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Effect of Targeted Subsides and Major Macroeconomic Variables on Income Distribution in Iran

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Abstract: One of the significant considerations of government's economic policies is the effect of these policies on quality of income distribution. In present study, the changing trend of Gini coefficient in Iran and related affective factors from 1996-2013 was examined in a logarithmic model. The impact of factors such as inflation, unemployment, Gross Domestic Product (GDP), exchange rate and targeted subsidies on dependent variable (Gini coefficient) by Eviews Software. Then the Reliability test, Integration test, Engle and Granger test, Autocorrelation test and Variance Heteroscedasticity test were conducted and it was found that all dummy independent variables introduced in this study have significant effect on the dependent variable. The independent variables of inflation, unemployment and exchange rate as well as the dummy variable of targeted subsides have positive and variable impact on independent variables GDP and negative impact on the increase in the Gini coefficient.

Key words: Gini coefficient, Iran, logarithmic model, income distribution, subsidies, major macroeconomic variables

INTRODUCTION

One of the significant consideration of government's economic policies is the effect of these policies on quality of income distribution. Achievement of greater equality is lonely a plausible purpose for social and economic plans of countries. So, in addition to the level of national output or income per capita, the way of its distribution has been also noticeable. To examine how the income is distributed between different groups of society, different methods could be applied. A common method is drawing the Lorenz curve and calculating Gini coefficient. The Gini coefficient is a number between zero and one in which zero represents perfect equality and number one represents a complete inequality (Samimi and Tehranchiyan, 2012).

Looking at the chart above, we can say that complete equality of income distribution is displayed by line y = x. So, complete equality condition, Lorenz curve is consistent on 45° line and the area between these two will be zero. In perfect inequality condition, the Lorenz curve bends towards axes and the area between that and 45° line become close to the total area of triangle. Therefore, reduced Gini coefficient indicates more equality in income distribution (Fig. 1).

Table 1 shows that Gini coefficient in Iran declined from 0.391-0.3643 in 1996 which shows that income distribution has been more righteously during this period. Table 1 demonstrates the changes of Gini coefficient from 1996-2003.

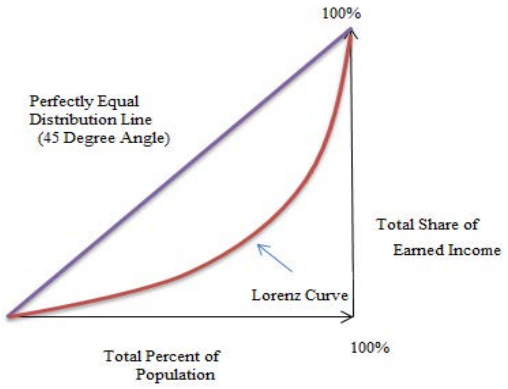

Fig. 1: Lorenz curve

The present study aims to study the impact of targeted subsides and major macroeconomic variables on income distribution in Iran using logarithm model and Eviews Software. Then, the research review of literature will be discussed inside and outside the country and the proposed model will be evaluated after review of theoretical subjects. At the end of the article, conclusions and recommendations will be provided.

Literature review

National studies: The studies by Zibaei (2005) entitled as "Evaluation of Effective Factors of Inequality and Income Distribution in Iran" showed that increasing labor productivity and the real exchange rate reform in the country and in the long run will improve income

Table 1: Gini coefficients in Iran

Years	Gini coefficient
1996	0.3910
1997	0.4029
1998	0.3965
1999	0.4009
2000	0.3991
2001	0.4304
2002	0.4287
2003	0.4241
2004	0.4240
2005	0.4248
2006	0.4356
2007	0.4337
2008	0.4122
2009	0.4111
2010	0.4099
2011	0.3700
2012	0.3643

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distribution and reduce inequality. But rising inflation and unemployment, not only does not improve income distribution but also acts as a kind of tax descending factor and leads to worsening of income distribution. Besides, increasing capital and labor productivity will improve social welfare but inflation and unemployment have a negative effect on social welfare (Zibaei, 2005).

The study by Noferesti and Fardin (2009) entitled as "Effects of Macroeconomic Shocks on Income Distribution in Iran" indicated that shock of exchange rate and inflation increases the income inequality in urban areas but its impact on income distribution income distribution is no not so perceptible in rural areas. The shock of rising oil revenues in the short term decreases the inequality of income distribution in urban and rural areas, however it lead to an increase in inequality in urban areas in the long run. A production shock also leads to increasing inequality in urban areas and reduced inequalities in rural areas.

Salimifar and Taherifard (2010) conducted a study entitled as "Analytical Study of Relationship Between Economic Growth and Income Distribution in Latin America" and used two Gini coefficient and decile of the income distribution. The results showed that the relationship between these two variables in Latin American countries was positive for some countries ad negative for others. In countries such as Brazil and Argentina, economic growth and income distribution was undirected but in Chile, economic growth along with supportive government policies has been effective on distribution of income.

The findings by Jaberi *et al.* (2012) entitled as "Effect of Financial Development on Income Inequality in Iran" showed that the relationship between financial development and Gini coefficient with GDP per capita is reducing and positive. Human capital has negative effect and inflation has positive effect on the Gini coefficient.

Sepehrdoost and Soleimani (2013) presented a paper entitled as "Effect of Consumer Subsidies on Income Distribution Status: a Case Study in Lorestan" and examined the performance of basic commodities subsidies on income distribution in Kurdistan and profited from Provincial data on income deciles during 1983-2010. The findings show that variables subsidies for basic commodities, employment rate and excise taxes have positive significant impact but inflation had unfavorable effects on income distribution in Kurdistan Province.

Komijani and Zadeh (2014) conducted a study entitled as "Impact of Inflation on Income Distribution and Performance Compensation Policies" and used patterns of factors affecting the Gini coefficient of income twenties. The results of the Gini index model showed that inflation, unemployment, government expenditures and the share ratio of 10% high income to 10% poor had negative affect on inequality. The increased subsidies for basic commodities and 40% share of the poor 40%, inequality will improve. For a more detailed analysis of the impact of inequality, the pattern of factors affecting the twenties has been used. The results showed that inflation, unemployment, subsidies of basic goods and the share of the 10% rich to 10% poor have been in favor of high-income twenties and results in inequality. Increased share of 40% poor has been in favor of low-income twenties and led to inequality.

International studies: A study by Bakker and Creedy (2000) entitled as "Macroeconomic Variables and Income Distribution: Conditional Model with General Definition". They examined the income distribution among men in New Zealand between 1985 and 1994. The findings showed that unemployment rate has the main impact on how the quality of income distribution which establishes the decreased earnings quality and increased Gini coefficient (Bakker and Creedy, 2000).

Xu and Zou (2000) implemented a research entitled as "Description of Changes in Income Distribution in China" and indicated that Gini coefficient has increased in China from 2.57 in 1984-3.78 in 1992. The findings showed that 1- inequality of income distribution increased with a decrease in GDP, high inflation, economic growth and increasing of foreign exchange: income redistribution intends to transfer resources from rich to poor and middle class.

Heer and Sussmuth (2007) conducted a study entitled as "Impact of Inflation on Wealth Distribution: Is it

Important to Cooperate in Stock Market and Income Tax?" and examined the impact of inflation on wealth distribution in America. The results showed that: the poor people keep their savings in cash while the rich individuals invest in stock market; high inflation increases the nominal interest rate, imposes a real tax on interest income, reduce 9 the rate of participation in the stock market and reduces savings and unjust distribution of wealth.

Theoretical fundamentals: Several factors can affect the Gini coefficient. Here are the most important factor to consider: Inflation rate inflation is attributed to a situation in which general level of prices are indiscriminately or disproportionately and constantly increases over time Tafazzoli and Till price inflation or persistent increase in the general level of prices was considered a disease. However, severe inflation also known as runaway inflation is a highly destructive economic processes with a few mutual benefits (Malcolm, 2006).

The major part of profits from trading financial assets is borrowing from the central bank which enhances the liquidity and aggregate demand. Since, supply of goods and services is not commensurately increasing, inflation is an expectable phenomenon. The general assumption is that high rates of inflation and hyperinflation is the consequence of excessive growth of the money supply (Barro and Grilli, 1994). This relationship between money supply and inflation and so devaluation of money has been discussed by classic economists, e.g., David Hume and David Ricardo (Blaug, 1997). Now a day the main direction of economics focuses on slow and even rate of inflation (Hummel, 2007), because low inflation could decrease the difficulties caused by the economic crisis by enabling the market with higher speed to its adjustment. Moreover, it can reduce the risk resulting from the liquidity trap (Svensson, 2003).

On the other hand, inflation bears the income distribution effect on financial market and the labor market. Thus in the financial market, it leads to transfer of income and wealth from lenders to borrowers and in labor market it leads to transfer of income and wealth from workers to institutions and employers (Taghavi, 2011). So, Inflation causes the unjustly distribution of income and increased Gini coefficient.

Economic growth: Economic growth implies increasing production or national income per capita. If the production of goods and services, by any means possible in a country increases, it can be seen increase economic growth. The era of modern economic growth does not pass >200 years. Before the late 18th century, there were individuals and families who were rich. But the nation as a whole and the majority of the population lived in poverty. If the economics of a country is assumed to be a cake with the fixed pieces, some could involve a huge chunk of this cake. But it was usually at the cost of depriving others of their share. Few could have imagined that it is possible to increase the share of people from economic cake in society. But according to modern economic growth, per capita income of all individuals living in a society increase rather than the income of a selected class.

Exchange rate: Exchange rate is the foreign currency value expressed on the basis of the domestic currency. With the increase in the exchange rate, the domestic price of imported goods rise will increase on the one hand and price of exported goods for foreigners will decrease. The result is increase exports and reduces imports. Similarly, the decline in exchange rate reduce the domestic price of imported goods, however the price of exported good will increase for foreigners. Therefore, import increases and export reduces. But exchange rates may have adverse effects economic shocks such as deterioration of income distribution due to activity of unproductive sectors of the economy through false demand for currency and so formation of bubbles in the currency market. For example, we witnessed an abruptly increase in exchange rate in Iran in 2002, some people gained windfall profits through buying and after a while selling the currency exchange while those people who really needed exchange had to buy it with higher fees. Then, a transfer of income was established from needful population to currency brokers of currency market which ended in unfair distribution of income.

Unemployment rate: Studies on the relationship between employment and income distribution, indicated that unemployment generally increases the dispersion of incomes and lower level of unemployment reduces the dispersion of income (Lecaillon *et al*., 1994). Employment provides the public with sources of income and enables the workers to participate in social activities be valuable and feel the sense of honor and respect. While employment is essential for complete achievement of the benefits of investing in human resources, unemployment deprives people of properly using their skills, knowledge and e the power of initiative and so efficiency of human resources will decrease. Then, the role of employment in reducing income inequality is more evident. Of course, reduced unemployment could only have a positive impact on income distribution when permanent unemployment is widely reduced or even completely faded. In this case, the economic structure will change and a proper ground to

reduce inequality will be provided. So, we can say that rising unemployment will increase the income gap between the numbers of people employed by those who are unemployed and results to increase in Gini coefficient and worse situation of income distribution.

Trageted subsides: Targeted subsides as one of the seven pillars of the economic development plan enjoys a special economic position and leads to changing the process subsidies payment. In the process, with the gradual elimination of subsidies from fuel, food, water, electricity and other items in Iran, payment of subsides changes. A part of the removed subsidies (60% in 2001) is paid in cash and other revenues are spent on cultural and civil activities. The targeted subsides is referred to as the largest economic project in Iran. Similarly, sine previous methods of payment subsidies in the country led to serious economic damages by waste of resources and injustice in the treatment of vulnerable income groups, targeted subsides was proposed as a necessity and not an option. The first objective of subsidies was protection of vulnerable groups. So, fair distribution of income was the most basic issue in payment of subsides.

MATERIALS AND METHODS

Model: The model presented in this study is as follows:

$$LGini = c_0 + c_1 LCPI + c_2 LGDP + c_3 LUN + c_4 LER + c_5 Dum + c_6 ar(1) + c_7 ar \quad (3)$$

Where:

Gini = Gini coefficient
CPI = Inflation indicator
GDP = Gross domestic production at constant prices in 1996 as an indicator of economic growth
Un = Unemployment rate
ER = Exchange rate
Dum = Targeted subsides
L = Logarithm
c_0 to c_7 = Coefficients of model variables

The variables of ar(1) and ar(3) are used to increase the statistical value of t in this model.

Model estimation: To estimate the above model, the logarithmic form is used. Firstly it reduces inconsistency and secondly it measures traction. After conducting the Reliability Test, Johansson Convergence Test and Engle Granger Test and ensuring the absence of spurious regression by Eviews Software, the model was estimated by OLS method.

Table 2: Results of unit root test for data level

		Critical values of Mackinnon (%)		
Variables	ADF statistics	1	5	10
LGini	-1.79	-3.92	-3.06	-2.67
LCPI	-1.73	-3.92	-3.06	-2.67
LGDP	0.14	-3.92	-3.06	-2.67
LER	-1.42	-3.92	-3.06	-2.67
LUN	-2.96	-3.92	-3.06	-2.67
LER	-1.42	-3.92	-3.06	-2.67
LUN	-2.96	-3.92	-3.06	-2.67

Research results

Table 3: Results of augmented Dickey-Fuller test for first difference of variables

		Critical values of Mackinnon (%)		
Variables	ADF statistics	1	5	10
LGini	-3.91	-4.00	-3.09	-2.96
LCPI	-3.99	-3.95	-3.08	-2.68
LGDP	-3.74	-3.95	-3.08	-2.68
LER	-3.67	-3.95	-3.08	-2.68
LUN	-5.17	-3.95	-3.08	-2.68

Table 4: Augmented Dickey-Fuller test results for the second order difference of variables

		Critical values of Mackinnon (%)		
Variables	ADF statistics	1	5	10
LGini	-5.76	-4.05	-3.11	-2.70
LGDP	-6.88	-4.00	-3.09	-2.69
LER	-6.49	-4.00	-3.09	-2.69

Reliability test: To investigate the reliability, generated Dickey Fuller test is applied. Accordingly, if the absolute value of the ADF statistics is larger than absolute value of critical terms of Mackinnon, the variable reliability of time series at 1, 5 and 10% significance level is confirmed. According to Table 2-4, all variables, including independent and dependent are unreliable at 1, 5 and 10% significance level.

LCPI and LUN are static by differencing. Lgini at 1% and LER and LGDP are not static at 1 and 5%. Then, we repeat augmented Dickey-Fuller test for the second time difference.

RESULTS AND DISCUSSION

According to table results, LER, LGDP and LGini are static with double-differencing.

Convergence test: Convergence test means that although the time series are lonely not static, linear combination of two or more time series, makes a long-term or equilibrium relation between them. The Johansen Cointegration test.

Johansen cointegration test: In order to conduct the Johansen Cointegration test, we firstly define the optimal interval using Vector Auto Regressive Pattern. In S VAR

Table 5: Definition of optimal interval

Interval	0	1
AIC	57.92	54.89
SC	58.17	56.33
HQ	57.94	54.96

Table 6: Johansen test results

Hypothesis H_0	Hypothesis H_1	Test statistics	Critical value 5%
r = 0	r>1	151.42	60.06
r<1	r>2	62.75	40.17
r<2	r>3	29.95	24.27
r<3*	r>4	9.32	12.32
r<4	r>5	3.55	4.12

model, recognition of optimal interval bears significance importance. For this purpose, Akaike and Schwarz criteria were used to determine the length of the interval. So, the VAR pattern should be estimated with multiple delays courses such as 1, 2, 3 or more. Then, by comparing the Akaike and Schwarz criteria obtained in any period of delay which give us the slightest answer, the optimal interval will be selected. Table 5 in comparisons between different intervals based on the indicators in the table above, according to the results obtained, finally, favorable during the interval is considered a (Lag = 1).

Safter determining the optimal interval, Johansen co-integration test is used to evaluate convergence. In made comparisons between criteria in different intervals and based on above table and gained results, the optimal lag is equal to 1. After determination of optimal lag in order.

By examining the above Table 6, it is observed that assuming H_1 = r>4 and H_0 = r>3, the statistics test is 93.32 which is smaller than critical value of 12.32 and so we could not reject H_0 = r>3. As a result, we accept that there are three converge vectors at this level. Therefore, long-run equilibrium relationship between the variables of the model is established and the regression of these variables is not false and related R^2, t, F is acceptable.

Engel-granger test: According to Engel- Granger test, the regression is firstly estimated by OLS method and sentences of error are obtained. The by Dickey-Fuller test or Augmented Dickey Fuller test, we test the reliability of error sentences. If the error sentences are static, we conclude that discussed variables. The results of this test are as follows.

According to Table 7, the absolute value of all ADF terms is large than critical values of Mackinnon. So, the error sentences are static and due to static status of error sentences, the research variables are accumulated. The results of pattern estimation are as follows:

Table 7: Unit root Test for surface disturbance sentences with the assumption of intercept (I), intercept and process (T) and without intercept and process (N)

			Critical values of Mackinnon		
Variables	ADF statistics	Algebraic factors	1%	5%	10%
Residual error terms	-4.18	I	-3.92	-3.06	-2.67
Residual error terms	-4.99	T	-4.80	-3.79	-3.34
Residual error terms	-4.66	N	-2.71	-1.96	-1.60

Table 8: Results of Breusch Godfrey test to examine outocorrelationin

R^2(n-p)	Prob.
0.59	0.74

$$LGini = 0.24+8.22\ LCPI\ -4.54\ LGDP\ +0.009\ LUN\ +7.79\ LER\ +0.36\ Dum\ -0.23\ ar(1)+0.68\ ar(3)$$
$$(6.51)\ (2.38)\ (-2.13)\ (4.70)\ (3.93)\ (2.24)\ (-0.54)\ (2.07)$$
$$R^2 = 89\%\ D\text{-}W = 2.12\ F = 7.49$$

The results indicate that the model coefficients and regression were significant. The coefficient of determination also indicates that regression could explain 89% of variance in the dependent variable.

Autocorrelation test: When a linear or cyclic relationship between errors sentences in continuous periods of time, the problem of outocorrelation in regression arise and in this case, the results are unbiased and consistent but they have not efficiency and does not have the least variance. We use the Breusch Godfrey test to examine the outocorrelation. To conduct the test, we firstly create an auxiliary regression and show the R^2(n-p)statistics by Obs*R^2 and compare it to X^2(0.05, P). The H_0 indicates the lack of outocorrelation and if X^2>Obs*R^2 0.05, P, H_0 assumption is accepted. Another way to detect the presence of autocorrelation is to examine the probability. If the probability is >0.05, the H_0 assumption is accepted and there is no outocorrelationin regression. Therefore, the results obtained from the following table indicates the absence of autocorrelation in the regression (Table 8).

Variance heterogeneity test: When the assumption of constant variance of the error terms is violated, the problem of heterogeneity occurs in which case the results of the analysis will not be effective. In other words it does not have the least variance and t and F statistics will be misleading. One of the advanced tests used for variance heterogeneity test is ARCH (2) Test. The H_0 in this test signifies the homogeneity of variance. The results obtained by Eviews software could be interpreted as follows: if X^2>Obs*R^2, the H_0 assumption is accepted

which says that there is no variance heterogeneity in regression and if the probability value is larger than 0.05, H_0 is approved. According to the results of Arch test in this model, the probability is 0.53 which is larger than 5% and so there is no variance heterogeneity in regression.

Coefficient analysis: The results show that all variables are statistically variable which are followed as follows. LCPI traction coefficient is equal to 8.22. Positive sign shows the direct relationship between Gini coefficient and inflation. In other words, increased inflation leads to unjust distribution of income. This results is in consistent with studies by Jaberi *et al.* (2012), Sepehrdoost and Soleimani (2013), Noferesti and Fardin (2009), Komijani and Zadeh (2014), Heer and Sussmuth (2007), Xu and Zou (2000) and Zibaei (2005).

The traction coefficient of LGDP is equal to -4.54. The negative sign of coefficient indicates the indirect relationship of GDP with Gini coefficient. In other words, increases GDP woill lead to fairer income distribution. This results is consistent with the study by Jaberi *et al.* (2012), Xu and Zou (2000), Salimifar and Taherifard (2010).

The traction coefficient of LUN is equal to 0.009. The positive sign of coefficient indicates the direct relation of unemployment with Gini coefficient. In other words, increased unemployment leads to unjust distribution of income. This finding is consistent with studies by Zibaei (2005), Bakker and Creedy (2000), Komijani and Zadeh (2014), Sepehrdoost and Soleimani (2013).

The traction coefficient of DUM is equal to 0. 936. The positive sign of coefficient indicates the direct relation of targeted subsides with Gini coefficient. In other words, targeted subsides in present situation leads to unjust distribution of income. This finding is consistent with studies by Sepehrdoost and Soleimani (2013) and Komijani and Zadeh (2014).

CONCLUSION

It is an acceptable fact that income distribution is an important economic and political goal for governments. In economic terms, changes in income distribution could affect the savings rate and as so investment demand in various markets and other economic factors and so it is an important factor from the governments' point of view. The income distribution is politically and to attract the voters' point of view is an important issue for every government. From every aspect, it was and will be a noteworthy issue for government stability.

SUGGESTIONS

The findings of this study suggest that inflation, exchange rate, unemployment and targeted subsidies had a positive effect on the Gini coefficient and increase in any of them leads to more unjustly distribution of income. However, variables like GDP had a negative effect on Gini coefficient and their increase leads to more justly distribution of income. In the end, the following suggestions are offered to achieve more equitable distribution of income and reduce the Gini coefficient.

Because of the high rate of inflation in country and its impact on increased Gini coefficient, the government through exercising the policies such as reduced expense or increased taxes and central bank through exercising the policies such as increased legal resources or increased balance rate and selling government bonds could reduce inflation rate which facilitates more justly distribution of income.

Because of low economic rate in country which signifies depression and unemployment, support of domestic producers and attending their problems and limitation could provide the ground for increased GDP, diminishing economic depression and so reduction of Gini coefficient.

One of the problems of conducting targeted subsides is to reduce Gini coefficient in country. The present study defined that the targeted subsides plan by current method not only reduced the Gini coefficient but also had negative impact on income distribution. Therefore, the exertion of several changes in this plan such as deletion of income producing deciles from receiving subsides in stairway model between different income deciles, we could reduce class distinctions.

The exchange rate shock, by enabling non-productive sector of the economy leads to weak income distribution. So, more sever supervision and prevention of economic depression, we could prevent the exchange rate shock. On the other hand, in the event that there is a bubble in the foreign exchange market, increasing the supply of currency can be a good idea to break the bubble.

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