

A Method for Establishing A Support Criterion or Poverty Line

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In this paper, a method for establishing a support criterion or poverty line is developed based on Engel's Law and domestic nutritional values. The support criterion is differentiated across rural and urban areas. An important result is that for 1989, people who spend less than 108,000 Rials annually lie inside the poverty line in urban areas. A further important result is that food should be given to the poor instead of money since the food allowance may not be spent appropriately and may lead to abuse.

1. Introduction

The study and finalization of a certain amount of money for the poverty criterion does not, on its own, help us identify the poor. However, once the poor are identified, by relevant and specific methods, the question that arises is how much should they receive. This is where the criterion becomes useful. The criterion is not only valuable for evaluating the amount of the subsidy, but it helps set up a progressive taxing structure.

Usually, in order to obtain the poverty criterion which is based on a specific definition of poverty, a basket containing necessary consumable commodities is considered. Next, the money value of the basket of

necessities is calculated and presented as the poverty criterion. The poverty line arrived at in this manner is not applicable to different regions or even to both urban and rural areas. Therefore, different baskets with differing prices should be considered in determining the poverty line in urban and rural areas. This makes it questionable as to what the appropriate definition of a basket of necessities is correct and what commodities should be included.

This article attempts to define a support criterion (SC) based on Engel's Law and nutritional values, which is more convenient than the abovementioned method. The SC for urban and rural areas is evaluated separately. The available data employed is the family expenditures in 1362 (1983) and 1368 (1989). If the data is available for different regions, then the SC for those regions is also readily obtainable.

Engel asserts that as income increases, the ratio of food expenditures to income will decrease and this is true for different income groups and different years. This implies that the rich spend a smaller percentage of their income on food relative to the poor. Hence, the poor prefer to spend their income first on food and then on shelter, clothing, etc. Since malnutrition is a more immediate concern. Engel emphasizes the food basket rather than any other basket of commodities and services.

In the preceding analysis, one main question arises: What is the acceptable amount of food? Is the acceptable amount composed of essential foods, which is in line with the definition of poverty? We define the acceptable intake of food according to the nutritional requirements of energy and protein. In other words, the people who do not receive the necessary nutrients are the ones who should be mainly protected. In order to distinguish among the different groups of needy, a food basket which contains the necessary materials is not considered. In its place, the consumer behavior is taken into account in order to determine the protection criterion.

2. The Protection Criterion

To determine the group that should be protected, the nutritional values for rural and urban areas with respect to expenditure for 1983 to 1989 are collected. Table 1 shows the energy and protein requirements, the main support criterion for urban and rural areas expressed in deciles for 1989.

Table 1.
Consumed Energy and Protein in 1989

	energy (kcal)		Protein (gr)	
	urban	rural	urban	rural
Average	2828	2791	96.2	82.2
1st decile	1400	1877	36.9	55.4
2nd decile	1785	2187	52.1	62.9
3rd decile	1979	2468	62.21	74.4
4th decile	2232	2527	71.9	75.7
5th decile	2420	2794	78.8	81.6
6th decile	2710	2747	94.7	78.1
7th decile	2845	2778	99.5	81.6
8th decile	3333	2918	118.6	86.2
9th decile	3863	3321	138.5	98.4
10th decile	5628	3545	208.8	120.7

The above table shows that the amount of energy and protein consumed by the first decile, the poorest, through the last decile, the richest, exhibits an increasing trend. The ratios of last decile to the first decile regarding energy and protein are respectively and approximately 4.3 and 6.6. Obviously from the energy amount of the first decile to the

last decile, several indices may be chosen. One may refer to the standard of food and health organization and specify an amount of energy. If less is consumed, this will cause serious problems resulting from energy and protein deficiencies. Similarly, another level of energy consumption may be selected above which no problem of energy shortness and malnutrition will appear. Finally, another index may be selected which if surpassed implies that the energy and other nutrients are taken abundantly and the problem evolves to one of gluttony.

Here we consider only the support region and define a contour such that anyone who falls inside, should be protected. We employ the indices that are produced by Iran's Markaze-Amar and the Institute of Nutrition and Food. Table 2 presents the necessary amounts of energy, protein, iron, and calcium.

Table 2.
Necessary Daily Nutrient Intake

energy	protein	Iron	calcium
kcal	gr	mg	mg
2168	56.8	11.3	550

Considering the energy criterion which is the most important and referring to Table 1, it is apparent that in urban areas the first through the third decile of the population should be protected, while the fourth decile group is at the boundary as far as the nutritional values are concerned. In other words, 30% of the urban population should be protected. In rural areas, only the first decile of the population needs protection.

Hereby, we established the protection line for urban and rural areas and found the percentage of each population that should be offered protection. We have yet to answer the first question, namely what is the

money value of the protection criterion and the necessary value of the subsidies required to protect each group. In order to calculate the money value of the support criterion, data on total expenditures and food expenses for each group of the population is required. Table 3 presents total expenditures and food expenses in both urban and rural areas for each decile group considered. The data reveal that the urban population in the third decile group consumed 1979 units of energy and are close to the necessary energy daily intake requirements. This group spends a total of 208,882 Rials while their food expenditures are 86,816 Rials. Similarly, the fourth decile group spends a total 262,763 Rials where 111,119 Rials is spent on food. This food expenditure surpasses the 2168 unit energy requirement. It is concluded that those who spend an amount equal to or greater than the fourth decile group locate outside the protected group, while those who cannot afford that sum should be protected.

In order to accurately draw the protection line, we need data on total expenditures and food expenses pertinent to 2168 units of energy. Obviously, the correct line lies somewhere between the third and fourth decile group. Perhaps if the household expenditures were disaggregated further, it would become clearer as to the specific expenditures which are related to the 2168 daily requirement of energy. Unfortunately, such disaggregated data are not available.

Given the constraints, the best way to obtain the money value of the protection line is as follows:

Table 3.
Total Expenditure & Expenses for decile groups
in urban and rural areas in 1989

	Urban		Rural	
	Expenditure (Rls)			
	total	food	total	food
Average	489497	199828	238350	119476
1st decile	89201	32972	60005	34507
2nd decile	156709	63211	95714	58499
3rd decile	208882	86816	120039	73344
4th decile	262763	111119	143353	84535
5th decile	319947	134601	169616	99467
6th decile	384349	168409	199066	112830
7th decile	468161	192596	235223	130604
8th decile	590186	255369	284189	146071
9th decile	794533	330789	370042	181698
10th decile	1616332	620911	700059	271139

By simple division, we may obtain the amount of total expenditures and food expenses for each unit of energy relative to each decile. Table 4 presents figures for urban and rural areas in 1989 (1368). According to this table, the consumers who are the nearest the protection borderline, i.e. the fourth decile group, spend 117.7 Rials and 49.8 Rials as total expenditures and food expenses respectively in order to obtain a unit of energy. Assuming the same consumption behavior for those consumers who are located in between the protection criteria and fourth decile group, the same figures are applicable for this group to acquire a unit of energy.

Next, it suffices to obtain the extra energy taken by the fourth decile

group and then by looking at the total expenditure and food expenses for each unit of energy, one may estimate the total expenditure and food expense pertinent to 2168 units of energy.

Table 4
Total Expenditures and Food Expenses Pertinent to Each Unit of Energy for Urban & Rural areas in 1989 (1368)

	Urban		Rural	
	Expenditure (Rls)			
	total	food	total	food
Average	173	70.6	85	42.8
1st decile	63.7	23.5	32	18
2nd decile	87.8	35.4	43.7	26.7
3rd decile	105.5	43.8	48.6	29.7
4th decile	117.7	49.8	56.7	33
5th decile	132.3	55.6	60.7	35.6
6th decile	141.8	62	72	41
7th decile	164.4	67.7	84.6	47
8th decile	177	76.6	97	50
9th decile	205.7	85.6	111	54.7
10th decile	287.2	110	197	104.6

Thus, it follows:

$$2231-2168 = 63 \text{ units}$$

Excess energy related to the 4th decile group.

$$262763/2231 = 2231=117.17 \text{ Rls}$$

Total Expenditure per unit of energy related to the 4th decile.

$$111119/2231 = 49.8 \text{ Rls}$$

Food expenses per unit of energy related to the 4th decile.

$$117.7 * 63 = 49.8 \text{ Rls}$$

Excess energy in Rls relative to total expenditures.

$$63 * 49.8 = 3137.4 \text{ Rls}$$

Excess energy in Rls relative to food expenses.

To calculate the protection criterion or total cost per capita relative to the necessary amount of energy (2168 cal), the excess energy in rials relative to total expenditures is subtracted from the total expenditures of the 4th decile: $262763 - 7415 = 255348$ Rls.

This figure relates to the protection criterion or poverty curve for urban population in 1989. Considering an average five persons per urban household, the above per capita cost may be converted to monthly cost per household.

$$255348/12 = 21279 \text{ Rls}$$

monthly cost per capita

$$21279 * 5 = 106395 \text{ Rls}$$

monthly cost per household on the poverty line

In the same way, the protection criterion may be calculated for rural areas. Considering the same index of energy as for the urban areas (2168 cal) and referring once again to Table 1 for nutritional data in rural areas, it is apparent that only the first decile group in rural areas lies inside the protection curve. The first decile group in 1989 absorbs 1877 cal per day and per capita, which is less than the necessary amount. The second rural decile group obtains 2187 cal per day, which is a little more than the required amount.

The first rural decile group with a total expenditure of 60005 Rls and food expenses in the sum of 3450 Rls is not capable of receiving the necessary calorie intake, while the second decile with a total expenditures of 95714 Rls and food expenses of 58499 Rls crosses over the boundary of protection. Applying the same method as in the urban case, the rural protection curve in 1989 is evaluated. Since the calorie

amount related to the second decile is very near the index of 2168 cal, the evaluation is carried out with respect to this decile. Therefore, the excess calorie of second decile with respect to the index is determined, and by referring to total expenditures per calorie, Table 4, the money value of the surplus is found and deducted from total expenditures.

$$2187 - 2168 = 19 \text{ Cal}$$

$$19 * 43.7 = 830 \text{ Cal}$$

$$95714 - 830 = 94884 \text{ Rls}$$

Protection criterion in 1989

Converting this figure for a household of five persons on a monthly basis we arrive at:

$$94884/12 = 7907 \text{ Rls}$$

protection criterion per capita and per month

$$7907 * 5 = 39535 \text{ Rls}$$

protection criterion for a household of five persons per month

The method of evaluating the protection criterion in 1989 may be generally summarized as follows:

C = energy index per capita related to a household of 5 persons.

C_i = absorbed daily energy by decile i where $i = 1, 2, \dots, 10$

E_i = total expenditure per capita by decile i

Ef_i = food expenses per capita by decile i

E = total expenditure per capita at criterion index

Ef = food expenses per capita at criterion index

C_n = Absorbed amount of energy by decile n , which is the nearest to the protection criterion.

E_n = Total expenditures per capita by decile n

Ef_n = Food expenses per capita by decile n

Based on the above definitions, we have:

$C_d = c - c_n$	Deficit (excess) energy of the nearest decile to the energy criterion index;
$E_n/C_n = Ep_n$	Total expenditures per unit of energy of decile n;
$Ef_n/C_n = Efp_n$	Food expenses per unit of energy of decile n;
$Cd*Ep_n = Ed$	Total expenditures related to deficit (excess) of energy in money value; $Cd*Efp_n = Ef_d$ Food expenses related to deficit (excess) of energy in money value; $E = E_n + E_d$ Total per capita expenditures at protection criterion.
$E_f = Ef_n + Ef_d$	Food per capita expenses at protection criterion

The figure E derived from equation 1 is based on the consumer behavior rather than the money value of a specific basket. Obviously, E varies according to different years, which is due to price variations in consumer and substitutable goods. Therefore, for the prediction of the protection criteria or poverty index for future years or those years in which there are no complete data, it is very important to determine the rate of price increase of the related basket as well as the effect of commodity shuffling in the basket as a result of price variations.

As it is very difficult to estimate accurately such an inflation rate, the best practical way is to use the trend of cost increase at the protection criterion during different years. If such a trend is obtainable, one may predict the protection criterion or poverty index for future years.

It seems that as we have calculated E, we should aim to help those people who earn less than E, and increase their income to E. If it is possible to identify these people, one may estimate the necessary budget to increase their income up to the protection criterion. This budget for each group of ten persons is calculated as follows:

$$b = \sum_{i=1}^n (E - E_i) \quad E > E_n \quad (3)$$

$$b = \sum_{i=1}^{n-1} (E - E_i) \quad E = E_n \quad (4)$$

In fact $E - E_i$ is the budget subsidy related to decile i for each person, and may be represented as :

$$S_i = E - E_i$$

where S_i is the per capita subsidy related to decile i . Now, equations 3 and 4 look as follows:

$$b = \sum_{i=1}^m (S_i) \quad (5)$$

where m refers to the number of deciles that should be subsidized.

Equation 5 is derived for ten people. If the total population that should be subsidized is N , then the total budget is equal to:

$$B = b \left(\frac{N}{10} \right)$$

By looking at data for urban and rural areas in 1989, the budget for ten persons in urban areas (b_u) is calculated as follows:

$$b_u = S_1 + S_2 + S_3$$

$$b_u = (255348 - 89201) + (255348 - 156709) + (255348 - 208882)$$

$$= 311252 \text{ Rls}$$

Similarly for rural areas we have:

$$b_r = 94884 - 60005 = 34879 \text{ Rls}$$

We have used the same method to estimate the protection criterion or poverty index shown in Table 5 for the period 1983-1989.

Table 5
Protection Criteria in Urban Areas
(1983 to 1989)

1362	1363	1364	1365	1366	1367	1368
130024	147507	147335	-	192740	228482	255341

3. An Evaluation of Direct Aid in Food:

Referring to urban data for 1989, the third decile group absorbs 1979 Cal which is 189 less than the index. This deficit can be balanced by allowance of 46466 Rls (255348 - 208882). But part of this donation will be spent on food. When we estimated the protection criterion for 1989, the excess rials of food expenses were calculated to be 3137.4 Rls. Since the food expenses of the 4th decile (Table 3) is known, we can derive the food expenses sufficient energy of 2168.

$$E_f = E_f^n - E_f^d$$

$$E_f = 111119 - 3137 = 107982 \text{ Rls}$$

E_f is the protection criterion related to food expenses for urban areas in 1989. It means that those people who spend annually less than 107982

Rials annually on food lie inside the poverty line and should be protected. By referring again to Table 3, the food expenses related to deciles with less than 107982 Rls can be extracted and the allowance to each decile calculated as:

$$Sf_i = E_f - Ef_i$$

where Sf_i is the subsidy for food to each person related to decile i.

$$Sf_1 = 107982 - 32972 = 75010 \quad \text{Rls}$$

$$Sf_2 = 107982 - 63211 = 44771 \quad \text{Rls}$$

$$Sf_3 = 107982 - 86816 = 21166 \quad \text{Rls}$$

In other words, if each person related to the first decile receives 75010 Rls and spends this amount on food according to his own consumer behavior, he can overcome his energy deficit. Similarly, the figures related to second and third decile are 44771 Rls and 21166 Rls respectively.

The important point in this method is that the allowance (in Rials) estimated to pay off those food expenses necessary for the energy deficit does not vanish. In this condition, food should be given instead of money in such a way that it does not bear any abuse in a free market.

References

- [1]* Household Surveys, Markaz-e-Amar Iran, 1362-1369
- [2]* Nutritional Indices, Food and Nutrition Institute of Iran.