthly expenditure (ISTAT) for the year 2000. The sample consists of approximately 23,000 households, which have been divided into three groups according to their provenance from North, Centre and South as to construct three different models, one for each zone.

As previously said, in both stages of the basic model some statistically significant sociodemographic variables are included (Table 7). They have been chosen trying in an attempt to find a sort of balance between accuracy and parsimony of the model. Indeed, the demographic aspects of the consumers are very relevant factors to explain the consumption choices. Moreover, the elasticities to total expenditure and prices can vary according to the different demographic profiles that exist inside the population. However, there are, in general, several sociodemographic variables and for this reason it is crucial to choose very carefully which one to insert in the model: too many variables render the model very complex and it becomes too difficult to interpret the results.

Table 7. Socio-demographic variables included in the two-stage model

Socio-demographic factors	Operational sociodemographic variables
Household size	z_1 = number of household members
Gender of the household head	z_2 = 1 if the household is headed by a woman (0 otherwise)
Age of the household head	z_3 = age of the household head
Social position of the household head	z_4 = 1 if the household head has a higher education (0 otherwise)
	z_5 = 1 if the household head is unemployed (0 otherwise)
Number of children	z_6 = number of children under age 14
Relative economic status of the household	z_7 = 1 if the household total food expenditure per capita is smaller then the 1st expenditure quartile (0 otherwise);
	z_8 = 1 if the household total food expenditure per capita is between the 1st and 2nd expenditure quartile (0 otherwise);
	z_9 = 1 if the household total food expenditure per capita is between the 2nd and 3rd expenditure quartile (0 otherwise);
	z_{10} = 1 if the household total food expenditure per capita is larger than the 3rd expenditure quartile (0 otherwise);

The choice of analysing total expenditure allocation (1st stage) via an Engel model depends on the fact that we do not possess the price index for the aggregates of Food and Non-Food. Therefore expenditure and elasticities for Food and Non Food aggregates are estimated using an Engel relation. In the literature there are many different proposals of functional forms. Here we employ the one proposed by Working [14], which assumes a linear relation between the budget share of each good and the logarithm of total expenditure:

$$w_i^h = \alpha_i + \sum_k^K \alpha_{ik} z_k^h + \beta_i \ln(x_T^h) + \varepsilon_i^h \tag{1}$$

where $i,j=1,2,..n$ are the commodities, $h=1,...,N$ is the family, $k=1,2,..,K$ are the demographic variables, $z^h = (z_1^h,...,z_K^h)'$ is the vector of the demographic variables, x_T^h is the total expenditure for food and non-food, $\varepsilon_i^h = (\varepsilon_1^h,...,\varepsilon_n^h)'$ is a stochastic error term that has typically zero mean and non-singular covariance matrix and is homoschedastic.

The demand system estimated at the second stage by using a SUR procedure (Seemingly Unrelated Regression), is made by seven equations: the one for the aggregate "beverages" has been deleted because of the additivity restriction.

In this work we had to deal with the so-called problem of Zero Expenditures, because not all the households of the ISTAT sample bought at least one commodity from each of the aggregated considered. The reasons for this phenomenon are many: the infrequency of the purchase, the seasonality of some products, the autoproduction of some commodities, etc. While estimating the model, it is necessary to consider this aspect, because if one includes the zero observations in the econometric estimation without special treatment, the dependent variable would exhibit a concentration of zero values and the estimation process would lead to biased and inconsistent estimators. In other words, the econometric model is misspecified. Econometric literature proposes different approaches to remove the problem of Zero Expenditure. In this work we applied the "Generalized Heckman Procedure" [6, 7, 8]. This is a two step estimation procedure to provide consistent and asymptotically efficient parameter estimates. In this model the decision to purchase is separated from the decision of the quantity to be bought. In the first step the probability that a given household will purchase a specific good is determined from a Probit regression using all available observations. This probability is used to compute the inverse Mill's Ratio for each household and each commodity. In the second step the inverse Mill's Ratio is used as an instrument that incorporates the censoring latent variables in the demand equations.

To introduce the demographic variables, we employed a method that makes possible the "translation" of the original demand system parameters according to the demographic variables. Therefore, the demand system is made by demand equation, such as the following:

$$w_i^h = \alpha_i + \sum_k^K \alpha_{ik} z_k^h + \sum_j^n \gamma_{ij} \ln p_j^h + \beta_i \ln\left(\frac{x^h}{P^{*h}}\right) + d_i MR_i^h + \varepsilon_i^h \tag{2}$$

$$\ln P^{*h} = \sum_i w_i^h \ln p_i^h \tag{3}$$

where $i,j=1,2,..n$ are the commodities, $h=1,...,N$ is the family, $k=1,2,..,K$ are the demographic variables, $\alpha_i, \gamma_{ij}, \beta_i, d_i, \alpha_{ik}$ are the parameters which have to be estimated, x is total expenditure for food, p_j is the price of the j commodity, z^h is the vector of the demographic variables, P^* is the Stone index and MR is the inverse Mill's Ratio. Finally, ε_i^h is the stochastic error term, as previously described.

The following are the parameter restrictions so that the demand equations are consistent with the theory:

$$\sum_i \alpha_i = 1; \quad \sum_i \gamma_{ij} = 0; \quad \sum_i \beta_i = 0; \quad \sum_i \alpha_{ik} = 0;$$
$$\sum_i d_i = 0; \quad \sum_j \gamma_{ij} = 0; \quad \gamma_{ij} = \gamma_{ji} \tag{4}$$

The prices in the model are the ISTAT monthly price indeces for year 2000 of the total community. They have been attributed to each family according to the month when the interview took place.

Homogeneity and symmetry restrictions, coming from the economic theory, have been imposed during the estimation of the model.

Wald test rejects the null hypothesis of no demographic effects in the model and we can include the socio_demographic variables by using a "demographic translating " linear procedure, which assumes that only the intercept carries the demographic characteristics.

Expenditure elasticities from the first and second stage are computed using the following expression:

$$e_i^h = 1 + \frac{1}{w_i^h} \beta_i \qquad (5)$$

where β_i and w_i are calculated as for Working's Engel model in the first and the AIDS model in the second stage, respectively.

The (group specific) expenditure elasticities from the first stage e_F (elasticity of food demand with respect to total household expenditure) are multiplied by those of the second stage e_i (elastiticities for food types i with respect to total food expenditure) to obtain "integrated" elasticities e_{Ii} of demand for the i-th food commodity from the second stage with respect to total expenditure:

$$e_{Ii} = e_F \times e_i \qquad (6)$$

4. Numerical results and conclusions

Tables 8, 9 and 10 present the elasticities computed from the parameter estimates and the mean budget share. The figures have an order of magnitude that can be expected for a developed country such as Italy.

Food expenditure varies with changes of household budget with an elasticity of approximately only 0.6 so that even those food types whose elasticity is well above one with respect to food expenditure have "integrated" expenditure elasticity that qualify them as necessities.

The relatively high integrated expenditure elasticity values for meat, fish and vegetables (particularly in the South) indicate that an increasing income will have positive effects on the consumption of these food types. The expenditure elasticity of non-alcoholic beverages is not easily interpretable given the heterogeneity of the aggregate and the fact that the equation is residual.

In general, first stage elasticity with respect to aggregate food is lower in the North than in the South or the Centre for all the demographic variables.

As far as the second stage is concerned, the elasticities present many interesting peculiarities, but also some common aspects.

For each food category, it can be noticed that the elasticity does not seem to be influenced by the gender of the household head, with the exception of the South where very high values are observed if the household head is male. The elasticity does not also appear to change

significantly with the expenditure quartiles and it is always higher when the household head is unemployed.

It is interesting to observe the behaviour of some specific food categories. For example, as far as fish is concerned, in the North and in the Centre, the elasticity is lower in the presence of children than in the South.

Moreover, dairy products and eggs, oils and fats exhibit an elasticity much lower in the South than in the North and the Centre.

Particularly interesting is the behaviour of the elasticity for bread and cereals. It is always lower in the presence of children, with a very low value in the South (0.159) when compared with the Centre (0.454) and the North (0.475).

From the analysis of the elasticities, it can be observed that according to the availability of expenditure there is a correspondence for a stronger aptitude to the purchase of more healthful or "luxury" food (fish and vegetables). Moreover some differences emerge among the North, Centre and South of Italy.

The discrepancies in the behaviour of consumers from various zones of Italy depend on income differences and demographic factors (different household size, different education level and average age of the household head, etc.). Indeed, in the North of Italy the incidence of food expenditure (Table 3) strongly reduced in the last decades, is approximately 19% out of the total expenditure, while in the South it is 25%.

Ceteris paribus, geographic differences depend also on different lifestyles, deep-set food traditions that tend to persist over time.

It is important to notice that expenditure data are expressed in monetary terms. Therefore, they also incorporate the price effect due to changes in the quality of the bought products. From this point of view, the strong increase in the last few years in number of poor households from the Centre of Italy (from 6% in 1997 to 9,7% in 2000) could explain why many families substitute high quality products with other similar but less expensive ones. This could also justify expenditure elasticity values being quite high for some food types.

Table 8. Expenditure elasticity; North of Italy, 2000

	ELASTICITY - STage I		INTEGRATED ELASTICITY- STAge II							
	food	non-food	meat	fish	dairy products, eggs	oils, fats	vegetables, potatoes	fruit	bread, cereals	beverages
Sample mean			*0,646*	*0,639*	*0,512*	*0,592*	*0,531*	*0,492*	*0,545*	*1,129*
Number of children										
1	0,569	1,116	0,701	0,695	0,564	0,640	0,569	0,520	0,476	1,228
2	0,569	1,116	0,689	0,684	0,562	0,628	0,551	0,497	0,470	1,222
3	0,568	1,116	0,699	0,786	0,558	0,623	0,542	0,488	0,478	1,020
no children	0,597	1,118	0,734	0,726	0,580	0,673	0,605	0,561	0,482	1,307
presence of children	0,569	1,116	0,699	0,694	0,564	0,639	0,566	0,517	0,475	1,227
Household head gender										
male	0,586	1,117	0,728	0,721	0,578	0,668	0,599	0,554	0,484	1,282
female	0,617	1,120	0,741	0,731	0,586	0,677	0,611	0,570	0,476	1,267
Household relative economic status										
food expenditure per capita smaller than the 1st quartile	0,658	1,125	0,773	0,773	0,614	0,707	0,636	0,596	0,501	0,618
food expenditure per capita between the 1st and 2nd quartile	0,627	1,121	0,754	0,746	0,597	0,691	0,621	0,576	0,496	0,624
food expenditure per capita between the 2nd and 3rd quartile	0,593	1,118	0,736	0,725	0,582	0,675	0,603	0,560	0,490	0,617
food expenditure per capita larger than the 3rd quartile	0,482	1,111	0,630	0,621	0,499	0,579	0,519	0,475	0,418	0,535
Household size										
1	0,620	1,120	0,745	0,738	0,589	0,680	0,614	0,574	0,478	1,257
2	0,597	1,118	0,745	0,734	0,588	0,683	0,614	0,571	0,484	1,296
3	0,577	1,117	0,720	0,711	0,571	0,661	0,592	0,547	0,478	1,280
4	0,578	1,117	0,713	0,709	0,569	0,656	0,584	0,534	0,484	1,284
>4	0,595	1,118	0,729	0,734	0,582	0,672	0,596	0,539	0,502	1,307
Working position of the household head										
employed	0,565	1,116	0,708	0,701	0,562	0,649	0,583	0,534	0,476	1,233
unemployed	0,623	1,121	0,755	0,747	0,597	0,693	0,621	0,567	0,486	1,326

Table 9. Expenditure elasticity; Centre of Italy, 2000

	ELASTICITY – STage I		INTEGRATED ELASTICITY- STAge II							
	food	non-food	meat	fish	dairy products, eggs	oils, fats	vegetables, potatoes	fruit	bread, cereals	beverages
Sample mean			*0,731*	*0,746*	*0,534*	*0,673*	*0,631*	*0,516*	*0,465*	*1,336*
Number of children										
1	0.642	1.101	0.701	0.713	0.529	0.644	0.598	0.473	0.455	1.230
2	0.630	1.100	0.689	0.699	0.533	0.631	0.584	0.450	0.447	1.296
3	0.625	1.100	0.686	0.723	0.537	0.626	0.576	0.424	0.434	1.100
no children	0.675	1.104	0.734	0.749	0.534	0.676	0.634	0.520	0.466	1.346
presence of children	0.640	1.101	0.700	0.711	0.530	0.642	0.596	0.470	0.454	1.235
Household head gender										
male	0.670	1.013	0.729	0.742	0.532	0.671	0.628	0.513	0.463	1.333
female	0.678	1.013	0.742	0.678	0.540	0.680	0.641	0.527	0.473	1.346
Household relative economic status										
Food expenditure per capita smaller than the 1st quartile	0.708	1.014	0.774	0.802	0.563	0.710	0.667	0.554	0.501	0.701
Food expenditure per capita between the 1st and 2nd quartile	0.692	1.013	0.753	0.769	0.553	0.694	0.650	0.534	0.475	0.695
Food expenditure per capita between the 2nd and 3rd quartile	0.676	1.013	0.735	0.817	0.395	0.679	0.595	0.347	0.263	1.371
food expenditure per capita larger than the 3rd quartile	0.580	1.012	0.632	0.637	0.461	0.582	0.544	0.439	0.394	0.553
Household size										
1	0,682	1,013	0,747	0,767	0,542	0,683	0,643	0,536	0,479	1,317
2	0,684	1,013	0,744	0,760	0,540	0,685	0,644	0,532	0,465	1,371
3	0,662	1,013	0,721	0,732	0,528	0,664	0,622	0,505	0,458	1,310
4	0,657	1,013	0,714	0,725	0,525	0,659	0,616	0,492	0,458	1,334
>4	0,673	1,013	0,730	0,749	1,000	0,675	0,628	0,494	0,476	1,372
Working position of the household head										
employed	0,651	1,013	0,709	0,720	0,520	0,652	0,610	0,492	0,455	1,270
unemployed	0,694	1,013	0,756	0,774	0,549	0,695	0,653	0,541	0,474	1,414

Table 10. Expenditure elasticity; South of Italy, 2000

	ELASTICITY – STage I		INTEGRATED ELASTICITY- STAge II							
	food	non -food	meat	fish	dairy products, eggs	oils, fats	vegetables, potatoes	fruit	bread, cereals	beverages
Sample mean			*0,703*	*0,722*	*0,589*	*0,685*	*0,699*	*0,602*	*0,501*	*1,187*
Number of children										
1	0,670	1,131	0,726	0,780	0,429	0,673	0,719	0,425	0,166	2,055
2	0,662	1,130	0,726	0,787	0,419	0,668	0,723	0,377	0,092	2,083
3	0,638	1,127	0,656	0,671	0,573	0,640	0,657	0,550	0,468	1,092
no children	0,686	1,134	0,706	0,725	0,591	0,687	0,701	0,605	0,502	1,192
presence of children	0,668	1,131	0,726	0,780	0,430	0,672	0,719	0,420	0,159	2,051
Household head gender										
male	0,453	1,255	0,467	0,481	0,383	0,454	0,464	0,391	0,318	0,836
female	0,696	1,136	0,718	0,740	0,600	0,697	0,711	0,615	0,500	1,180
Household relative economic status										
food expenditure per capita smaller than the 1st quartile	0,729	1,144	0,751	0,775	0,629	0,730	0,745	0,645	0,534	0,523
food expenditure per capita between the 1st and 2nd quartile	0,704	1,138	0,726	0,747	0,595	0,705	0,721	0,611	0,499	0,596
food expenditure per capita between the 2nd and 3rd quartile	0,678	1,133	0,700	0,722	0,571	0,679	0,696	0,581	0,464	0,585
food expenditure per capita larger than the 3rd quartile	0,557	1,119	0,576	0,592	0,467	0,558	0,572	0,479	0,381	0,471
Household size										
1	0,704	1,138	0,726	0,746	0,609	0,705	0,718	0,625	0,515	0,960
2	0,691	1,135	0,711	0,729	0,594	0,692	0,705	0,609	0,500	1,188
3	0,673	1,132	0,695	0,716	0,564	0,674	0,690	0,578	0,458	0,987
4	0,673	1,132	0,694	0,717	0,565	0,674	0,691	0,577	0,467	1,278
>4	0,686	1,134	0,708	0,733	0,574	0,688	0,705	0,585	0,476	1,339
Working position of the Household head										
employed	0,666	1,131	0,687	0,709	0,559	0,667	0,683	0,570	0,461	1,235
unemployed	0,704	1,138	0,726	0,745	0,605	0,705	0,720	0,621	0,507	1,240

References

[1] Brosig, S. (2000), "A model of household type specific food demand behaviour in Hungary", Institute of Agricultural development in Central and Eastern Europe (IAMO), Discussion Paper n.30.

[2] Carboni, R. (2003), "I consumi alimentary" in Cantarelli F. (ed.) *Rapporto sullo stato dell'agroalimentare in Italia 2001*, Monte Università Parma, Parma, pp. 187-218

[3] Conforti, P., Pierani, P., Rizzi, P.L. (2000), "Food and Nutrient Demands in Italy. Actual Behaviour and forecast through a multistage Quadratic System with Heterogeneous Preferences", Dipartimento di Economia Politica, Università di Siena, Quaderno n. 303.

[4] Deaton, A., Muellbauer, J. (1980a), "An Almost Ideal Demand System", American Economic Review, Vol. 70, n.3, pp. 312-326.

[5] Elsener, K. (1999), "Analysing Russian Food Expenditure using Microdata", Institute of Agricultural development in Central and Eastern Europe (IAMO), Discussion Paper n.23.

[6] Heckman, J.J. (1979), "Sample selection Bias as a Specification Error", Econometrica, Vol. 47, n.1, pp. 153-161.

[7] Heien, D., Durham, C. (1991), "A test for the habit formation hypothesis using households data", Review of Economics and Statistics, Vol. 73, pp. 189-199.

[8] Heien, D., Wessels, C.R. (1990), "Demand Systems Estimation with micro-data: a censored regression approach", Journal of Business and Economic Statistics, Vol. 8, n. 3, pp. 365-371.

[9] ISTAT (1993), "*Indagini multiscopo sulle famiglie 3° e 4° ciclo. Aspetti della vita quotidiana*", Istat, Roma.

[10] ISTAT (1994), "*Indagini multiscopo sulle famiglie 3° e 4° ciclo. Aspetti della vita quotidiana*", Istat, Roma

[11] ISTAT (1995), "*Indagini multiscopo sulle famiglie 3° e 4° ciclo. Aspetti della vita quotidiana*", Istat, Roma

[12] ISTAT (1996), "*Indagini multiscopo sulle famiglie 3° e 4° ciclo. Aspetti della vita quotidiana*", Istat, Roma

[13] ISTAT (1997), "*Indagini multiscopo sulle famiglie 3° e 4° ciclo. Aspetti della vita quotidiana*", Istat, Roma

[14] Working, H. (1943), "Statistical laws of family expenditure", Journal of the American Statistical Association, Vol. 38, pp. 43-56.