

The Relationship between Economic Growth and Income Distribution in Jordan

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[Abstract] This paper examines the relationship between income distribution and economic growth in Jordan for the period 1987-2010. Using a Granger causality test and a Johansen cointegration test, the results indicate that income distribution affects and causes economic growth, and there is a long-run relationship between the two variables. This paper also applied the Kuznets inverted U-Hypothesis to the case of Jordan. The results indicate that the relationship between economic growth and inequality in income distribution follows the Kuznets inverted U-Hypothesis in Jordan for the period of the study.

[Keywords] economic growth; income distribution; granger causality; Jordan

Introduction

The traditional viewpoint about the relationship between income distribution or inequality and economic growth suggests that income distribution affects both macroeconomic activities and economic growth. This traditional viewpoint had been challenged in the last decade. Simon Kuznets developed the most famous hypothesis of the relationship between inequality in income distribution and economic growth. He argued that as a country develops, income inequality initially increases, and, only after some time, it declines, which makes a U-shaped relationship between per capita income (economic growth) and inequality (Abounoori, 2007).

What would be the effect of inequality on the economic growth and economic performance in Jordan? This paper attempts to answer this question by finding out whether there would exist a sufficiently strong correlation between inequality and economic growth in Jordan during the period 1987-2010. It will also test the hypothesis about whether or not an increase of inequality in income distribution reduces economic growth. This paper is organized as follows. Section 2 provides the literature view. Section 3 details the data base and discusses the empirical methodology used. Section 4 presents the empirical results. Finally, Section V contains the conclusions.

Literature Review

Literature on the relationship between the economic growth and inequality in income distribution started with Simon Kuznets' (1955) in his article entitled "Economic Growth and Income Inequality." He found out that income inequality during the first stages of economic growth increases, and then it gets reduced in the later stages of growth, making an inverted U-shaped relationship between the economic growth and inequality in income distribution. Banderia and Garcia (2004) evaluated the Kuznets curve for 13 countries in Latin America during the years 1970-1995 and figured out that there is no direct causal relationship between the economic growth and inequality.

On the other hand, Galor and Zeira (1993) argued that income distribution plays an important role in determining the aggregate economic activity and economic growth. Masoud and Farahbakhsh (1998) tested the Kuznets hypothesis, using a time-series data for Iran for the years (1968-1996) and using the ordinary least squares method. They found out that an increase in the economic growth helps improve income distribution, and the undesirability of income distribution will slow economic growth. Their econometric reviews show that there is a significant correlation between economic growth and income distribution improvement.

Adeli and Ranjbaraki (2002) examined the long-term relationship between economic growth and

income distribution in Iran during the years 1968-2001. The results of their study show that the Kuznets hypothesis is not true in this period for the Iranian economy. In addition, there is a positive long-term convergence relationship between the economic growth and the income unequal distribution indicator (Gini coefficient). Further, the Granger causality test between two variables indicates that there is a mutual effect between them.

Forbes (2000) examined the existence of a negative relationship between inequality and growth by running the AR/PT regressions and using the panel data. He found out that a relationship becomes positive -- more inequality leads to higher growth. Besides, Barro (1999) used the Seemingly Unrelated Regressions technique and found out no evidence of a linear relationship between inequality and growth. Yet, he maintained a non-linear relationship: inequality appears to be good for growth at high levels of income but bad for growth at low levels of income. Weriemmi and Ehrhart (2004) tested the relationship between inequality and economic growth in the European Union and the Mediterranean Basin countries, using cross-sectional data. The results showed that rapid economic growth will increase income inequality.

Li and Zou (1998) examined the relationship between income inequality and the economic growth in an AK model of endogenous growth. They stated that when the household utility function is logarithmic in public consumption, a more equal distribution of income leads to a higher rate of capital taxation and a lower rate of economic growth. This means income inequality can help generate faster economic growth. On the contrary, Alesina and Rodrik (1994) claimed a negative relationship between inequality and growth in a similar AK model of endogenous growth, but with government spending, used entirely for the purpose of production instead of consumption.

Finally, Ramzi and Ashrafzadeh (2012), upon examining the Kuznets hypothesis by using time-series data, examined the situation of Iran. They concluded that Kuznets' hypothesis is not true during the period 1971- 2007 in Iran and there is a positive long- term convergence relationship between economic growth and income distribution.

Data and Methodology

Data

The data used for this study are basically time series data for Jordan covering the period 1987- 2010. The two economic variables included in this study are the Gini index (*Gini*), used as an indicator to measure inequality in income distribution, and Gross Domestic product (*GDP*) as an indicator to measure economic growth. Data were sourced from The Central Bank of Jordan and The World bank statistics.

Method

In this paper, the statistical properties of both economic growth and income distribution were investigated, using the unit root test. Causality among variables, using Granger causality test, was utilized to determine the directional causality between variables. Then, a long-term relationship was estimated, using Johansen cointegration test. Finally, the existence of Kuznets hypothesis was tested for Jordan.

The Unit Root Test

Macroeconomic time series data are generally characterized by a stochastic trend which can be removed by differencing. Some variables are stationary on levels, others become stationary after one differentiation, and some may become stationary by more than one differentiation (*d* times). To test for the stationary of the variables, the Augmented Dickey-Fuller (ADF) technique was utilized. The ADF equation was performed for the case when it includes intercept only in addition to the case when it includes both intercept and time trend. The results are reported in Table 1.

Table 1. ADF Test Results

	<i>Gini</i>	<i>dGini</i>	<i>GDP</i>	<i>LGDP</i>	<i>dGDP</i>
ADF test with intercept and trend	-2.112240	-4.419717	1.152173	-1.216392	-3.728185
Critical value at 5% level	-3.622033	-3.632896	-3.622033	-3.622033	-3.632896
Number optimal of lags	0	0	0	0	0
ADF test with intercept and without trend	-1.854151	-4.424644	4.678575	1.277021	-3.743935
critical value at 5% level	-2.998064	-3.004861	-2.998064	-2.998064	-3.004861
Number of optimal lags	0	0	0	0	0

The results indicate that both variables, the *Gini* index and the *GDP*, are not stationary on their levels. In other words, they have a unit root. Since the computed values (in absolute value) are smaller than the critical values (in absolute value) at a 5% level of significance, the null hypothesis of the unit root or non-stationary variable cannot be rejected. Then, we repeated the unit root test for the first difference for both variables. The results point out that both the *Gini* index (*dGini*) and the Gross domestic product (*dGDP*) became stationary after the first difference.

Granger Causality Test

The Granger causality test is a statistical hypothesis test for determining whether or not one variable is useful to forecast another. According to Granger causality, if a variable (*x*) Granger-causes variable (*y*), then past values of variable (*x*) should contain information that helps predict variable (*y*). Since both the *Gini* index and the *GDP* became stationary after the first difference, then we are able to perform causality testing for (*dGini*) and (*dGDP*). The results of the Granger causality test of the study appear in Table 2.

Table 2. Granger Causality Test

Null Hypothesis	level of significance	p-value	F-value	Test result
Income inequality does not Granger cause economic growth	5%	0.0903	2.14775	Reject (p-value<0.10)
Economic growth does not Granger cause income inequality	5%	0.4933	0.73878	Accept (p-value>0.10)

The results of the causality test show that inequality in income distribution represented by *Gini* index Granger Causes economic growth at 10% significant level. This finding is consistent with Forbes (2000). This means that an increase or a decrease in inequality in income distribution can affect and causes the economic growth significantly. On the other hand, economic growth does not seem to Granger Cause inequality in income distribution. This suggests that information about economic growth in past periods cannot explain the behaviour of inequality in income distribution in the present time. One reason for such a result is the relatively stable series of one of the variables during the period of the study that cannot show the expected effect as the theory suggests.

Cointegration Test

In order to avoid spurious estimates, we intend to establish a long-run relationship among the variables. For this purpose, the Johansen cointegration method was used. Before running the test, this method requires determining the best number of lags. According to Akaike Information Criterion (AIC) criteria, the best number of lags to use was found (2). There are two statistics for the Johansen cointegration test. One is the value of the long-run test based on the maximum eigenvalues of the stochastic matrix. The

other one is the value of the long-run test based on the trace of the stochastic matrix. The results of both statistics are reported in Table 3. They determine that there is at least one cointegration vector at the 5% level of significance.

Table 3. *Johansen Cointegration Test*

Null hypothesis	Alternative hypothesis	Kind of test	t-statistics	Critical value	Results
r=0	r=1	Maximum eigenvalues	3.9772	9.1645	reject null hypothesis
r=0	r=1	Trace test	3.9772	9.1645	reject null hypothesis

Application of Kuznets Inverted-U to Jordan

We can use our available data to determine whether the relationship between Jordan's economic growth and its inequality (income distribution) follows Kuznets' Inverted U-Hypothesis for the period 1986-2010. Since the hypothesis suggests an inverted U-shaped relationship between income distribution and economic growth. Then, as utilized by Ramzi (2012), an extreme point exists forming a second-degree function as below:

$$GDP = a_0 + a_1 Gini + a_2 Gini^2 + u_t \quad (1)$$

The estimation of this was found as follows (where numbers inside parentheses are t-statistics):

$$GDP = 417483.2 - 20093.4 Gini + 243.5 Gini^2$$

(3.117) (-2.897) (2.720)

From this estimation, the coefficients were found statistically significant. Also, the F-value indicates that our model, as a whole, is significant, too. Therefore, the relationship between economic growth and income distribution does follow the Kuznets Inverted U-Hypothesis in Jordan for the period of 1987-2010. These results indicate, as appearing from the coefficient of the *Gini* variable, that inequality in income distribution has a negative effect on economic growth. From these results, we can infer that a small degree of income distribution is associated with a low level of *GDP*, and a large degree of income distribution is associated with a high level of *GDP*. This result is consistent somewhat with Barro's (1999) findings.

Conclusion

This paper investigates the effect of inequality of income distribution on economic growth and economic performance in Jordan, finding whether or not there exists a sufficiently strong correlation between inequality and economic growth. The findings suggest a long-run cointegration relationship existing between inequality in income distribution and economic growth. The causality test suggests that inequality causes economic growth, but the opposite is not true. Finally, the study applies the Kuznets hypothesis to the Jordanian case. The test showed that in the case of Jordan, the *Gini* coefficient has behaved as Kuznets predicted. This suggests an increase in inequality in income distribution would have negative effects on economic growth.

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