Determining the Poverty Line of Urban Households in East Azerbaijan Province by Using Linear Expenditure System

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Abstract: Measuring poverty can make the process of poverty evolutions understandable in every society and present an image of these developments during the time. Government can target and adopt appropriate decisions to do necessary measures as a result. In this regard, statistical study of poverty and its analysis at the level of province can be a guide for planners to reduce penury. The poverty line of urban areas in east Azerbaijan was estimated by using dynamic linear expenditure system (DLES) method assuming the formation of habits and using seemingly unrelated regression (SUR) model during 2001 to 2011. Components of eight commodity groups including food, clothing, housing, appliances and furniture, healthcare, transport and communication, recreation and education, and a group for other issues were used as well as their price index published by statistical center of Iran. The results obtaining from estimations by using STATA and Eviews soft wares indicate that poverty of urban areas in east Azerbaijan has ascending trend with an average growth rate of 23% during the period under review. The percentage of urban households below the poverty line of the Province is 50 percent on average, and poverty gap and severity of poverty indices have been reduced with average values of 42% and 23% respectively at the end of the period. Thus, according to the results for indicators of poverty, it can be said that although poverty eradication policies during the ten-year period of this research have improved the welfare of the poor people partially, the number of people below the poverty line has increased considerably during this period. The process of escalating prices can be one of the main reasons for this increase that can be solved by the government with curbing inflation.

Keywords: poverty line, linear expenditure system with the formation of habits, seemingly unrelated Iterative Regression, Poverty indices

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1- Introduction

Poverty and income distribution, as one of the most important social indices, have been changed into one of the biggest and most controversial proposed issues in developing countries in the recent decades. If net income of a household is less than the required standard minimum for providing the necessary resources for the basic needs of household, the target household is considered as a poor one. In this regard and according to the World Bank statistics, today, over a billion people in the world earning less than one dollar and twenty-five cents live in absolute poverty and they are not able to meet their basic needs, 95 per cent of them live in the third-world countries, despite great progress in economic, political, social and cultural fields. (Bouhadi et al., 2010).

When people experience poverty in a society, the society suffers as a whole. If this situation continues, its long-term impacts can harm the society economically, politically, and socially. Therefore, fighting poverty is not only a moral imperative, but it is also a kind of investment for the future. Researchers such as Emvano et.al (1999) who considered fighting against poverty as a necessary condition for the growth of the society, revealed its importance. In this regard, study and awareness of poverty in a society are the first step in the path of planning for fighting against it (Arabmazar and Hosseininejad, 2004; Khaledi and Permeh, 2005).

In order to be aware of poverty, its level should be measured. It is of great importance because of two main reasons to fight poverty: targeting all types of aids to vulnerable and low class of the society, and the study of process and the changes of the severity of poverty during the time or in different places.

Thus, detecting target group is the first step for implementing these goals in order to eradicate poverty among poorest of the poor (Makiyan and Saadatkhah, 2011). This study has consisted of five main parts in order to be aware of poverty situation and archive to the mentioned purposes.

2- Literature Review

Ram (1992) in a study entitled "Income distribution and welfare: An Inter Country Comparison" calculated age index in order to examine the change of two variables of revenue and how to distribute it in this index for two groups of countries including Iran. The results indicated high correlation of this index with revenue for each of two groups of countries.

Assadzadeh & Satya Paul (2004), in a research entitled "Poverty, Growth and Redistribution, a Case Study of Iran" addressed poverty changes in Iran during 2004-2014 based on the statistics of household's cost-revenue for 2004, 2009, and 2014. Degradability property of group indices of Foster, Greer and Thorbecke (FGT) were utilized for investigating the share of different occupational and regional groups in complete poverty. Findings obtained based on calculating absolute poverty line indicate that rural poverty has been reduced slightly, but urban areas experienced increase in poverty indices.

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Both urban and rural areas faced with a substantial increase in the indices in 1988.

Okurut et.al. (2002) in an article, entitled "determinants of regional poverty in Uganda" estimated regional and national poverty line. They compared poverty line and its index for different areas of Uganda by using cost-income data of household in 1992 utilizing FGT method. According to this comparison, North Uganda was known as the poorest area having the greatest depth of poverty and it was in undesirable situation regarding revenue inequality. They also used Logistic Model for determining effective factors on poverty. The results showed that training level, household size, and migration status were influencing factors on household poverty.

Geda et.al. (2005) in an article entitled "determinants of poverty in Kenya: a household level analysis" studied determinants of poverty by using Logit Model in 1994. This study shows that poverty situation is related to training level and household dimension in urban areas. Employment in the agriculture sector can be added to these factors in rural areas.

Widodo (2006) in an article entitled "demand estimation and household's welfare measurement: case studies on Japan and Indonesia" obtained demand function and level of household welfare by using linear expenditure system. According to the obtained results of this research, the maximum share of final budget of food consumption for Indonesian families is related to meat and the minimum share of final budget is related to fruits. These amounts are related to seafood and dairy products respectively in Japan. Indonesian households felt fewer gaps between minimum subsistence and the average food consumption. Another finding indicated that Japanese households have experienced more welfare reduction than Indonesian ones at one level of price increase in foodstuffs in nominal price, but Indonesian had more welfare reduction than Japanese regarding total costs.

Zaman and Akita (2011) examined poverty and inequality of income by using cost-revenue data of households and FGT group indexes in Bangladesh in 2005. According to the findings of this article, the level of training and wages in urban areas as well as productivity of the agricultural sector in rural and urban areas should increase in order to reduce inequality.

Khodadad Kashi (1999) in a research entitled "measuring poverty in Iran based on socio-economic features of households: application of age index in Iran" measured poverty in Iran during 1986-1991. The purpose of this article was presenting an image of poverty in Iran, which it has, two features: firstly, calculating the index of "poverty-age" and the second feature is using raw data of household's budget and calculating poverty based on socio-economic characteristics. The results indicate that poverty increased during 1985 to 1989 in Iran, but it reduced afterwards. This trend has been confirmed experimentally in different geographical areas, occupations, age groups, and levels.

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Arabmazar and Hosseininejad (2004) in a research entitled "an estimation of poverty level and its intensity in different occupational groups of Iranian rural households" estimated poverty intensity of rural households regarding head of household's occupation and geographical region of habitat by using FGT group indexes and collecting data related to cost-revenue of Iranian rural households in 2001. The results indicated that the severity of poverty in households whose heads are employed in agriculture is more than other rural households in the society regardless of those having unemployed or disabled head living in the most unfavorable situation of welfare. Moreover, residents of the eastern regions in the country suffer from problems of poverty more than other areas.

Aboonoori and Maleki (2005) in an article entitled "poverty line in Semnan Province during development plans of 1989-2004" estimated poverty line in Semnan Province during the first, second, and third development plans by using LES method so that they have estimated it with classification of goods and services consumed by households based on urban and rural areas into eight major groups. They concluded that poverty line has increased 7 per cent on average during three development plans in rural and urban areas of Semnan Province. The main reason of this rise was high inflation rate.

Arshadi et.al. (2010) in a research, entitled "determining the minimum salary of urban households of Kermanshah Province by using LES" estimated the minimum salary of urban households of Kermanshah Province during 1997 to 2007 by using dynamic LES with Habit formation linear expenditure system (HLES) and Iterative Seemingly Unrelated Regression (ISUR). The results showed that the total minimum annual salary was rising during this period. Urban poverty line adjusted with price index has also demonstrated growing trend. They calculated the indexes of census ratio, income gap ratio, income inequality among the poor, and Kakwani index for urban areas regarding calculated minimum wage. The results indicated worsening of total FGT of the situation of urban households during studied period.

Goodarzi Farahani and Abdoli (2011) in an article entitled: "estimation of minimum salary by using Linear Expenditure System in Iran and determining the proportion of households below the poverty line" used LES method in order to estimate minimum salary and calculate the percentage of poor households in Iran during 1972-2010. By calculating coefficients related to the marginal propensity expenditures on commodity groups, they concluded that the marginal propensity to expenditures on commodity groups of housing and food is more than other groups. They also indicated that entertainment product group is one of luxury normal goods and other commodity groups are necessarily normal.

Zaranejad et.al. (2014) in an article entitled "the minimum livelihood in rural areas of Khuzestan Province using linear expenditures system and generalized method of moments" estimated the minimum livelihood in rural areas of

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Khuzestan Province equivalent to 253634,3 Rials in 2006 and equivalent to 44164773 in 2009. The results indicated that food group has the highest share in commodity basket and transport and communication have the least share.

Since the issue of poverty does not have a single and specific definition, and considering researches in the field of poverty line that a summary of them has been presented, it seems that each researcher defines it with respect to the quality of his research. It seems that obtained minimum subsistence of this system can present an appropriate scale of poverty, with oblique and error, regarding strong theoretical foundations based on microeconomics of LES based on Stone-Geary utility function.

3- Theoretical Principles

Poverty is a multi-dimensional phenomenon that can be defined in different ways. The concept of poverty has been changed during the time and in different situations due to economic, political, social, and cultural conditions of the society. Each person can define it differently regarding his philosophy of human existence and emphasizing on the need, that is more important than others in his opinion. Townsend believes that people can be considered poor when they confront lack of resources for obtaining types of food diets, participation in activities, and ordinary conditions and facilities of life. Atkinson has considered two concepts for poverty. Poverty means lack of access to the specific life facilities in the first concept, and lack of having socio-economic resources and facilities in the second concept. Sen notes that all definitions for poverty refer to a type of deprivation. Deprivation is a relative concept that can vary according to time and place (Mahryar, 2004). Generally, it can be said that when a need of the human being is not met, the person is poor at the time. According to the mentioned debates, the main issue is identifying the need. In the literature on this subject, there are three types of criteria for defining need. The first criterion is defined based on minimum subsistence. The poverty arising due to lack of this minimum subsistence is called "absolute poverty." Achieving to the ordinary and conventional level of the society is the second criteria. Those who are less than this level are in "relative poverty." The last criterion for identifying requirements is paying attention to feelings, perceptions and individual behavior of needy person. This kind of poverty called "subjective." Experimental statements and observations are used in measuring subjective poverty line as well. Subjective poverty has been selected as a base in this article. This approach has been chosen for several reasons. Firstly, it is the only definition considering the personal dimension of poverty whereas other definitions; absolute and relative, are external criteria for measuring the need that can result in more error and bias in estimation of household's minimum need. The second reason is the theoretical principles of this method that is stronger in estimation of poverty line and having closer relationship with concepts such as utility and welfare functions in economic

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classical texts than substitute methods (Naderan and Gholami Netaj Amiri, 2000).

The minimum amount considered by households is found in categorizing them based on mental poverty line by observing their economic and social behaviors originated from their thoughts and beliefs. To analyze households' behavior, the manner of consumption expenditure among required major consumable items is used in this study.

A linear demand equation system in dynamic situation is used in this regard in order to consider the impact of households' behavioral pattern that is not the same by changing life conditions.

4- Research Method

Generally, system of demand equation used in the estimation of household's minimum subsistence can be divided into two groups:

1: Systems that cannot be related to the certain direct utility function

2: Systems that can be related to the certain direct utility function (Naderan and Gholami Netaj Amiri, 2000).

The shape of utility function of each good is formed based on main assumptions of demand model related to that good and expectations of consumer behavior for that product.

Utility function is defined based on consuming goods and services. In fact, the utility function specifies people's preferences for different packages of goods and services and consumer maximizes his utility according to the budget condition. Household's consumption package includes eight types of goods to calculate inflation. In this regard, Stone - Geary Utility Function has been defined having the most relationships with this package since it does not include low kind of commodities. If the minimum of consumption is positive, the intended commodity is necessary that is compatible with commodity package consumed by households. Thus, equation system known as LES is obtained by using this function and its development for eight-commodity package.

Stone- Geary Utility Function

One of the utility functions using "minimum subsistence" is Stone - Geary utility function extracted from LES. This function, also known as "founded for essential commodities" is the most compatible demand function for this purpose. One of the considerable points about Stone - Geary utility function is that each desired variable, that is likely to be involved in the process of demand and its formation, can be inserted into the model according to the requirements of the research topic (Sajjadifar and Khiyabani, 2011). Another advantage of this function, unlike other methods that estimates poverty line based on one aspect of human needs and not free from bias, is the type of estimation of poverty line using LES and mentioned utility function in different commodity groups, considering all people's needs, can solve the problem of bias in measurement (Naderi and Gholami Nataj Amiri, 2000).

Linear Expenditures System (LES)

The general form of this function is as follows:

Equation1:

$$U = \prod_{i=1}^{n} (q_i - \delta_i)^{\beta_i} \quad , \qquad (q_i - \delta_i) > 0$$

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$$\beta_i > 0 \qquad \sum_{i=1}^{n} \beta_i = 1$$

The utility function shows that total utility that a consumer receives from collection of commodities is a function by multiplying excess of each product (q_i) on minimum of consumption that product (δ_i) and the share of this excess in total utility is accompanied with β_i power. The above function is Constant Elasticity of Substitution (CES) and the condition of $\sum_{i=1}^{n} \beta_i = 1$ of function shape is formed by quasi concave (Makiyan and Saadatkhah, 2011).

To extract demand function of the above utility function and for simplicity, we get to this function by logarithm and slight changes that is more appropriate practically (logarithm does not have any impact on the amount of maximizing utility function).

Equation2:

$$u = \sum_{i=1}^{n} \beta_i \log(q_i - \delta_i)$$

By maximizing this function with respect to budget constraint of $Y = \sum_{i=1}^{n} p_i q_i$ and based on Lagrange function and derivation based on q, the following demand function is obtained:

Equation3:

$$L = \sum_{i=1}^{n} \beta_i \log(q_i - \delta_i) + \lambda(Y - \sum_{i=1}^{n} p_i q_i)$$

If we take the partial derivative Lagrange function of q and λ, and put it equal to zero, we can achieve to demand equations:

Equation 4:

$$\frac{\partial L}{\partial q_i} = \frac{\beta_i}{q_i - \delta_i} - \lambda p_i = 0$$

Equation5:

$$\frac{\partial L}{\partial \lambda} = Y - \sum_{i=1}^{n} p_i q_i = 0$$

By using equation4, we will have:

Equation6:

$$\frac{\beta_i}{q_i - \delta_i} = \lambda p_i \quad \Rightarrow \quad \beta_i = \lambda(p_i q_i - p_i \delta_i)$$

Using the limitation of $\sum_{i=1}^{n} \beta_i = 1$, the amount of λ is obtained:

$$\sum_{i=1}^{n} \beta_i = \lambda \left[\sum_{i=1}^{n} p_i q_i - \sum_{i=1}^{n} p_i \delta_i \right] = \lambda \left[Y - \sum_{i=1}^{n} p_i \delta_i \right] = 1$$

Equation7:

$$\Rightarrow \quad \lambda = \frac{1}{Y - \sum_{i=1}^{n} p_i \delta_i}$$

By putting obtained λ in equation 4, demand equation system will be as equation8:

$$\frac{\beta_i}{q_i - \delta_i} = \frac{p_i}{Y - \sum_{i=1}^{n} p_i \delta_i} \Rightarrow q_i = \delta_i + \frac{\beta_i}{p_i}(Y - \sum_{i=1}^{n} p_i \delta_i)$$

Finally, by multiplying above equation in p_i, demand system for n commodity group is obtained as follows in which expenditures for commodity i is a function of price, the cost of other commodities, and income (total expenditures) (Arshadi et.al, 2000):

This function consists of two components:

1. It is related to minimum subsistence i.e. expenditures that are necessary for consumers$p_i \delta_i$

2. This component is related to supernumerary expenditure indicating expenditures that consumer uses it voluntarily on the i-th product$\sum^{n} (p_i q_i - p_i \delta_i)$

Linear Expenditures System (LES) in Dynamic Mode

One of the LES constraints is its static. Fixed taking $\delta_i$means that consumer has not changed his necessary subsistence and demand structure is equal

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in all periods while it is expected that minimum livelihood increases or changes by rising life level and people's expectations. As a result, it is necessary that δ_i changes as a variable and not a parameter because of changes in consumer tastes and habits. The issue of static demand system changes into a dynamic demand system in this case. Therefore, we assume that the minimum subsistence of i-th commodity in each period depends on the ratio or percentage of the consumption of this product in the previous period i.e. $\delta_{it} = a_i q_{it-1}$ (Arshadi et.al, 2010).

Using relative habits equation, LES is obtained as follows:

Equation10:

$$C_{it} = p_{it}q_{it} = a_i q_{it-1} p_{it} + \beta_i (Y - \sum_{i=1}^{n} a_i q_{it-1} p_{it})$$

According to the definition, we have:

Equation11:

$$q_{it-1} = \frac{C_{it-1}}{p_{it-1}}$$

Therefore, a variable like x_{it} is defined and inserted into the model:

Equation12:

$$x_{it} = \frac{C_{it-1}}{p_{it-1}} . p_{it} = q_{it-1} p_{it}$$

Finally, the model is as follows:

Equation13:

$$C_{it} = p_{it}q_{it} = a_i x_{it} + \beta_i (Y - \sum_{i=1}^{n} a_i x_{it})$$

The total of this function for eight commodity groups brings LES function with the hypothesis of habit formation. The systematic function is related to the allocation of total costs among commodities that demand of each commodity is in relation with its price, other commodity prices, and revenue "simultaneously."

The required cost for each commodity is obtained in this system as follows:

Equation14:

$$\delta_{it} P_{it} = a_i (Q_{it-1} P_{it}) = a_i x_{it}$$

The poverty line is obtained by adding the obtained minimum livelihood for all commodity groups (Arshadi et.al, 2010):

Equation15:

$$Z_t = \sum_{i=1}^{8} \delta_{it} P_{it} = \sum_{i=1}^{8} a_i x_{it}$$

Iterative Seemingly Unrelated Regression (ISUR) Method

As it was mentioned before, we are dealing with a systematic function to estimate households' minimum livelihood based on total cost consisting of eight equations i.e. a model with more than an equation. Simultaneous equation models and Iterative Seemingly Unrelated Regression can be noted as these types of patterns.

Simultaneous Equations

There is more than one endogenous variable in simultaneous equations model relating to each other. Used methods to estimate these systems are as follows:

1. Ordinary Least Squares (OLS): using this method will be possibly only if there is no relationship between error terms and explanatory variables equations.

2. Two- Stage Least Squares (2SLS): This method has two stages and there should be a relationship between error terms and explanatory variables equations.

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3. Three- Stage Least Squares (3SLS): two previous methods are counted as one of the estimation methods of single-equation i.e. each equation is estimated separately and the possibility of relationship between error terms is not considered. 3SLS is a method that structural equations of a simultaneous system can be considered and estimated simultaneously.

4. Weighted Least Squares and Weighted Two- Stage Least Squares: are methods that can be used in simultaneous equations model when confronting to the problem of unequal variants.

Seemingly Unrelated Regression (SUR)

One of the models proposed as equation system is SUR. There is only one endogenous variable as a dependent one (Shirinbakhsh and Hasan Khansari, 2009) and it is assumed that there is a simultaneous correlation among residuals equations and the model has the problem of unequal variants. In this case, OLS estimations are inefficient and GLS estimations should be used. SUR model is counted as one of the GLS method (Zaranejad and Anvari, 2005). The model provides the possibility that equation coefficients and coefficient variance to be changed, and residuals to have simultaneous correlation in equation system. The calculations can be repeated several times in doing this model for the purpose of convergence in estimated parameters and defining a determined distance between estimations of each stage with the previous one in order to achieve to the best result. In this case, the intended model is called ISUR.

To estimate intended parameters, SUR model was used in this research since we have one endogenous variable in each equation in used equation system.

Poverty indexes

a. The ratio of census

This index is as the proportion of poor people below the poverty line (q) to all the community members or sample (n):

Equation 16:

$$H = \frac{q}{n} \qquad 0 < H < 1$$

The amount of this index varies between zero and one. When the income of all people is more than the estimated poverty line in that society, the index is zero. It is one when all community members live below the poverty line. The most important advantages of this index is easy calculation and simple understanding and the biggest demerits are not considering the severity of poverty and not having sensitivity to decrease in the incomes of the poor (Arshadi, et.al, 2010).

b. The index of poverty gap

Another index indicating the depth or severity of poverty is income gap ratio. This index shows the distance of the poor from the poverty line and it is equal to:

Equation17:

$$G = \frac{1}{qz}\sum_{i=1}^{q}(z - y_i)$$

In this equation, q is the number of people below poverty line; z the number of poverty line, and y_i the i-th household's income (cost). This ratio is expressed as a percentage of the poverty line and it indicates that how much the average income of poor classes in the society should be increased to eradicate

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poverty. Although this index indicates the depth of poverty generally, it cannot express the distribution of intensity of poverty among poor people (Arabmazar and Hosseininejad, 2004).

c. The index of severity of poverty

Looking at two indexes of H and G, it can be understood that none of them is sensitive to redistribution of income in poor families. In other words, if we compare the part of very poor household's income with less poor household, the above indexes will not be changed. As a result, Sen introduced another index called severity of poverty that emphasizes the severity of poverty, it as follows:

Equation18:

$$F(a) = \frac{1}{q}\sum_{i=1}^{q}\left(\frac{Z - y_i}{Z}\right)^a \quad , \ a > 0$$

Poverty is considered as a function of poverty gap ratio in this index that has a power. In fact, "a" shows the degree of poverty gap importance. If a=0, we will have F(0)=q/n compared to the same census, and if a equals 1, F(1) will equal to HG i.e. the same proportion of income gap that it has been normalized with the number of total society's households. In addition, if a equals to 2, we will have:

Equation19:

$$F(2) = \frac{1}{q}\sum_{i=1}^{q}\left(\frac{Z - y_i}{Z}\right)^2$$

This index gives the maximum weight to households that are farther than poverty line. Therefore, it can be concluded that the major intended group of this index is the poorest poor. The mentioned index is called the severity of poverty in the literature on poverty (Arabmazar and Hosseininejad, 2004).

Data and data collection method

Used data in this study can be divided into three groups for estimating poverty line and its indexes in 2001-2011 collected by Central Bank and Statistical Center of Iran. The first group is data based on cost-revenue decile of urban households in East Azerbaijan Province collected by Statistical Center of Iran. The second group includes raw data obtained via questionnaire from urban households of the Province, and the third group of data is related to the index of the price of consumer goods and services in different budget groups of urban households of the Province.

Set of data was used in this research based on decile and the index of the price of goods and services including food, clothing, housing, appliances and furniture, healthcare, transport and communication, leisure and education, and the group of other issues for estimating demand model and poverty line based on total cost. Obtained raw data of the questionnaire was also used for calculating poverty indexes so that the number of households below the poverty line is obtained after calculating total expenditures of each household in each period and according to the calculated poverty line and then the remain calculations are done.

5- Research Findings

Since used data have two dimensions of time and level (cost deciles) for estimations or in other words used data are panel ones. To fit this model in equation system of 8, "d" index is considered for cost deciles. In order to randomize the equation, u distributing

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sentence is added to it. Since all households in the deciles will confront with achieved prices vector in the market, the price will be equal for all deciles. So, it can be said that $p_{idt} = p_{it}$. Therefore, according to the final equation for LES, we will have:

Equation20:

$$C_{idt}= p_{it}q_{idt} = a_i x_{idt}+\beta_i(Y_{dt}-\sum^{n}_{i=1}a_i x_{idt})+u_{idt}$$

$i=1,\ldots,8$; $d=1,\ldots,10$; $t=1380,\ldots,1390$

Since commodity groups related to food and tobacco, transport and communication, entertainment, hobbies and household's cultural services are obtained from integrating some sub-groups, the price index of these groups, for example food and tobacco, can be obtained as following:

Equation21:

$$E_{fd} = \sum_{i=1}^{2} E_I,\ w_i = \frac{E_i}{E_{fd}},\ P_{fd} = \sum_{i=1}^{2} w_i p_i$$

E_{fd} is total expenditures of food and tobacco. W_i is the share of every commodity group (food or tobacco) from total expenditures of this group, and p_{fd} is the price index of this group.

However, in order to estimate parameters and determine minimum subsistence, it is necessary to specify that whether the intercept among different levels of studied data is different or fixed. This is possible through F-Limer and Hausman tests. The results of these tests are shown in tables 1 and 2.

In order to estimate poverty line using LES, the parameters of this system should be estimated in two steps. In the first step, the parameters of β_i are obtained through estimating Engel function for eight commodity groups.

Equation22:

$$C_{idt}= p_{it}q_{idt} = \alpha+\beta_i Y_{dt},\ Y_{dt}=\sum p_{it}q_{idt}$$

β_i indicates final share of i-th commodity in utility. It shows the changes in the price about different commodities, for each coordinated increase in revenue. P_{it} and q_{idt} are respectively price index and the amount of i-th commodity in t period. Y_{dt} is household's total expenditures in t period for d-th decile. This equation is estimated based on data related to cost deciles and after determining interception of sectional units, using panel data model and then β_i of each group is obtained. We use obtained β_is from last step in final equation of LES i.e. equation 15. We can obtain a_i parameter related to relative habits factor of each commodity group via ISUR method by changing LES function form as follows:

Equation23:

$$\begin{cases} p_{it}q_{idt} - \beta_i Y_{dt} = a_i x_{idt} - \beta_i \sum_{i=1}^{n} a_i x_{idt} + u_{idt} \\ p_{it}q_{idt} - \beta_i Y_{dt} = \sum_{k=1}^{8} (I_{ik} - \beta_i) a_k x_{kdt} + u_{idt} \end{cases}$$

$$I_{ik} = \begin{cases} 1 & i = k \\ 0 & i \neq k \end{cases}$$

Since the components of disturbing equations have simultaneous correlation and variance-covariance matrix of these components equals to zero, one of these equations should be eliminated for estimating parameters of model and other equations should be estimated, an then the parameter of removed equation is obtained by $\sum_{i=1}^{n} \beta_i = 1$. Here, after several tests and studying different commodity groups for obtaining the best result, we put aside the group of services at home and estimate it. The results of these estimations have been shown in table 3 and 4.

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Table1. The results of F-Limer test

Commodity Groups	The statistics of F Test	Probability Value	Result
Food and tobacco	14.87	0.0000	Different intercept
Clothing	25.1	0.0000	Different intercept
Housing	4.82	0.0000	Different intercept
Commodities and services at home	2.55	0.0113	Different intercept
Transport and communication	6.31	0.0000	Different intercept
Healthcare	24.50	0.0000	Different intercept
Entertainments and hobbies	0.61	0.7881	Fixed intercept
Other issues	0.47	0.8936	Fixed intercept

Source: (Researchers' calculations)

Table2. The results of Hausman test

Commodity Groups	The statistics of Hausman Test	Probability Value	Result
Food and tobacco	57.19	0.0000	Fixed effects
Clothing	19.49	0.0000	Fixed effects
Housing	11.96	0.0000	Fixed effects
Commodities and services at home	23.45	0.0000	Fixed effects
Transport and communication	36.31	0.0000	Fixed effects
Healthcare	-58.26	-	Fixed effects

Source: (Researchers' calculations)

The results of F-Limer test shows that the intercept of all groups except entertainments and habits, and other issues was different (table1), and the results of Hausman test indicates that panel data model with fixed effects should be used for estimating parameters for these groups (table2).

Table3. βi estimated coefficient of urban households' commodity groups

Commodity group	β_i	Probability value
Food and tobacco	0.1998	0.0000
Clothing	0.0753	0.0000
Housing	0.1718	0.0000
Commodities and services at home	0.0458	0.0000
Transport and communication	0.1149	0.0000
Healthcare	0.1606	0.0000
Entertainments and hobbies	0.0982	0.0000
Other issues	0.1331	0.0000

Source: (Researchers' calculations)

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According to the amounts of probability value related to βi coefficients, it is clear that all coefficients are in three significance levels of 0.01, 0.05, and 0.1 and they are reliable. As mentioned, βi shows that the consumer is willing to increase price in which commodity group. In other words, final transmission coefficients to expenditures show that if households' supernumerary expenditures increase 1000 Rials on average, how much will belong to i-th commodity group. The results indicate that the highest marginal propensity to supernumerary expenditures is related to food and tobacco group in urban households. In other words, in case of increase in urban households' supernumerary expenditures at a rate of 1,000 Rials, devoted expenditures to food and tobacco group will rise at a rate of 199.8. The highest share is related to housing group after food and tobacco.

However, a_i is estimated with having βi parameter of commodity groups and put them in equations of LES and changing it into a linear equation and using ISUR method.

Table4. a_i estimated coefficient of urban households' commodity groups

Commodity groups	a_i	Probability value
Food and tobacco	0.7628	0.0000
Clothing	0.7465	0.0000
Housing	0.838	0.0000
Commodities and services at home	0.7253	0.0000
Transport and communication	0.7144	0.0000
Healthcare	0.7651	0.0000
Entertainments and hobbies	0.8268	0.0000
Other issues	0.7269	0.0000

Source: (Researchers' calculations)

Probability value relate to a_i coefficients indicates the significance of coefficients in three significance levels of 0.01, 0.05, and 0.1. In the following, the poverty line of that year is calculated with the coefficient of relative habits of each commodity group and calculating minimum subsistence of the commodity group in the intended period via the equation of $\delta_{it} = a_i q_{it-1}$ as well as using price index of each commodity in the desired year. Annual and monthly poverty line of urban households and poverty indexes in urban areas are presented respectively in tables 5 and 6.

Table5. Urban poverty line (based on Rial)

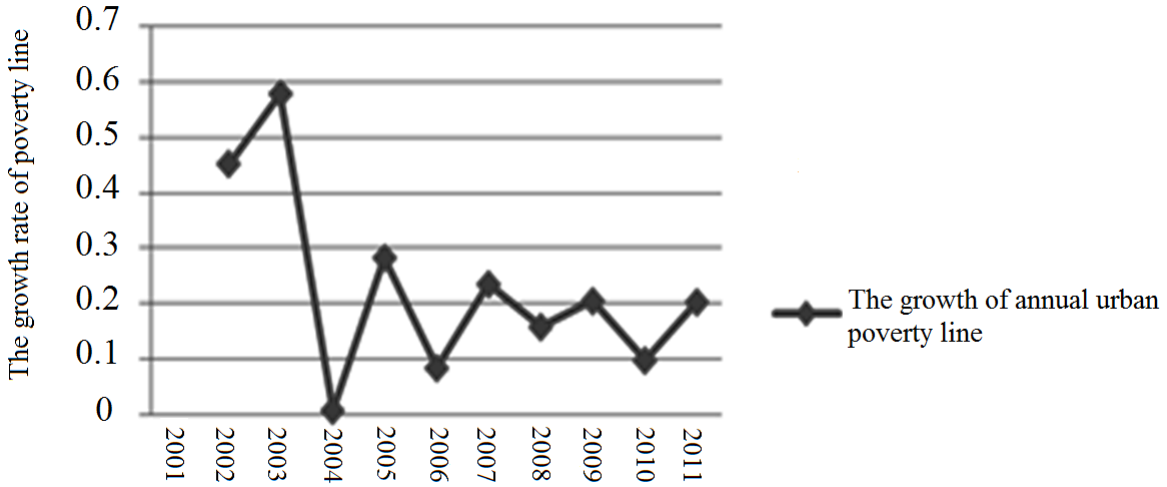
Year		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Urban poverty line	Annual	13718667	19920814	31437159	31718088	40710665	44185221	54605267	63298930	76317825	83883452	100952405
	Monthly	1143222	1660068	31437159	2643174	3392555	3682102	4550439	5274911	6359819	6990288	8412700

Source: (Researchers' calculations)

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Diagram1. The growth of annual urban poverty line



Source: (Researchers' calculations)

According to table5, it can be concluded that annual poverty line in urban areas of East Azerbaijan Province has had quite ascending trend. The growth rate of poverty line has had high volatility. The maximum rate was for 2003 and urban poverty line was 23 per cent on average during period under study.

Table6. Poverty indexes in urban areas

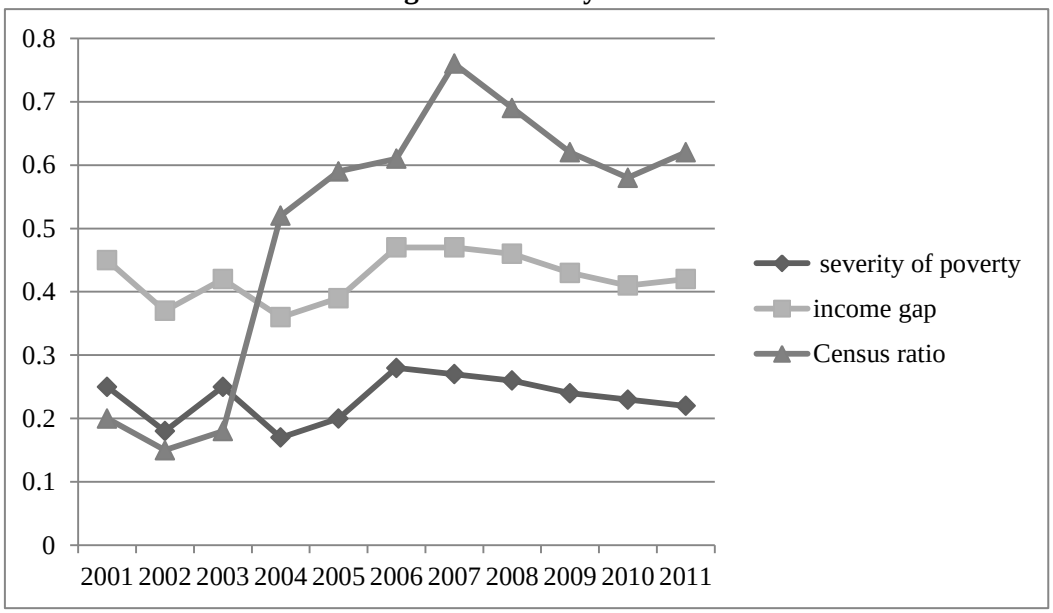
Year	Census rate	Income gap	Severity of poverty
2001	0.2	0.45	0.25
2002	0.15	0.37	0.18
2003	0.18	0.42	0.25
2004	0.52	0.36	0.17
2005	0.59	0.39	0.2
2006	0.61	0.47	0.28
2007	0.76	0.47	0.27
2008	0.69	0.46	0.26
2009	0.62	0.43	0.24
2010	0.58	0.41	0.23
2011	0.62	0.42	0.22

Source: (Researchers' calculations)

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Diagram2. Poverty indexes



Source: (Researchers' calculations)

As diagram 2 shows, census rate has had considerable increasing process for urban areas of East Azerbaijan Province at the end of the period than beginning that it shows rise in poverty rate and percentage of households below poverty line in urban areas of the province. The average index of census rate is 49 for urban areas of this province during period under study.

Studying the index of income gap rate indicating severity and depth of poverty, we see that the amount of this index with a full swing at the end of the period is almost equal with the beginning of the period in urban areas. It shows that the amount of necessary income to bring the incomes of the poor to the poverty line is almost equal during period under study in the beginning and end of the period. In fact, it can be said that the severity and depth of urban poverty line have not been changed. The average of this index is 42 per cent for urban areas during period under study.

Studying the index of income inequality among the poor, that it has given particular importance to depth and severity of depth and any change in it indicates change in welfare of the poor, we see that the average of this index is almost equal to 26 per cent for urban areas during the period under study. Investigating the process of moving this index for urban households of this province shows the worsening situation of poorest of the poor.

6- Conclusion and Suggestion

Marginal propensity to supernumerary expenditures and minimum subsistence for urban areas were estimated in this

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article aiming to present a perspective of poverty in urban households of East Azerbaijan Province during 2001 to 2011 using LES assuming the formation of habits and SUR method. Finally, the poverty line of urban areas was estimated by adding minimum subsistence of all commodity groups. The results indicate that poverty line has had ascending trend in urban areas during this period. According to the researches for several provinces such as Yazd, Kerman, Kermanshah, Ilam, and Semnan, it can be said that this trend has been repeated during this period almost in these provinces. Looking at the estimated coefficients for marginal propensity to supernumerary expenditures of urban households, we considered that food and tobacco group with the coefficient of 0.1998 had the most marginal propensity to supernumerary expenditures. It means that if economic boom or growth in urban households' expenditures (income) leading to increase in household's supernumerary expenditures (income) occurs, the most pressure will be on food and tobacco costs first, and then on housing, and finally on commodities and services at home. The amount of the coefficient has been almost the same for other provinces. For example, the highest coefficient of marginal propensity to supernumerary expenditures was related to food and tobacco group in the first rank, and housing was in the second one in the study of Arshadi et.al about minimum subsistence in Kermanshah Province. It shows the importance of food, commodity, and housing groups for households. Therefore, it is more appropriate to pay more attention during planning in order to promote households' welfare for these two groups. The amount of poverty indexes calculated after estimating poverty line indicated that poverty alleviation policies have partially resulted in improvement of welfare situation among the poor during a ten-year period of the study. In other words, income situation of households considered as poor has been improved and the severity of poverty has been reduced among these families, this group has been increased considerably though i.e. those who were not below the poverty line are among this group during this period. One of the major reasons of this situation can be increasing trend of prices. The continuity and expansion of social justice and equal distribution of income among different groups of the society is of great importance in the government's plans, but these goals will not be achieved without curbing the inflation. Increase in commodity and service prices has resulted in reduce in purchasing power of people particularly poor group, and it has worsened their economic situation and reduced the effectiveness of poverty alleviation plans as a result. Therefore, it is recommended that distribution policies, knowing, and supporting vulnerable households should be used in order to reduce poverty line and improve household's welfare level. In order to distribute income among different groups of people equally and increase the revenue of the poor, the society will experience dynamicity both physically and mentally, and the ground is prepared for increasing employment, production,

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and as its result economic development. Moreover, authorities and officials can improve the effectiveness of these plans by knowing people's priorities well and more accurately.

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