

Analysis and Interpretation of Functional Connectivity of Per Capita Food Consumption in Albania

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Doi:10.5901/ajis.2016.v5n3s1p245

Abstract

This paper presents the analytical model of per capita food consumption as the main determinant component of the measurement of food poverty level (extreme poverty). The model study the relation of per capita consumption depending on a set of explanatory variables that are thought to have a statistically significant impact and are defined as influential factors in extreme poverty. Albanian households spend a considered amount on food products. More than 50 % of the total consumption goes to buy food products. This percentage in 2012, is decreased compared 2002 and have almost one point percent difference compared with 2005 and 2008. Computation: SPSS, STATA

Keywords: Engel curve, food consumption expenditure, regressive, poverty

1. Poverty Measure

In Albania the poverty is measured through consumption. An individual is considered poor if its level of per capita expenditure falls below the minimum level needed to meet basic needs for food and non food items of this individual. Household consumption is considered to be measured more accurately than income due household hesitate to declare their income, income are influenced more from seasonality or high grey economy. The reference data used in the paper and the only source to measure poverty in Albania is based on Living Standard Measurement Survey. The latest data available are from LSMS 2012. The first LSMS is conducted on 2002 and it is used as a base year to deflate results for other survey years (2005, 2008 and 2012).

Evaluation of poverty based on a multidimensional definition of poverty and not only deprivation of income or consumption, poverty is also defined in connection with not appropriate a series of arrangement of social care that are unrelated with income, such as education, health, issuing authority, using of basic services and infrastructure. Poverty is monetary and non monetary. The monetary poverty is used the cost of basic needs methodology (Ravallion and Bidani, 1994). INSTAT 2014, explain the methodology which first calculates a food poverty line, estimated through minimum of calories and after added a value for non food components for basic necessities. Food costs are the main determinant component of extreme poverty. Thus if we distribute food costs, depending on per capita spending of aligning itself regress linear form but the values are collected in the first quintile-n spending.

Extreme Poverty: The food poverty line is the level of per capita expenditure per month, necessary for an individual to take the minimum amount of 2288 calories per day. Converted in money, the food poverty line or extreme poverty line was set at 3,047 ALL per month. The non food component of the poverty line was calculated disregarding, taking into consideration the percentage of non food expenditure of those households that spend for food consumption an amount approximately equivalent to the food poverty line. The poverty line has been set at 4,891 ALL per month at constant prices (2002)¹.

Engel curve study the trend and the relationship between food expenditures and total income/expenditures. Engel curves were widely examined by using different econometric methods for different groups of goods.

2. The Engel Method of Measuring

In the empirical literature, the estimation of Engel curve has been applied across a wider set of applications, to quantify

¹http://siteresources.worldbank.org/PGLP/Resources/povertymanual_ch3.pdf

the total expenditure elasticity for different categories of commodities. The expenditures are calculated in household level so the household can be treated as a single entity and all members are assumed to possess unified preferences. The roles of income are constructed by model of expenditures as with this method also are calculated main indicators of poverty and inequality. Also the Engel curve estimates are made using consumption expenditures. Using expenditures instead of income is most common in developing countries. This happened because of grey economy, under reported, easy to declare and less sensitive and also less influenced by seasonality (Dawoud, Seham D. Z., 2013).

Engel curve tend to show the household budget shares allocation to the income or total food expenditures.

Somehow it test the Engel law that poorer households spent a higher share of total expenditure to food.

In different literatures are presented different models to prove this connection (see Deaton and Muellbauer, 1980). For the models we will the general codification for when with Y_{ij} is coded dependent variable (food consumption), X_{ij} for independent variable and α_{ij} and β_{ij} parameter. Where "j" is the good and the term "i" is the household. To explain relationship between food and expenditures exist different methods used by different authors.

One method is *linear relationship*.

You (2003) used models in the study where food, transportation, cigarette and alcohol expenditures were examined with Engel functions. As food is a necessity (Engel's law), its expenditures elasticity is less than one. But how should this elasticity vary with expenditures? Consider the linear Engel curve updated for our country in the form: food expenditure Y_{ij} (dependent variable), where α and β_1 are constants and M is income/consumption (or X_{ij} → independent variable). This is the direct linear form of the food model.

The second model could be linear form but in this case as a dependent variable taking into consideration the share of income/consumption goes for food or the food budget share w_i (that is, $w = \text{food expenditure} / M$). As w falls with income and as the slope coefficient β_1 is a positive constant, the elasticity increases with income. Accordingly, the Engel curve implies that food becomes less of a necessity, or more of a luxury as the consumer becomes more affluent, which violates economic intuition (Theil 1983). When the food consumption elasticity has the tendency to vary over countries or over households, Lluch et al. (1977) found that this elasticity tend to fall as expenditures increased. Although the rise on the income/consumption elasticity appears to be a fundamental flaw, the linear Engel curve have been explained by the linear expenditures function (Stone 1954) and the Rotterdam demand model (Barten 1964, Theil 1965).

Working, (1943) and Leser, (1963), provides another form of the model that is more related with the household utility maximization, *budget shares linearly to the logarithm of total household expenditures*. W_{ij} or Y_{ij} is the budget share on food or the dependent variable (the ratio of expenditure on food to the total household expenditure), X_i is the total household expenditure or dependent variable, α_i and β_i are parameters to be estimated and ϵ_j is an error term. An expression for the expenditure elasticity and the marginal budget share for good "j" can be derived from this equation. This model has been popular in cross-country demand studies but it suffers from the defect that for large changes in income, the budget share ultimately becomes negative or larger than unity, which is 1. The basic Working-Leser model has been extended to include other variables assumed to affect the budget shares allocated to the different types of goods (see Deaton, 1997).

Log-lin model form

Working (1943) and later Leser (1963) proposed the *log-linear budget share* supposing that better fitting this functional form. Houthakker (1957) analysed the income elasticities of 30 different countries for four different expenditure groups. Cheshier and Rees (1987) estimated the income elasticity of different food demand with the supposition that price does not change during the period of the survey.

According to Engel's law, the food budget share declines as income/consumption increases. In case that is less than 1 and is most likely to be positive (so that food is a normal good).

Another form is the *double logarithmic* (log-log) functional form is used to estimate expenditure elasticity. This functional type has proven to be the most appropriate way of estimating the expenditure elasticity of demand because of its simplicity and quite easy estimation and interpretation (Ahmed et al., 2012). Also, expenditure coefficient is the coefficient of elasticity and there is no need of calculation.

Dawoud, Seham D. Z. (2013) analyze trend of Engel curve of Egypt by log-log form. In the latter model, interests and the bargain power may differ among members and the composition of the household income is relevant in explaining expenditure decisions (Bourguignon and Chiappori, 1992; Browning et al, 1994 n.d.).

Table 1: Engel curve method

No	Author	Function	Coefficient	
			Albanian function	p-value
1	Lluch et al. (1977)	$Y_i = \alpha + \beta X_i + u_i$	$Y_i = 812 + 0.477 * X_i + u_i$	<5%
2		$Y_i = \alpha + \beta \ln X_i + u_i$	$Y_i = -34093.9 + 4358 * \ln X_i + u_i$	<5%
3		$Y_i = \alpha + \beta 1/X_i + u_i$	$Y_i = 8575 - 2.49 * 1/X_i + u_i$	<5%
4	Working (1943)	$\ln Y_i = \alpha + \beta X_i + u_i$	$\ln Y_i = 7.7 + 7.7 * X_i + u_i$	<5%
5	Dawoud, Seham D. Z. (2013)	$\ln Y_i = \alpha + \beta \ln X_i + u_i$	$\ln Y_i = 1.025 + 0.821 * \ln X_i + u_i$	<5%
6	Working (1943)	$\ln Y_i = \alpha + \beta 1/X_i + u_i$	$\ln Y_i = 9.127 + 5132.4 * 1/X_i + u_i$	<5%
7		$Y_i/X_i = \alpha + \beta X_i + u_i$	$Y_i/X_i = 0.656 - 8.08 X_i + u_i$	<5%
8	Working, 1943, Leser, 1963	$Y_i/X_i = \alpha + \beta \ln X_i + u_i$	$Y_i/X_i = 1.335 - 0.084 \ln X_i + u_i$	<5%
9		$Y_i/X_i = \alpha + \beta 1/X_i + u_i$	$Y_i/X_i = 494 + 493 * 1/X_i + u_i$	<5%

3. Trend on Food Consumption

The paper aims to study the relation of per capita consumption depending on different economic positions of individuals. The paper shows different methods and functions of relationship of food consumption with total expenditures. There are a set of explanatory variables that have a statistically significant impact and are defined as influential factors in extreme poverty.

Based on Instat (Maj 2014), the poverty is increased in 2012 compared with 2008. Normally if the poverty decrease by years, also the share of food will decrease. This means that individuals are better off and tried to spend more for non food products. This doesn't happen from 2008 to 2012 where the poverty increased again (Table 3).

Table 2: The food and per capita consumption in 2012

Variable	%	Mean
Total consumption		8,971
Food	58.4	5,055

Source: INSTAT (LSMS 2012)

The share of utilities has an increase trend by years. The share of education of real per capita consumption is also increased first three survey years. In 2012 is decreased by 0.2 point percent from 2008.

Table 3. Percentage of real consumption per capita by year

	2002	2005	2008	2012
Food	64.5	59.2	57.7	58.4
Non-food	19.4	24.5	22.7	20.0
Utilities	12.6	12.7	15.2	17.6
Education	2.3	2.7	3.8	3.4
Durables	1.2	0.9	0.5	0.6

Source: INSTAT (LSMS 2002, 2005, 2008, 2012)

According to Engel's law, by the income (consumption) increase the proposition that households spend for necessary goods decrease and they tend to spend more for non food products and luxury goods. The poor households or less developed countries tried to spend more for food and necessary products.

We have considered food and utilities are necessary goods, and non food and durables are classified as luxury commodities. The marginal budget share estimates reveals that for a one lek increase in the household budget, on average and ceteris paribus, expenditure on food commodities rises by 0.58 Lek, on non food commodities by 0.20 of a lek, on durable goods by 0.6 of a Lek and on utilities by 0.18 of a lek.

The highest level of share food is for the Central region (60.7 %) and the lowest for Tirana.

Table 4: Share of consumption

	Food	Non-food	Utilities	Education	Durables
Coastal	58.9	20.3	17.0	3.2	0.6
Central	60.7	18.5	16.7	3.5	0.6
Mountain	57.9	20.9	16.0	4.7	0.5
Tirana	52.7	22.4	21.0	3.1	0.7
Total	58.4	20.0	17.6	3.4	0.6

Source: INSTAT (LSMS 2012)

Using Engel curve framework, represent a way to analyze household consumer behavior. It describes how consumer spending behavior varies with income/consumption level, supposing that the prices are held fixed (Cristinna Cattaneo). Studying the trends by quartiles of consumption, going from the level 1 to the level 5 the mean food consumption increased, while the share of food decreased. The ratio of Q5/Q1 per capita food consumption is about 3.2 times higher and the share of food consumption has around 10 point percentage differences from the first to the fifth quartile. This means that in the highest level of consumption, or the rich people tend to spent less on food.

Table 5: Mean of food consumption and share of consumption by per capita consumption quartiles

Quartiles of consumption	Mean food consumption	Share of food consumption
First	2679	63.8
Second	3703	60.7
Third	4569	58.2
Fourth	5796	56.3
Fifth	8526	52.9
Total	5055	58.4

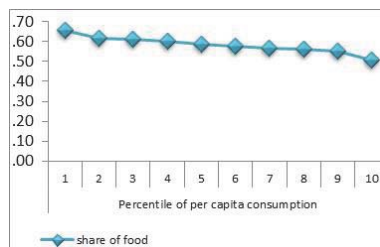


Figure 1: Share of food consumption by percentile of total consumption

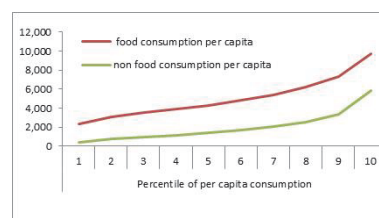


Figure 2: Food and non food consumption by percentile of total consumption

Corinna Manig,C. and Moneta,A. (2009) underline than as people become richer they get the opportunity of consuming more but also qualitatively better goods. Based on Engel's law as households became wealthier, their budget share for food is on average decreasing.

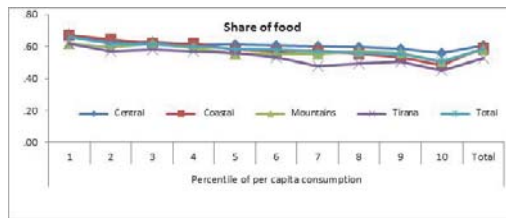


Figure 3: Share of food consumption by region and percentile of total consumption

If we split consumption more, from 5 division to 10, the trend is the same. The per capita food and total consumption increased in the richest people but the trend on share on food decreased significantly and is more visible after the 8th percentile. The difference from the bottom to the top is considered higher.

Region of Tirana has the lowest figures of share of food by percentile of total consumption. To the poor individual they spent the highest percentage on food compared with others and this percentage is almost the same for all regions. The mountain trend is not as was expected, as this has been from years, poorer regions. This is not visible to the trend of consumption as the mountain is in a good position compared with Central and Coastal. Families isolated also have less per capita consumption, though this disadvantage may be disappearing. The definition of isolation here refers to families who are away from social services. Specifically in this case, we measure it with the distance (in miles) from the nearest school.

Capita consumption varies according to *residence*. The resident in the village or rural area has average less per capita consumption compared to the average per capita consumption of residents in the urban area. Testing if have a significance difference between urban and rural area we need to test β_6 that is equivalent with testing independent two separate regressions we have a significant difference between urban and rural areas. Among the demographic *regions* there are significant differences in terms of per capita consumption. The population in mountain regions compare with the other regions are much poor and also extreme poor. As the gender of head, the variable *stratum*² we have excluded from the regression as it is not significant in statistically way at 5% level.

3.1 Regression Albanian trend of food consumption

In the table 1 we present analytically the theoretical concept of the connectivity of food consumption with the total consumption.

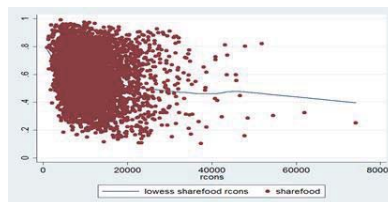


Figure 4: Share of Food consumption by total consumption

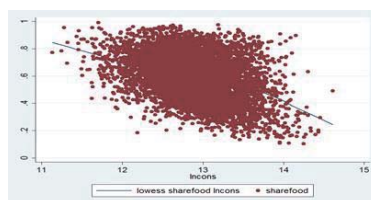


Figure 5: Share of Food consumption by Log total consumption

² The Albania geographically is divided in four stratum: Coastal, Central, Mountain, Tirana

It was estimated the functions of the food shares to the total consumption and to the log of total consumption. The following figures (4 and 5), show the connectivity and the functional trend. It is estimated the corresponding coefficients to the total and logarithm of total expenditure in the estimated shares, which are reported. The estimates for the expenditure elasticity suggest that food is a necessary good. We have also to see with the other goods like non food and durables classified as luxury commodities or utilities considered also as necessary good. Analysis the cross country influencing factors in short run poverty we saw an increase of it. Economic and social changes that have accompanied this last years have a significant influence in increase of living standard and welfare of the households. There are a set of socio-economic factors that influence the consumption trend like: changes in wages, mobility of workers (migrations and emigrations) investment, change the workers structure, changes in household composition, changes on income source. These factors have had the positive effect in the decrease of poverty and well being of the households. Analyses these factors will have determinant role in decreasing the absolute poverty and extreme poverty and country development.

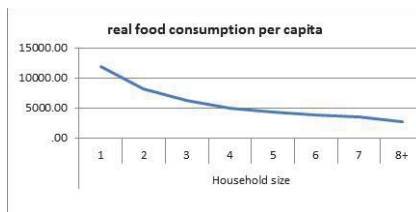
An important approach is studying the household composition, household size or number of children. Some countries use equivalent scale to give different weights on consumption children and adults. Based on Engel's second law the food share is an inverse indicator of welfare across households of different sizes and compositions. Another approach is the Rothbarth method which separates the goods of adults by goods consumed by children. In this way measure the standard of living of the adults through calculate expenditure by adults goods. This not uses directly the equivalent scale method. In our consumer, we do not use the Rothbarth method or equivalent scale but per capita consumption that takes on the consideration only the household size. Using Rothbarth method is useful to separate the cost of children as are products that are not consumed by children. We will not go through this method, using equivalence scale. For the moment we will consider as useful the household size. Larger households tend to spend more of their budgets to food than do smaller ones, holding other factors constant. These type of households mostly are households with children.

Thus, according to Engel's second law, the larger household should have a lower food share. But a decline in the food share with constant per capita expenditures can occur only if there is a decline in food spending per person. It is very unlikely that people who are better off would spend less on food, especially in less developed countries. The mean of per capita food consumption consumed on the household with one member is about 1/4 of the total (Figure 7).

Table 6: Food shares by household size



Table 7: The mean of per capita food consumption consumed by household size



Is expected that households that have the same adults but have a child (calculate child cost), the Engel curve will be up. Some researchers have used the equivalence scales from observed data on household consumption patterns. In this paper we are not going to analyze the different weights used based on household composition. It The differences in demand may reflect the preferences of the adults. Also the demand is influenced by other factors, that why is important trend in food to study with other households characteristics.

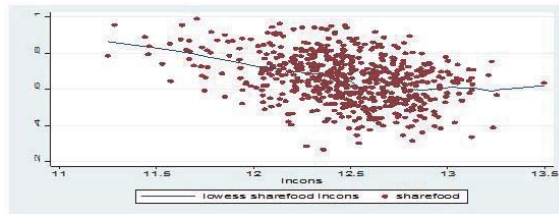


Figure 7: Food consumption of the poor

3.2 Regression of food expenditures

The analytical model is lin-log model using the Engel expenditure model.

$$rfood = \beta_1 + \beta_2 \text{Lnrcns} + u_i$$

Engel postulated that "the total expenditure that is devoted to food tends to increase in arithmetic progression as total expenditure increases in geometric progression." So $\beta_2 = \frac{\Delta Y}{\Delta \text{Ln}X}$ is change in rfood over relative change in X.

$$\frac{dY}{dX} = \beta_2 \left(\frac{1}{X} \right) \Rightarrow \beta_2 = \frac{dY}{\frac{dX}{X}}$$

If relative change of X ($\Delta X/X$ relative per capita total consumption) change with 1% or 0.01 the absolute change of per capita food consumption will increase with 0.01(β_2), so with 45.16%. Coefficients are statistically significant for 5 % level.

$$rfood = - 35501.21 + 4516.29 \text{Lnrcns} + u_i$$

$$T_v (-157.68) (180.67)$$

$$R^2 = 56.3\%$$

Some authors have analyzed also other influenced factors to per capita food consumption. (Cagayan, and Astar(2012) n.d.) analyzed the Engel Curve household food and clothing consumption in Turkey. Food costs are the main determinant component of extreme poverty. Thus if we distribute food costs, depending on per capita spending of aligning itself regress linear form but the values are collected in the first quintile-n spending. This graphical form best explains the trend that they should have.

3.3 Characteristic and significant determinants of being extreme poor

There are some characteristic that define the most important aspect of being in extreme poverty. Based on these factors we have taken in account as the determinant factors that influence the food per capita consumption (dependent). We have take in account per total consumption (lncons), size of the household (Hhsize), age of individuals (Age), average years of school (yearsch), the number of individuals that works per household (workingsum) and one variable dummy for the area (urbrural) code 1-urban and 0-rural (Table 8).

Table 8: Regression of influenced factors to the per capita food consumption

	Reg1		Rfood/rcons		Reg2		Reg3	
	β	P-value	β	P-value	β	P-value	β	P-value
Cons	- 35501.21	0.000	2.308	0.000	.425	0.442	107410	.000
Lncons	4516.29	0.000	-.133	0.000	.158	0.064	-26803	.000
Lncons2					-.0112	0.001	1720	.000
Hhsize							-192.08	.000
Age							4.41	.000
Yearsch							-61.78	.000
Urbrural							585,6	.000
Workingsum							-309.9	.000

$$(2008) Rfood = 3'867.4 + 0.309rcons - 320.9acthsize + 90.62 workinsum + 8.44age - 36.24yearsch - 741.1 urbrur$$

$t_{(56.637)} (104.511) (-34.623) (6.594) (12.584) (-10.853) (25.099)$
 $R^2 = 0.57$

$(2012) R_{\text{food}} = 107410 - 26803\text{Incons} + 1702\text{Incons}^2 - 192.08\text{acthshsize} - 309.9 \text{workinsum} + 4.41\text{age} - 61.78\text{yearsch} + 585.6\text{urbrur}$
 $R^2 = 0.67$

Large households and the new one have lowest consumption. A household with children under the fifteen years old has averaged less consumption per capita. Instead, families with a greater number of adults rather than people dependent (as reflected by the variable "low ratio of dependence") have a per capita consumption significantly higher.

Individuals with higher *education* tend to decrease the food per capita consumption. This maybe is related with the fact that they tend to buy luxury goods. The increase the mean years of school with 1 year will decrease the per capita food consumption with 61.78 leks. Changes in the human capital and increase in the expenditures for education contributes to higher qualified work force and well paid.

Poverty varies by *gender of head* of household, but it's not significant at 5% level so we have exclude as influential variable.

As the higher is the age also the higher will be per capita food consumption. From this regression we can produce also other results for the probability of being extreme poor. Maybe further can be produced a bivariate logistic regression using dichotomous dependent variable, 1- extreme poor and 0- non extreme poor.

4. Conclusion

The higher share of expenditures goes for food. With the increase of income/expenditures the share for food tends to be lower. Trends on food consumption depended by household composition and other household characteristics. When level of per capita expenditure per month, necessary for an individual to take the minimum amount of calories in one place by age and sex fall under the line of this necessity than this individual is Extreme Poor. The probability of being poor is complex and is closely related with households or national factors. The area is negatively related with the per capita food consumption.

So define the extreme poor with per capita food consumption and conclude that larger household in size, larger average years of school will decrease per capita food consumption. As larger is the number of individuals that works per households, increase of age will increased the per capita food consumption. The changes in social and economic factors this last years, changes in the market of goods and services have the main impact in the micro level. So individuals are less absolutely poor and extreme poor. This decrease year over years is related with market changes and will leave more money to spend for non food products.

The poverty is influencing from demographic factors, households characteristics and social conditions. Analyze the factors that influence individuals conditions is helpful for policy makers to eliminate the level of the people that leave in extreme poverty and achieving the Millennium Developing Goals.

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