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Equivalent Scale on Food Consumption in Turkey

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Abstract: This study investigates effect of household composition and size on food consumption in the rural and urban areas of Turkey through equivalence scales that vary by household member age. Food consumption studies on Turkey have tended to ignore the impact of household composition in consumption traditionally analyses of food consumption are conducted on a per capita basis. Equivalence scales were estimated by Engel method using Household Consumption Expenditure Survey (HCES) data of the State Institute of Statistics. This data covers 26,166 households. The results indicate; while household size increases per capita food expenditure decreases in both rural and urban areas of Turkey. They also founded that cost of additional one child is decreasing by children age as going to older. This cost is much lower in rural are than urban area of Turkey. It is frequently stated in the literature of poverty that the level and severity of poverty is higher in rural areas than urban areas. Therefore, the finding of this study shows that in rural areas, the cost of per person for obtaining the certain standard of living is lower than in urban areas in Turkey.

Key words: Engel curve, equivalent scale, food consumption, Turkey

INTRODUCTION

Equivalence scales are indexes that measure the relative cost of living of families of different sizes and compositions (Deaton and Muellbaur, 1980). They play a fundamental role in government welfare policies and permit welfare comparisons across household of different size and composition (Deaton and Muellbauer, 1986). Families with many children or older children often receive larger benefits than those with fewer or younger children from economies of scale in consumption. The existence of economies of scale means that as the households size increases, the cost per person of maintaining a certain standard of living decreases (Bosch-Domenech, 1991). Despite their importance, there is no generally accepted method of measuring household size economics. The Engel method is popular because is simple, using food budget shares to indicate the welfare of different sized households (Lancaster *et al.*, 1999).

Choosing the food share as an indicator of economic well-being is based on Engel's observation that the standard of living of a household varies with family size and is negatively related to the share of the household budget spent on food. This empirical regularity is often referred to as Engel's first law. When comparing families differing for their number of children, it is reasonable to expect that larger households need more resources to attain the same standard of living. This assertion constitutes the second empirical Engle's law. An Engel equivalence scale measures this cost difference between households of varying size from the budget shares devoted to food.

The assumption of a hierarchical preferences structure implies that an individual's propensity to spend on non-food consumption is positive only after meeting a subsistence level of food consumption. That's why estimating equivalence scale with Engel method is chosen in this study.

Thus, the main objective of the study is estimate the adult equivalent scale on food consumption for urban and rural areas in Turkey.

MATERIALS AND METHODS

The data is obtained from the 1994 Household Consumption Expenditure Survey (HCES) of the State Institute of Statistics of Turkey (SIS, 1994). HCES was applied to 2,188 sample households changing every month of 1994 from January to December. Therefore, the total sample covers 26,256 households. Our sample size is 26,166 households, 18,200 households for urban areas and 7,966 households for rural areas, (90 households were dropped from the sample because their household incomes or expenditures were not identified).

The total food expenditure consist the expenditures on commodities: bread and cereals, meat and fish, milk, cheese and eggs, fat and oil, fruits and vegetables, sugar and other foodstuffs (honey, tea, coffee, sweets, pre-prepared meals, etc). The share of food expenditure on total household expenditure is used as a dependent variable in this study.

The independent variables considered in this study: total household expenditure, household size, number of children aged under 7, number of children between 7-11 ages, number of children between 12-18 ages and number of adults over 19 age. The analysis is carried out separately for urban and rural areas.

The most frequently used method for constructing equivalence scales is that of Engel. It assumes that the greater the proportion of expenditure allocated to the purchase of food, the lower the level of well-being of the household. If two households spend the same proportion of their budgets of food (i.e., they have the same level of well-being), the relation between the total expenditures of the two households will give an index of the cost of maintaining the first household compared with the second and this index will be the equivalence scale.

The estimates of adult equivalence scales by Engel method for urban and rural areas in Turkey were obtained separately by estimating the following Engel Curves expressed in budget share on food with the extension of Working-Leser equation that incorporates a vector of demographic characteristics (Deaton and Muellbaur, 1986; Deaton *et al.*, 1989; Tsakloglou, 1991; Lanjouw and Ravallion, 1995).

$$W_f = \alpha_i + \beta \ln\left(\frac{X}{n}\right) + \delta\left(\ln\left(\frac{X}{n}\right)\right)^2 + \sum_{j=1}^{j} \gamma_j n_j + \varepsilon \quad (1)$$

Where, W_f is the food share, X is total expenditure, n_j is the number of persons in the category j (j = 1, j), n is the total number of persons in the household, α, β, δ, γ are parameters, ε is a random error.

The fit of equation is improved by the inclusion of a term quadratic in ln(X/n). The quadratic coefficients (δ) allow the possibility of items changing from necessities to luxuries or vise versa (Deaton and Muellbauer, 1986; Bosh-Domenech 1991).

The procedure for converting Engel curve estimate into equivalence scales is the following (Deaton and Muellbaur, 1986; Bosh-Domench, 1991). At the same arbitrary food share W_f, we compare the budget X^* that would cause a household to have the same food share of a reference household with budget X^0. The difference (X^*-X^0) is the additional expenditure required for the household to reach the same food share. This is, therefore, the cost associated with the different demographic characteristics of the household. The equivalence scale E is the ratio X^*/X^0. For the specific Engel curve given by Eq. 1, X^* is the expenditure required by household h to reach the same level of well-being as the reference household h = 0, with X^0 and n_j^0 (j = 1,….,j). When the food shares are equal, X^* is defined by

$$\alpha + \beta \ln\left(\frac{X^*}{n^h}\right) + \sum_{j=0}^{j} \gamma_j n_j^h = \alpha + \beta \ln\left(\frac{X^0}{n^0}\right) + \sum_{j=1}^{j} \gamma_j n_j^0 \quad (2)$$

So that, the Engel equivalence scale $E^h = X^*/X^0$, it is obtained the Eq. 3.

$$E^h = \frac{X^*}{X^0} = \frac{n_h}{n_0} \exp \sum_{j=1}^{j} \left(\frac{\gamma_j}{\beta}\right)\left(n_j^0 - n_j^h\right) \quad (3)$$

RESULTS

Table 1 presents the summary statistics of some of the principal variables. The mean household size is 4.45 for urban areas and 4.85 for rural areas. Food expenditure represents a high percentage of total household expenditure with 34% for urban areas, 48% for rural areas.

For urban area, the parameter estimation of Working-Leser model is

$$W_f = 2.3321 - 0.2081\ln(X/n) + 0.0031(\ln(X/n))^2 \quad (4)$$
$$-0.0318n_{c1} - 0.0281n_{c2} - 0.0312n_{c3} - 0.0298n_a$$

(0.2103)	(0.0013)		(0.00009)
(0.0011)	(0.0012)	(0.0019)	(0.0009)

Based on Household Consumption Expenditure data in 1994, I obtain for the whole sample of 7966 rural households one regression Eq. 5 by OLS.

$$W_f = 2.6421 - 0.2530\ln(X/n) + 0.0028(\ln(X/n))^2 \quad (5)$$
$$-0.0378n_{c1} - 0.0382n_{c2} - 0.0462n_{c3} - 0.0427n_a$$

(0.3936)	(0.0027)		(0.00016)
(0.0018)	(0.0021)	(0.0015)	(0.0145)

t- tests indicate that coefficients are different from zero for urban and rural areas, according to White test R^2 is 0.00148 for urban area, 0.00194 for rural area, Heteroscedasticiy does not appear.

Table 2 gives the estimated Equivalence Scales for urban and rural areas, using the parameters from Eq. 4 and 5, respectively. The reference household contains two adults. The cost of one child under 7 age is 58% of that of an adult for both urban and rural areas, while a child between 12-18 ages costs 58% for urban areas and 50% for rural areas. But the costs of the second or third child are much smaller. With three children between 0-18, the average cost of one child is only 18% of that of an adult in Turkey. In a similar fashion, if the number of adult increases above the initial two, the cost of the additional adult is also smaller, as can be observed in Table 2, it may come as a surprise that the cost of an additional older

Table 1: Descriptive statistics of the data

Variables	Description of the variables	Sample			
		Urban		Rural	
		Mean	Stan. dev.	Mean	Stan. dev.
X	Log of total household expenditure	15.80	0.69	15.53	0.68
W_f	Food expenditure ratio	34.00	0.16	48.00	0.17
N	Household size	4.45	1.98	4.85	2.47
n_{c1}	Child number under 7 ages in households	0.61	0.85	0.69	0.99
n_{c2}	Child number between 7-11 ages in households	0.53	0.77	0.63	0.88
n_{c3}	Child number between 12-18 ages in households	0.80	1.05	0.87	1.12
n_a	Adults in households	2.39	1.04	2.66	1.19

Table 2: Cost comparisons with different numbers of children and adults

	Cost of additional individual[1]		Adult Equivalent Scale [2]	
	Urban	Rural	Urban	Rural
No child			1.00	1.00
1 child<7	0.58	0.58	1.29	1.29
2 child<7	0.48	0.48	1.48	1.48
3 child<7	0.40	0.39	1.60	1.59
1 Child between 7-11 ages	0.62	0.58	1.31	1.29
2 Child between 7-11 ages	0.53	0.48	1.53	1.48
3 Child between 7-11 ages	0.44	0.39	1.66	1.59
1 Child between 12-18 ages	0.58	0.50	1.29	1.25
2 Child between 12-18 ages	0.48	0.38	1.48	1.38
3 Child between 12-18 ages	0.39	0.29	1.59	1.44
1 Add. Adults	0.60	0.54	1.30	1.27
2 Add. Adults	0.50	0.42	1.50	1.42
3 Add. Adults	0.42	0.34	1.63	1.51
4 Add. Adults	0.30	0.26	1.59	1.52

[1]: As a proportion of the cost of one adult, [2]: Two adult = 1

child appears higher than the cost of an additional adult. This makes sense if additional adults are elderly people, as case of Turkey, where extended families live frequently in the same household. It is frequently observed in the literature of poverty that the level and severity of poverty is higher in rural areas than urban areas. It seemed, in rural areas, the cost of per person for keeping the same standard of living is lower than urban areas Bosh-Domenech, 1991).

Estimated adult equivalent scale presented in the Table 2. The food expenditure of the reference households (consists of two adults) assumed one unit. In the same way, for example, a household with two adults and one additional child less than 7 age (in Table 2 line 2) implies an increase in the food expenditure of 29% for keeping the same standard of living respect to reference family in urban and rural areas.

DISCUSSION

Household equivalence scales are deflators that, in contrast to the mere counting the number of household members can be used to convert budgets to different household types to a needs-corrected basis. Adult equivalent scales are important in that they are necessary input in the development of income maintenance programs and in the definition of poverty lines that are dependent on household size and household composition.

A results obtained from this analyses indicates exactly that, per capita expenditure on food falls across household of different types. Larger household size is associated with a lower food share.

With the establishment of adult equivalent scales, adjusted per capita expenditures may result in substantially different poverty ranking of a particular household than if a simple member count had been used and potentially altering the measurement of poverty.

CONCLUSIONS

In conclusion, Engel estimates of equivalence scales lend support to the hypothesis of important economies of scale in household consumption and suggest that the cost of children and additional adults is well below the costs of one adult. Therefore, they caution against the use of per capita income or expenditure in setting the standards for public welfare benefit payments and question the policies that ignore the complexities of household composition. More interestingly, the results seem to indicate that there are differences between rural and urban living in comparisons of household well-being.

Analyzing gender effect on food consumption expenditures may be an interesting subject for further research.

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