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THE DETERMINANTS OF HOUSEHOLDS' FOOD CONSUMPTION IN GREECE

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Abstract

Several studies have been devoted on analyzing consumers' characteristics on demand for specific kinds of food; however less attention has been paid to the parameters of the level of food expenditures and the willingness to change this level. The aim of this survey is to illustrate the focal determinants of household expenditures on food in Greece. The procedure of the statistical and econometric analysis estimates the profile of consumers who are aware of their expenditures on food, employing a cross-sectional data set from Athens and Crete. In particular, we carried out an extensive survey of 800 questionnaires, from October 2011 to February 2012, using the stratified random sampling method. We distributed 400 questionnaires in Athens and 400 questionnaires in Crete. The results showed that independent variables of demographic and socioeconomic traits such as income, gender, age, marital status, place of residence and status of employment have an important impact on household expenditures on food. In addition, further empirical analysis supports the first law of Engel in our data. Strong associations were found between demographic, socioeconomic parameters and consumer attitude in food expenditures experimentation.

Keywords: Engel' law, consumer studies, consumer behaviour, food expenditures, home economics

1. Introduction

Theories on food expenditures have been analyzed in previous economics studies. The empirical analysis of consumers' behaviour about the household expenditures on food, gains even more interest over time. Many researchers have tried to explain the characteristics of demand for food expenditures. The dominant factors, determinants of the demand, are demographic, psychological, social and cultural. The increasing interest in research is based on the gradual differentiation of the expenditures on food across household groups. Furthermore, it is of high interest that the contemporary consumers' attitude is linked to healthy lifestyle. The idea of the "nutritional footprint" acquires even higher importance, as a dynamic phenomena observed in consumers' life, due to the decreased mortality and thus the increased life expectancy (Kinsey, 1994).

However, the current financial crisis seems to have affected consumers' attitudes in many countries. The economic uncertainty and insecurity have led consumers to take decisions minimizing their costs, even for basic needs, such as food quantity and quality. In a period of inflation and unemployment, consumers are more likely to change the composition of their expenditures (Barda & Sardianou, 2010; Francisco et al., 2013; Liu et al., 2013); therefore there is a strong shift towards consumption for cheaper products with lower nutritional value.

From a microeconomic perspective, several studies have been conducted on various determinants of food expenditures such as socio-economic and demographic factors (Jae et al., 2000; Raper et al., 2002). As expected, one of the most important determinants of the household expenditures on food is per capita monthly income. More specifically, there is a positive relationship between income and expenditures on food (Capps & Love, 1983; Davis et al., 1983; Fan et al., 1994; Ghany et al., 2002; Gould, 2002; Heien et al., 1989; Kinsey, 1994; Kirkpatrick & Tarasuk, 2003; Manrique & Jensen 1998; McDowell et al., 1997; Nayga, 1995; Ricciuto et al., 2006). However, this relationship is not linear, highlighting the existence of non-linearities on household expenditures for food with respect to income - Engel's law- (Banks et al., 1997; Chung & Lopez, 1988; Kinsey, 1994; Vitaliano, 2010). Similarly, highly educated consumers have a different attitude towards diet style. In particular, more educated consumers try to have a more balanced dietary model, by choosing several types of food; thus, there are discrepancies in the level of food expenditures across households (Capps & Love, 1983; Davis et al., 1983; Garcia & Grande, 2010; Heien et al., 1989; Liu et al., 2013; Tarasuk, 2003; Ricciuto et al., 2006; Sabates et al., 2001).

Simultaneously, as far as consumers' age is concerned, many surveys have detected differences in the preferences between younger and elderly consumers leading to different levels of expenditures on food (Davis et al., 1983; Heien et al., 1989; Jae et al., 2000; Mihalopoulos & Demoussis, 2000; Garcia & Grande, 2010; Jacobson et al., 2010; Liu et al., 2013; Naygar, 1995; Raper et al., 2002; Ricciuto et al., 2006; Sabates et al., 2001). Employment status, gender, marital status and residence region also seem to affect the level of expenditures on food across household groups. Employment status, marital status and gender influence indirectly the level of food expenditures, due to the differences in their roles and preferences within the household. On the other hand, consumers who live in rural places can produce their own primary goods whereas consumers in urban areas have more food consumption choices leading them to have higher food expenditures (Capps & Love, 1983; Davis et al., 1983; Fan et al., 1994; Garcia and Grande, 2010; Guest et al., 2006; Heien et al., 1989; Kirkpatrick & Tarasuk, 2003; Liu et al., 2013; Manrique & Jensen, 1998; Mihalopoulos & Demoussis, 2000; Moss et al., 2007; Nayga, 1995; Oygard, 2000; Terguc, 2012). Although consumers who live in urban places used to consume a lot of money on food, nowadays this trend seems to be changing (Hossain, 2002).

Furthermore, the household behaviour of expenditures on food is directly related to the household size. As expected, previous studies have estimated that there exists a positive relationship between the number of members in a household and the level of its expenditures on food (Garcia & Grande, 2010; Heien et al., 1989; Jacobson et al., 2010; Jae et al., 2000; Manrique & Jensen, 1998; Mihalopoulos & Demoussis, 2000; Nayga, 1995; Neulinger & Simon, 2011; Ricciuto et al., 2006; Sabates et al., 2001; Teklou, 1996; Thiele & Weiss, 2003).

So far, the literature has identified a variety of economic and socio-demographic determinants that are potential factors of food consumption. However, few studies, regarding the consumer's behaviour on the household expenditures on food with the use of cross-section data have been conducted in Greece. The main objective of this article is to present and discuss the results of the analyses of the influence of several socio-demographical and behavioral determinants on expenditures in 800 Greek households during financial crisis. The paper proceeds as follows: Section 2 presents the methodological issues and the data used in the empirical analysis. Section 3 presents the empirical results, while the conclusions of the analysis and the policy implications and limitations are discussed in Section 4.

2. Methodological issues and data

The research provides insights into the determinants that affect consumers' attitude towards food expenditures. The empirical analysis is based on a cross-section data set. An extensive survey of 800 consumers using a stratified random sampling technique was carried out[1]. The dataset is based on two separate locations -Athens and Crete- due to different mentality and consuming attitudes. Specifically, Crete is characterized by a high level of own consumption, implying very different trends in consumers' behaviour with respect to food expenditures. The vehicles of the analysis are the multiple ordinary least squares regression (OLS) and the Logit model, while for performing the analyses Stata 12 statistical package was used. Each household is assumed to maximize its random utility subject to a fixed budget. Since the level of food expenditures plays an important role in this maximization, the factors that influence that level through the following expression has been tried to be detected.

$$w_i = bZ_i + u_i \qquad (1)$$

Where, w_i is a quantitative dependent variable, Z_i is the vector of independent variables, **b** is the estimated coefficients of independent variables and u_i is the error term. Therefore, in this empirical study, the following expanded specification for the proportion of expenditures of a household as a percent of total monthly expenditures was employed:

$$perfood = b_0 + b_1 lnmincome + b_2 gender + b_3 retired + b_4 incrnutr + b_5 rent + b_6 efhighkids + u_i \qquad (2)$$

Where the dependent variable *perfood*, is the level of expenditures on food in a household expressed as the percent of the total expenditures on a monthly scale and the explanatory variables are: *lnmincome* is the logarithm of consumers' monthly income; *gender* is the sex of the respondent accounting for 1 if the consumer is male and 0 otherwise; *retired* is a dummy variable that takes the value 1 if the consumer states that he/ she is retired and 0 otherwise; *incrnutr* is a dummy variable that takes the value 1 if the consumer states that he/ she has noticed that there is a large increase in food prices in the short term and 0 otherwise; *rent* is a dummy variable which takes the value 1 if the respondent declares that he lives in a rented house and 0 otherwise; *efhighkids* is a dummy variable that takes the value 1 if the consumer indicates that given the current economic situation, the increased cost of parenting is an important factor that affects consuming behaviour and 0 otherwise; u_i is the disturbance term of regression. The empirical results of the equation are presented in section 3 of this study. Table 1 summarizes the expected sign for b_j coefficients of Eq. (2).

More specifically, it is assumed that the more wealthy consumers are, the more likely it is to have higher level of expenditures on food. It is also assumed that retired consumers spend more time indoors and so they are more likely to pay more for food. Furthermore, consumers who have realized that the price level of food products has risen and consumers who believe that the increased cost of parenting is an important factor that affects consuming behaviour,

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[1] *The sampling procedure is conducted by the author.*

are included to the cluster of consumers with higher level of expenditures on food. On the other hand, consumers who live in a rented house have increased expenditures and so we assumed that they will spend less on food. In general, according to previous studies it is difficult to predict the impact of demographic characteristics on the decision to spend on nutritional needs.

Table 1. Expected sign of the variables specified in the empirical analysis.

Designation	Expected sign
Lnmincome	+
Gender	+/-
Retired	+
Incrnutr	+
Rent	-
Efhighkids	+

Due to financial measures, the examination of the differentiation of consuming behaviour regarding the quantity and quality of household food purchases is more interesting. Thus, in this survey, we also tried to estimate the reactions of consumers who are willing to reduce the level of spending on food, due to the reductions in their salary cut by 10%. More specifically, the method that was used for the econometric analysis was the logistic regression.

$$y_i = a\,x_i + e_i \qquad (3)$$

Where y_i, is as dependent dummy variable, x_i is the vector of explanatory variables, **a** is the estimated coefficients of regressors and e_i is the disturbance term of the regression. The binary Logit model is a non-linear model and is represented as:

$$Prob(y = 1|x) = \Lambda(x\beta) = \frac{\exp(x\beta)}{1+\exp(x\beta)} \qquad (4)$$

Where Λ indicates the cumulative standard logistic distribution function (Wooldridge, 2009). Logit model can be derived from an underlying latent variable model. Let's assume that y* is the unobserved variable determined by:

$$y^* = \gamma_0 + x\gamma + e, \quad y = 1\{y^* > 0\} \qquad (5)$$

The function is called indicator function which takes the value 1 if the event in brackets is true, and 0 otherwise. Assuming that e is independent of x and that it is symmetrically distributed about zero we can derive the response probability for y (Wooldridge, 2009):

$$rnutrit = a_0 + a_1 lnmincome + a_2 age + a_3 educaei + a_4 married + a_5 place + a_6 help$$
$$+ a_7 incrnutr + a_8 cheaplab + a_9 refastfood + a_{10} efhighkids$$
$$+ e_i \qquad (6)$$

where *rnutrit* is the binary dependent variable that expresses the consumers' willingness to reduce spending on food due to cut salaries by 10%; *lnmincome* is the logarithm of consumers' monthly income; *age* is the consumers' age; *educaei* is the dummy variable that takes the value 1 if the consumer has a higher education degree and 0 otherwise; *married* is the dummy variable that takes the value 1 if the consumer is married and 0 otherwise; *place*

is the dummy variable which takes the value 1 if the respondent is a resident of Athens and 0 if the respondent is a resident of Crete; *help* is the dummy variable that takes the value 1 if the consumer has asked for any form of financial assistance from a relative or from any public organization and 0 otherwise; *incrnutr* is the dummy variable that takes the value 1 if the consumer has noticed a large increase in food prices in a relatively short period and 0 otherwise; *cheaplab* is the dummy variable that takes the value 1 if the consumer states that in order to reduce the cost of spending, due to the economic crisis, chooses to buy "cheap label" products like sugar, coffee, pasta and 0 otherwise; *refastfood* is the dummy variable that takes the value 1 if the consumer has reduced the number of orders of take away meals and 0 otherwise; *efhighkids* is a dummy variable that takes the value 1 if the consumer declares that given the current economic situation, the increased cost of parenting is a factor that affects consumer behaviour and 0 otherwise and; e_i, the errors of the regression.

3. Results

In this section the results of the statistical and econometric analysis to estimate the consumers' profile based on their preferences on food consumption, are presented.

3.1 Descriptive statistics

Trying to clarify and interpret the determinants of the level of food expenditures across different households, we collected 800 questionnaires. To be more specific, we used cross section data from two regions of Greece, namely 400 questionnaires from Athens and 400 questionnaires from Crete. We chose these areas because Athens is the most populated urban area (capital city) of the country, while on the other hand, Crete is the largest island where a very high level of primary goods is being produced. As expected, these areas have discrepancies regarding the consumers' food preferences.

From the sample of 800 consumers it was estimated that on average, each household consumes around 173.88 Euros per month on food products. In particular, the food expenditures in a household represent approximately 16.82% of total monthly expenditures. More specifically, it was estimated that the average monthly income of urban consumers is 918.15 Euros while the average monthly income of rural consumers is 853.34€ respectively. As far as demographic characteristics are concerned, 46.4% of the total sample is men, 6.8% refers to retired consumers, 53.4% has higher educational status while more than 1 out of 3 consumers is dwelling in a rented house. Furthermore 49.8% indicates that there is at least one unemployed person in the household.

Simultaneously, it is noteworthy that 70% of the sample has noticed that there are inflationary pressures on food prices despite the economic crisis. Additionally, 44.9% of the sample states that they have started to substitute brand-name products with "cheap-label" products. This result is greatly remarkable as it can affect the function of many private markets. What is more, 68.4% has reduced the take away purchases, and finally, 31.8% argues that the increasing cost of parenting affects its consuming attitude.

3.2 OLS and quantile regressions

Table 2 summarizes the empirical results of the above estimators. Statistically insignificant variables are omitted from the model. All the estimated coefficients of the

explanatory variables presented in this model have the expected sign and are statistically considerable.

Table2. OLS model estimation and quantile regressions for the proportion of expenditures on food in a household as a percentage of the total monthly expenditures

Variables	OLS	$\theta = 0.25$	$\theta = 0.50$	$\theta = 0.75$	$\theta = 0.90$
C	0.129*** (0.014)	0.026 (0.021)	0.094*** (0.013)	0.186*** (0.019)	0.327*** (0.024)
lnmincome	0.003** (0.002)	0.006** (0.002)	0.007*** (0.002)	0.004 (0.002)	-0.001 (0.003)
gender	-0.025*** (0.008)	-0.023 (0.014)	-0.015 (0.009)	-0.016 (0.013)	-0.038** (0.016)
retired	0.148*** (0.024)	0.150*** (0.028)	0.167*** (0.019)	0.174*** (0.027)	0.253*** (0.031)
incrnutr	0.027*** (0.009)	0.022 (0.015)	0.032*** (0.020)	0.034** (0.014)	0.018* (0.016)
rent	-0.017* (0.008)	0.010 (0.014)	-0.014 (0.009)	-0.031** (0.014)	-0.073*** (0.016)
efhighkids	0.022** (0.009)	0.028* (0.015)	0.024** (0.010)	0.025* (0.014)	0.040** (0.017)
R^2/ Pseudo R^2	0.134	0.054	0.081	0.107	0.139

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.
   Asymptotic robust – heteroskedasticity standard errors are presented in parentheses

It should be emphasized that the dependent variable is not the entire cost of food in a household but it reflects the proportion of expenditures on food as the percentage of total monthly expenditures. This facilitates the comparisons between households. Firstly, applying the test of Breusch-Pagan for heteroskedasticity[2], the use of robust standard errors seems appropriate. Furthermore, Ramsey test indicates that the model does not have any problem of misspecification. As far as endogeneity is concerned the empirical Hausman analysis, using the variable of monthly income as an endogenous variable, did not find any problem of weak or strong endogeneity.

As expected, income per capita has positive effects on the level of expenditures on food in households (Davis et al., 1983; Garcia & Grande, 2010; Ghany et al., 2002; Heien et al., 1989; Jacobson et al., 2010; Liu et al., 2013; Manrique & Jensen, 1989; Nayga, 1995; Ricciuto et al., 2006; Teklu, 1996; Thiele & Weisse, 2003). More specifically, the estimated income elasticity equals 0.018[3]. This implies that an increase in the monthly personal income by 1% leads to an increase in the proportion of expenditures on food of the total amount of the monthly household expenditures by 0.018 percentage points (Jacobson et al., 2010; Ricciuto et al., 2006). The scientific community questions whether the effect of an increase in income follows Engel's law with respect to food consumption. Our results confirm that law, indicating that as consumers' income increases, the proportion of expenditures on food decreases (Thiele & Weiss, 2003; Vitaliano, 2010). More specifically, it can be seen that the coefficients of the logarithm of income follows an inverse U-shape form.

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[2] *The results are available from the author upon request.*
[3] *The elasticity is estimated as: Coefficient of the independent variable* ***x*** *(1 / mean of the dependent variable).*
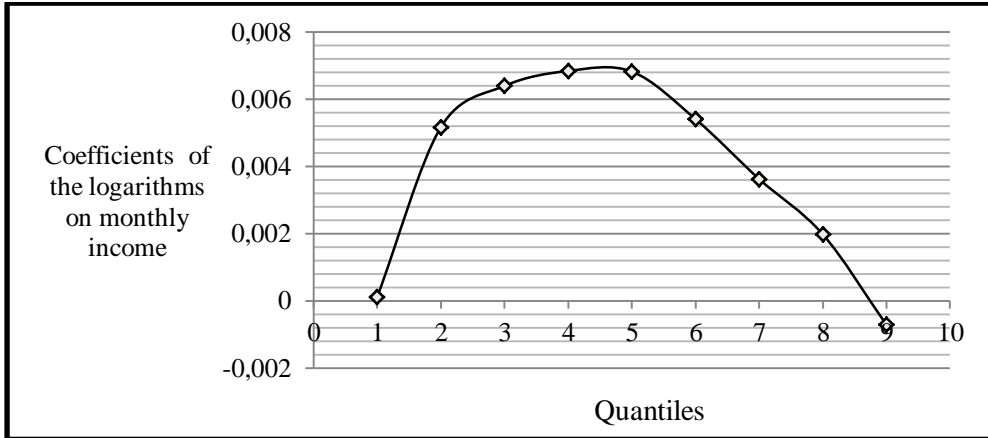
Figure 1. The coefficients of logarithms of monthly income across quantiles.

The general conclusion that can be drawn is that there are disparities in behaviour between low and high levels of expenditures on food across households. The estimated coefficients of the logarithms of income differ significantly across quantiles. The quantile technique provides considerable insight that cannot be obtained by using simple regression model. Figure 1 shows that lower income households tend to face higher expenditures on food as percent of total monthly expenses than richest income groups. Similar results can be obtained by the following figure that illustrates the histogram between total monthly expenditures per household (X-axis) and the percentage of expenditures on food to total consumers' monthly expenditures (Y-axis).
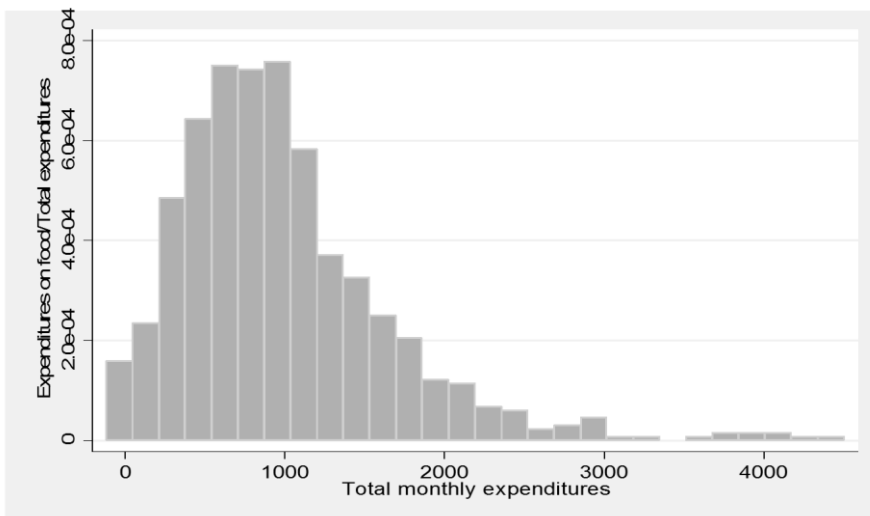

Figure 2. Histogram between total monthly expenditures per household (X-axis) and the percentage of expenditures to total monthly expenditures (Y-axis).

Figure 2 shows that there is an increasing trend of expenditures on food, with respect to total expenditures in households, up to the point of about 1,000 euros. Beyond this point, the expenditures on food are decreasing as total monthly expenditures rises also confirming Engel's law.

As far as gender is concerned, results suggest that in a household, women consume more than men (Barda & Sardianou, 2010; Manrique & Jensen, 1998; Oygard, 2000). Age was also found statistically significant; elderly consumers spend more money on food in comparison with younger consumers (Barda & Sardianou, 2010; Davis et al., 1983; Garcia & Grande, 2010; Jacobson et al., 2010; Jae et al., 2000; Manrique & Jensen, 1998). One possible interpretation of this result is that retired consumers spend more money on food because they spend more time indoors. Secondly, retired people and elderly consumers pay more attention to a healthier lifestyle which is more expensive.

Regarding consumers' preferences, an increase in prices influences the composition of food expenditures (Barda & Sardianou, 2010). More specifically, consumers who have noticed a large increase in food prices in the short term period have a higher level of expenditures on food. On the contrary, consumers who live in rented houses consume lower expenditures on food (Kirkpatrick & Tarasuk, 2003). More specifically, consumers who incur extra cost for paying their rent, try to reduce their expenditures. Simultaneously, consumers who live in urban areas consume higher expenditures on food (Davis et al., 1983; Garcia & Grande, 2010). In particular, it was estimated that consumers who live in Athens consume more expenditures on food than consumers who live in Crete. Finally, consumers who indicate that "parenting" is very costly as a social activity, spend a lot of money on food within their household. It is expected that larger households consume more (Heien et al., 1989; Jae et al., 2000; Manrique & Jensen, 1998).

3.3. Logit model

Thereafter, marginal effects of explanatory variables on the probability of reducing expenditures on food are presented in Table 3. It is straightforward to say that the estimation of the goodness-of-fit that explains the percent correctly predicted is 85.23% indicating a very good prediction of this model. The results are in agreement with previous studies.

Demographic and psychological parameters influence consumers' behaviour. As expected, consumers with higher annual family income are less likely to reduce their expenditures on food. Thus, as household income increases, the probability of reducing the expenditures on food decreases (Ghany et al., 2002; Heien et al., 1989; Jacobson et al., 2010). In contrast, the impact of age functions differently. As age increases, the probability of reducing food expenditures increases (Kirkpatrick & Tarasuk, 2003; Nayga, 1995). Simultaneously, the consumers' educational level was also estimated a statistically significant variable (Davis et al., 1983; Manrique & Jensen, 1998; Sabates et al., 2001). More specifically, higher educated consumers are less likely to reduce their expenditures on food (Jae et al., 2000). This result agrees with earlier studies; more educated consumers' expenditures on food are related to products with higher nutritional value. Household size is affected by marital status (Neulinger & Simon, 2011). Compared with single consumers, married people are less likely to reduce their expenditures on food. Region of residence has differentiated effects across households. In general, consumers who live in Athens have a higher probability of reducing their expenditures on food (Hossain, 2002). Similarly, consumers who have asked for financial aid over the last year from relatives or a public organization, are more likely to reduce their food expenditures.

Table 3. Assessment of model for the determinants of consumers' intention to reduce the expenditures on food because of further reducing their income by 10%. (N =

Explanatory variables	Coefficients	Estimated coefficients (average marginal effects)
lnmicome	-0.215*** (0.065)	-0.019*** (0.006)
age	0.039*** (0.011)	0.004*** (0.001)
educaei	-0.616** (0.271)	-0.058** (0.028)
married	-0.561* (0.312)	-0.0486* (0.024)
place	0.981*** (0.286)	0.084*** (0.023)
help	0.697** (0.275)	0.066** (0.026)
incrnutr	0.733** (0.324)	0.059** (0.023)
chelabel	0.500* (0.271)	0.046* (0.024)
refastfood	-0.967*** (0.272)	-0.102*** (0.032)
efhighkids	1.156*** (0.275)	0.121*** (0.032)
constant	-2.317*** (0.849)	-
Psuedo – R^2	0.214	-

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively. Asymptotic robust – heteroskedasticity standard errors are presented in parentheses.

Apart from economic and demographic determinants, psychological factors influence consumers' behaviour. Specifically, consumers who have noticed that prices are increasing through short time are willing to reduce the food expenditures. Furthermore, consumers who have chosen to buy "cheap label" products are more likely to limit their food expenditures. On the other hand, consumers who have chosen to reduce their expenditures for take away food are less likely to generally reduce their food expenditures.

4. Conclusions and implications

Indeed, financial crisis leads to alter the relationship between relative expenditures in households. More specifically, consumers who are influenced by the general economic environment, try to adapt their consuming behaviour in order to maximize their ordinal random utility. Demographic and behavioural characteristics are the main determinants influencing food expenditures across households. Our empirical results suggested that income is a key determinant affecting food expenditures across households. This result is

intuitive and supported by previous research. Furthermore, it was estimated that the level of food expenditures is positively affected by educational level and marital status. Highly educated consumers choose more healthy products while married consume more. Retired consumers pay more attention on healthy issues consuming more than other age categories. Females give more attention to feeding issues in a household, spending concurrently more money on food than males. Consumers who pay rent expense less money on food, as a percentage of their total expenditures, while consumers who live in urban areas consume more. Moreover, this study showed the importance of consumers' attitude on the level of prices. The inflation pressures on food products are positively related to the level of household expenditures. One more innovative result was the evidence of Engel's law. The expenditures on food are not linear with respect to income. Rich people consume lower percentage of their income on food than poorer people.

The results of this study can inform policy deliberations by public organizations. For instance, the increasing demand for low price and therefore low quality food due to economic measures may have negative influence on consumers' health. Furthermore, it may enhance the predictions of food services firms as far as their food products are concerned. However, further research is needed to achieve the goal of higher investigation of the parameters that determine food behaviour in a household. Turning, finally, to directions for further research, there are number of determinants that could not be considered in this analysis due to data limitations, however they could be hopefully incorporated in our future research.

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