TREND OF POVERTY INTENSITY IN IRAN 1991-2010

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ABSTRACT
Income inequality among poor people, average income of poor people, poverty line, total number of the poor and total population are the factors that affect poverty intensity and any difference in each of them causes difference in the size of poverty intensity. Among them, SST Index is an appropriate instrument to measure the poverty intensity. This index can measure the poverty intensity considering number of the poor and depth of poverty and inequality among them.In this paper, first the absolute poverty line based on 2300 calories for urban and rural areas, then the SST Index and its components -the poverty rate, average poverty gap ratio of the poor, and a measure that is related to the Gini index of poverty gap ratios- are calculated for the period of 1991-2010. Moreover for calculation of these indexes the data from the Statistical Center of Iran's Household Expenditure and Income Survey were used
The poverty intensity in 2010 compared with that in 1991reduced from 13.1 to 7.3 percent in urban areas. In rural areas, the poverty intensity reduced from 28.1 to 7.5 percent.
Intensity of poverty in rural and urban areas in 20 years (1991-2010) has found a marked reduction and a major cause of this decrease is due to reduction of poverty rate**.** In addition, the decrease of poverty intensity over the 20 years has been higher in rural areas than in urban areas.

JEL Classification: O40, I32, O53, O57
Keywords: *Poverty intensity, poverty index, poverty rate, poverty gap*

1. INTRODUCTION

Although the poverty has more extended concept than merely not having money, generally it refers to a percent of people whose income or consumption is below poverty line achieved in terms of standard indices of the life. However the considerable point is that the number of the poor and poverty line solely cannot describe the poverty. Because in lieu for poverty line and the number of the poor in two or several societies, the poverty intensity of these societies maybe different, thus there are indices for perception of poverty in each society that indicates the poverty intensity. The income inequality among poor people, average income(or expenditure) of the poor, number of the poor, and total population are considered as the elements that affect the poverty intensity and difference of each one of them caused to the difference in the measure of poverty intensity[2].One of the introduced index for measuring of poverty intensity is Sen-Shorrocks-Thon (SST) index which is the product of headcount ratio, the poverty gap index(applied to the poor only), the Gini coefficient of the poverty gap ratios [9].
In this paper, by using raw data of Household Income and Expenditure Survey in rural and urban areas, at first the absolute poverty line was calculated based on 2300 calorie and then due to this poverty line, the SST index was computed for a 20-year period from 1991 to 2010 and its variation rate has been perused.
Theoretical context:
In the initial economic literature, a lot of recommended poverty factors are derived from the viewpoint of Amartia Sen[8]. But many of them are not applied in practice. The most common factors in this relation is poverty rate(the ratio of individuals below poverty line) which is written as the following equation:

$$H=q/N \quad (1)$$

Where q is the number of poor and N is total population.
But this factor cannot indicate the poverty depth; by an equal poverty rate in two poor societies the average income may be different. For instance if two statistical societies 1 and 2 are considered and in two statistical societies 10 families are studied, if in each society both families have an income lower than poverty line, the poverty rate for both societies will be equal to 20%. Now this question is raised that if the poverty in both societies is equal? If in the first society the distance between each family's income and poverty line is two times more than the distance between each family's income and poverty line in the second society, certainly it may not be claimed that the poverty in both societies is equal. Accordingly, Amartia Sen indicated that another factor should be in consideration for specifying the poverty is the gap between each family's income and poverty line and he propounded in this connection two close to each other factors, the relationship between them are as follows: [5]

$$I = \frac{1}{q}\sum_{y_i<z}\frac{(z-y_i)}{z} \quad (2)$$

And

$$HI = \frac{q}{N}\frac{1}{q}\sum_{y_i<z}\frac{(z-y_i)}{z} = \frac{1}{N}\sum_{y_i<z}\frac{(z-y_i)}{z} \quad (3)$$

Where the poverty gap ratio for non-poor population is zero (Because their income deprivation is zero).Although such criteria show prevalence and mean depth of poverty, they cannot reveal deprivation rate difference between poor people.

In 1976, Amartia Sen proposed a set of conventional principles as a basis for poverty measurement. One of the key points discussed by Sen is that all poverty criteria of that time were insensitive to how to distribute poverty. As he thought, there are seven known principles to evaluate poverty criteria as follows [6,7]:

1. Concentration principle, 2. Weak uniformity principle, 3. Impartiality principle, 4. Weak transmission principle, 5. Strong transmission principle, 6. Continuity principle and 7. Invariance replication principle.

Among above principles, poverty rate index violates principles 2 and 4 and this is why lots of economists do not approve the poverty rate since this index is insensitive to poverty depth. Mean poverty gap ratio of the poor people (I) violates both weak and strong transmission principles. That is, mean index shows poverty depth relative to poverty gap but it is insensitive against distribution aspect. Due to this violation in poverty rate and average poverty gap ratio, Sen proposed two versions of the same for poverty measure[5]. The first one is:

$$S_0 = H[1-(1-I)(1-G(y_p))(\frac{q}{1+q})] \quad (4)$$

Where $G(y_p)$ indicates Gini index of poverty distribution of the poor and the greater population causes q/(1+q) equation go towards 1.

The version is:

$$S = H[1+(1-I)G(y_p)] \quad (5)$$

Immediately after Sen, lots of economists presented a wide range of poverty measures.Among thoseShorrocks (1995) proposed an adjusted form of Sen index which was conformed with Thon index (1979 & 1983) and was called Sen-Shorrocks-Thon (SST) index of poverty.

Mathematical equation of above index is as follows:

$$S_{SST} = \frac{1}{N^2}\sum_{y_i<z}(2N-2i+1)(\frac{z-y_i}{z}) \quad (6)$$

What is considerable in this equation is the poverty gap ratio $\left(\frac{z-yi}{z}\right)$ that is zero for those who are not poor.

Myles and Picot (2000)[3] showed that Sen Index especially SST index is a strong tool in policy-making. Xu and Osberg(1999,2002,2000)[4]showed that Sen and SST indexes can be analyzed into poverty rate, average poverty gap ratio of the poor and the measure of the inequality of the poverty gap ratios of the population .So, SST index can simplified as the following:

$$S_{SST} = HI(1+G(x)) \quad (7)$$

Where x shows the poverty gap ratios of the total population.

This decomposition indicates poverty intensity as a product of poverty rate, the average poverty gap ratios of the poor, and the measure of the inequality of the poverty gap ratios of the population.

By analyzing SST index into poverty indexes we can measure welfare reduction due to poverty, poverty incidence, poverty depth and inequality.

We can determine effective factors in changing poverty intensity by using this equation. This decomposition allows economists to view the source of a change in the measure of poverty intensity in terms of change in the poverty rate,

the average poverty gap ratio, and the inequality of the poverty gap ratios. To do this, by taking natural logarithm of both side of equation (7), gives:

$$Ln\,S_{SST} = LnH + LnI + Ln(1+G(x)) \quad (8)$$

$\ln(1+G(x))$ is an approximation of $G(X)$ based on the first-order Taylor series expansion. If we suppose $\Delta A = A - A_{-1}$, where A_{-1} is the A measure at the previous period, so this equation could be applicable to any first-order difference. Then equation (8) can be transformed as the following:

$$\Delta Ln\,S_{SST} = \Delta LnH + \Delta LnI + \Delta Ln(1+G(x)) \quad (9)$$

Where $\Delta \ln(1+G(x))$ is an approximation of $\Delta G(X)$.

This equation shows that percentage change in SST is the sum of percentage changes H, I and $G(x)$.[6]

2. DATAAND METHODOLOGY

In order to measuring poverty line and poverty indices, Household Income and Expenditure Survey in urban and rural areas have been applied. But in the case of micro data there is a basic problem in applying directly to data, that is, households of different size face different behavior and utility from the same amount of income. In order to solving the problem, we will divide all variables such as expenditure and income by the number of household members (family size). Therefore we can transform all variables such as consumption and income from households of different size into a single base [1].The period used in this paper is from 1991 to 2010. It is to note that one of needed elements in calculating SST indicator is poverty line which is based on 2300 calorie.

3. FINDINGS

The results of SST indicator and its component are shown in tables (1) and (2).The results of tables (1) and (2) show that poverty intensity in a 20 year period (1991-2010) has significantly decreased in rural and urban areas, in urban areas it has decreased from 13.1% to 7.3% and in rural areas it has decreased from28.1% to 7.5% .what is considerable is that poverty reduction in rural areas is more than urban areas. Of course, this reduction in urban areas had some fluctuation from 1991 to 1994 as figures 1 and 2 show. Investigating SST index elements shows that poverty reduction is mainly due to the reduction in poverty rate (H), and proportion of poverty gap indicators (I) and inequality has a small impact on this reduction.

Table1- SST index & its component - Urban areas:1991-2010

year	SST Index	Decomposition of SST			Changes			
		H	I	1+G(x)	Δln(SST)	Δln(H)	Δln(I)	Δln (1+G(x))
1991	0.131	0.232	0.305	1.856				
1992	0.173	0.291	0.327	1.818	0.278	0.227	0.070	-0.021
1993	0.224	0.38	0.336	1.753	0.258	0.267	0.027	-0.036
1994	0.247	0.405	0.351	1.734	0.098	0.064	0.044	-0.011
1995	0.081	0.151	0.282	1.909	-1.115	-0.987	-0.219	0.096
1996	0.072	0.141	0.267	1.916	-0.118	-0.069	-0.055	0.004
1997	0.064	0.125	0.265	1.925	-0.118	-0.120	-0.008	0.005
1998	0.072	0.14	0.267	1.916	0.118	0.113	0.008	-0.005
1999	0.068	0.133	0.268	1.918	-0.057	-0.051	0.004	0.001
2000	0.072	0.139	0.27	1.916	0.057	0.044	0.007	-0.001
2001	0.057	0.117	0.254	1.93	-0.234	-0.172	-0.061	0.007
2002	0.058	0.115	0.262	1.932	0.017	-0.017	0.031	0.001
2003	0.055	0.112	0.253	1.934	-0.053	-0.026	-0.035	0.001
2004	0.066	0.128	0.267	1.923	0.182	0.134	0.054	-0.006
2005	0.062	0.125	0.258	1.924	-0.063	-0.024	-0.034	0.001
2006	0.062	0.126	0.257	1.923	0.000	0.008	-0.004	-0.001
2007	0.062	0.119	0.27	1.928	0.000	-0.057	0.049	0.003
2008	0.074	0.142	0.273	1.915	0.177	0.177	0.011	-0.007
2009	0.127	0.232	0.296	1.858	0.542	0.489	0.079	-0.030
2010	0.073	0.142	0.267	1.915	-0.561	-0.488	-0.103	0.030

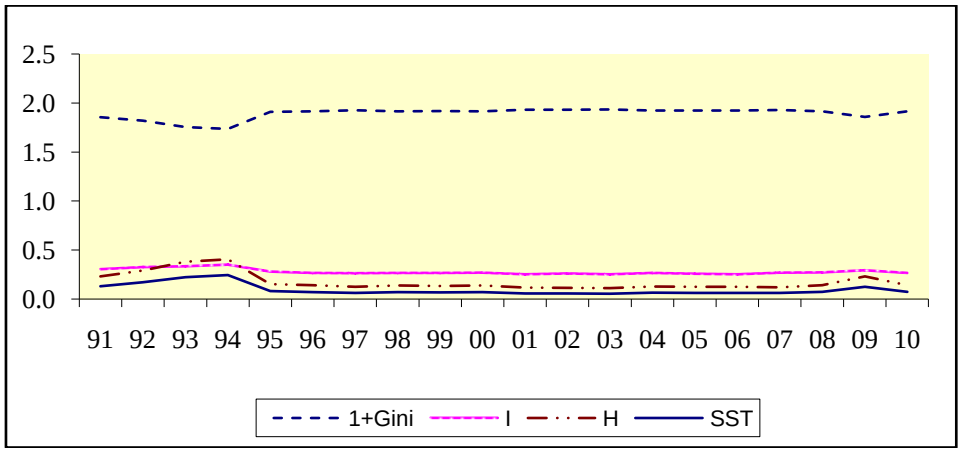

Figure1-Trend of SST index and its component in Urban areas:1991-2010

Table 2- SST index & its component - Rural areas:1991-2010

year	SST Index	Decomposition of SST			Changes			
		H	I	1+G(x)	Δln(SST)	Δln(H)	Δln(I)	Δln (1+G(x))
1991	0.281	0.415	0.392	1.728				
1992	0.225	0.335	0.377	1.784	-0.222	-0.214	-0.039	0.032
1993	0.241	0.379	0.362	1.757	0.069	0.123	-0.041	-0.015
1994	0.265	0.43	0.357	1.722	0.095	0.126	-0.014	-0.020
1995	0.151	0.246	0.332	1.847	-0.562	-0.558	-0.073	0.070
1996	0.131	0.226	0.311	1.862	-0.142	-0.085	-0.065	0.008
1997	0.121	0.211	0.306	1.87	-0.079	-0.069	-0.016	0.004
1998	0.09	0.163	0.291	1.901	-0.296	-0.258	-0.050	0.016
1999	0.052	0.097	0.273	1.942	-0.549	-0.519	-0.064	0.021
2000	0.071	0.132	0.281	1.92	0.311	0.308	0.029	-0.011
2001	0.06	0.119	0.262	1.929	-0.168	-0.104	-0.070	0.005
2002	0.051	0.102	0.26	1.94	-0.163	-0.154	-0.008	0.006
2003	0.052	0.103	0.262	1.939	0.019	0.010	0.008	-0.001
2004	0.048	0.099	0.251	1.942	-0.080	-0.040	-0.043	0.002
2005	0.05	0.103	0.25	1.939	0.041	0.040	-0.004	-0.002
2006	0.048	0.103	0.241	1.94	-0.041	0.000	-0.037	0.001
2007	0.049	0.098	0.256	1.943	0.021	-0.050	0.060	0.002
2008	0.07	0.134	0.272	1.922	0.357	0.313	0.061	-0.011
2009	0.12	0.218	0.283	1.867	0.499	0.486	0.041	-0.029
2010	0.07	0.148	0.263	1.913	-0.434	-0.383	-0.075	0.024

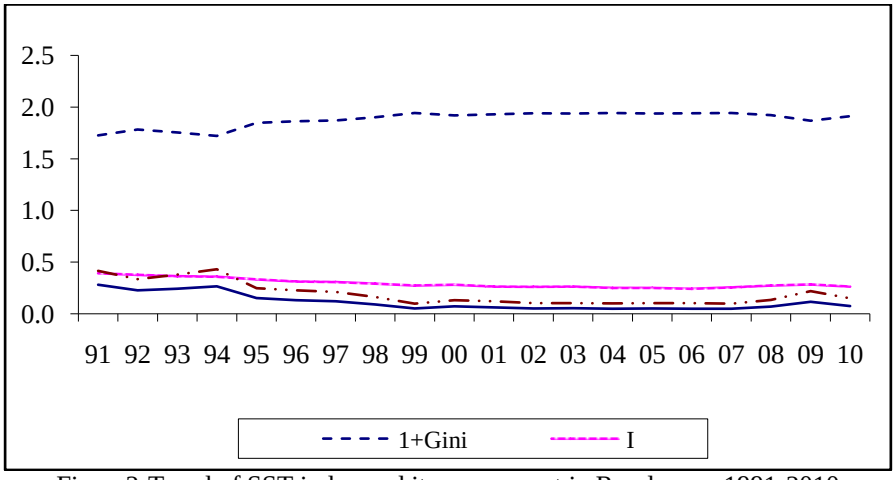

Figure2-Trend of SST index and its component in Rural areas:1991-2010

4. CONCLUSION

This paper has tried to examine the poverty intensity in Iran over a period of 20 year, beginning in 1991, till 2010.The chosen index for examination of poverty intensity, is the SST index.

This index is a modified version of Sen and Thon index which was proposed by Shorrocks in 1995.This index, calculates the poverty intensity by measuring, poverty rate, poverty gap and Gini coefficient of poverty gaps for the population.

In order to calculate SST, first the absolute poverty line was determined by using HIES micro data based on 2300. Then by using this poverty line we calculated SST and other indices such as poverty rate, the poverty gap and the poverty intensity in a 20 years period from 1991 till 2010. The results show that poverty intensity has decreased considerably in urban and rural areas. The poverty intensity in urban areas was 13.1% in 1991, which has declined to 7.3% in 2010. The results also show that it has decreased from28.1% to 7.5% in rural areas in this period. The

most important issue which could influence on the reduction of poverty intensity is the decline of percent of population under the poverty line.

The second influencing facts in reduction of poverty intensity was the poverty gap rate which decreased in urban area from 0.305 in 1991 to 0.267 in 2010 and in rural areas from 0.392 to 0.263.

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