INCOME INEQUALITY, ECONOMIC GROWTH AND INFLATION: A STUDY ON KOREA

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ABSTRACT

This paper examines the relationship between economic growth, income distribution, and inflation in Korea. The effect of income distribution on economic growth and how inflation relates to income distribution had been appeared in many studies. However, most of the studies are focused on the United States, the United Kingdom and the developing countries in Latin America. There is lack of studies on developed countries in East Asia. To fill the gap, this paper examines the relation among economic growth, income distribution and inflation in Korea. Error-Correction model is used to examine the co-integration movement of the data in 1980-2002. Empirical evidences suggest that income inequality has a long-term co-integrated movement with economic growth. Furthermore, a high income inequality obstructs economic growth. However, there is no empirical evidence to support the existence of long-term co-integrated movement between inflation and income distribution.

Keywords: economic growth, income distribution, inflation

JEL Codes: D31, E31

1. Introduction

Economic growth and income inequality are two important issues in the aspect of economic development. Economists have related economic growth with income inequality. Kuznets (1955) documented the income distribution in industrialized countries should be higher than in developing or agrarian countries. Paukert (1973) suggested that income distribution first becomes more unequal, reaches the peak, and then becomes less unequal with increasing per capita income. This hypothesis is called the Kuznets hypothesis or U hypothesis, which related income inequality with economic scale using an inverted U-shaped curve. Dimelis and Livada (1999) found that economic growth reduces income inequality in US and UK, but it increases inequality in Greece. Rodriguez (2000) provided empirical results from the regional data in US since 1960, showed that income inequality would reduce economic growth. Panizza (2002) also found a negative relationship between the income inequality and economic growth in US. Burtless (2003) found that US has higher economic growth and higher income inequality when compare with other G7 countries. Although studies show that economic growth is related to income inequality, whether rising income inequality would facilitate or prohibit economic growth is still an open question needed to be answered.

Apart from the relationship between economic growth and income inequality, the determinants of income inequality are also under debate. According to Laidler and Parkin (1975) and Fischer and Modigliani (1978), inflation increases income inequality because it hurts the poor more than the rich. Cardoso, et al. (1995) provided empirical results show that income inequality is positive related to inflation in Brazil during the 1980s. On the other hand, Bach and Stephenson (1974) and Blinder and Esaki (1978) suggest that inflation improves income distribution. Heer and Süssmuth (2003) find empirical evidence that inflation reduces income inequality. In short, the relation between inflation and income distribution is still unclear. Although there are many studies on the

effect of inflation on economic growth and income distribution, most of them are focused on the United States, United Kingdom or developing countries (see (Laidler & Parkin, 1975), (Fischer & Modigliani, 1978), and (Fischer, 1981), (Yu, 2005), and (Shahbaz, 2010)). There is lack of studies on developed countries in East Asia. It leads to the question that is there any differences in the effect of inflation on economic growth and income distribution between western and East Asia developed countries.

This study attempts to examine the relation between economic growth, income inequality and inflation in Korea. Among developed countries in East Asia, Korea is not a small scale economy like Hong Kong and Singapore. When compare with Japan, which has little inflation[1], Korea has a much higher inflation. The Annual inflations of Korea are 4.68%, 2.83%, and 2.93% in 2008, 2009, and 2010 respectively. By studying the situation in Korea, a better understanding on the relation between inflation, income distribution, and economic growth can be achieved.

The rest of this paper is organized as follows. Section 2 gives a literature review on income inequality, economic growth, and inflation. Section 3 is the data description and empirical analysis. Finally, conclusion of this paper is given in section 4.

2. Literature Review

2.1 Income inequality and economic growth

Hypothesis of economic theories is that income inequality is negative related to economic growth. There are three explanations that associate income inequality with economic growth. Alesina and Roderick (1994) and Person and Tabellini (1994) suggest a political-economy approach to explain the relation between

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[1] Annual inflation of Japan is -1.3% in 2009 and -0.6% in 2010

income distribution and economic growth in developing economies with income inequality. In their hypothesis, median voter support the governmental policies which improve the access of resources from rich to poor. These resources redistributive policies affect economic decision adversely by adopting tax-promoting activities. As a consequence, income inequality is inversely related to economic growth.

Socio-political instability approach is used to explain the relation in another way ((Perotti, 1993), (Alesina & Perotti, 1994), and (Benhabib & Rustichini, 1996)). They suggest that economic growth is declined by income inequality because social conflict within societies. In their hypothesis, societies with high income inequality have more social conflict, crimes, and illegal activities which harm economic development and investment. Moreover, Knack and Keefer (2000) suggest that in a highly polarized society, individuals have different cultural background and expectation are difficult to make decision on self-enforcing agreement. Therefore, increase in social polarization lowers economic growth.

The third approach appeal to the imperfection of capital markets ((Aghion & Boltion, 1992), (Banerjee & Newman, 1993), (Galor & Zeira, 1993), (Aghion & Bolton, 1997), (Chiu, 1998)). In imperfect capital market approach, income inequality is linked with low access to credit for the lower classes. Because the poor individuals would not have enough income and have no access to credit for investing in education, income inequality decreases overall investment in human capital and declines economic growth for societies.

2.2 Inflation and income inequality

A mechanism through which inflation can affect income inequality is by shifting income away from wage earners, towards profits. Tyson (1998) indicated that inflation

erodes real minimum wages and reduces the income of the poor. Moreover, inflation taxes the poor, who hold a larger fraction of their wealth in flat money, more heavily than the rich who hold both capital and flat money. Therefore, inflation is claimed to increase income inequality in this sense. Supporting evidences can be found in Björklund (1991), Blejer and Guerrero (1990), and Silber and Zilberfarb (1994).

On the other hand, empirical evidences for inflation may decrease income inequality can be found in Bach and Stephenson (1974), Blinder and Esaki (1978), Blank and Blinder (1986), and Romer and Romer (1998). Inflation decrease income inequality through two channels. First, Inflation transfers income from nominal lenders to nominal borrowers. As summarized by Laidler and Parkin (1975), inflation harms the income of the poor and the rich the most, because the middle class usually having more nominal debt than the poor and the rich. Therefore, inflation is claimed to decrease income inequality.

Second, inflation may also redistribute income through the tax system. In a tax system which progressive tax-scales are used, inflation pushes higher income earners into higher tax brackets. In this sense, tax bracket creep from inflation reduces income inequality (Heer & Süssmuth, 2003).

3. Empirical Analysis

3.1 Data Description

In this study, yearly data of Gini coefficient, GDP, and CPI of Korea between 1980 – 2002 are used. The data on Gini coefficient (Gini) of Korea is obtained from the estimated household inequality data set (EHII) ((Galbraith & Kum, 2004) and (Kum, 2008)). The EHII data set is produced by the University of Texas Inequality Project based on the industrial statistics database published annually by the United Nations Industrial Development Organization (UNIDO). Compare with the data set which is created by Deininger and Squire (1996), EHII data set is claimed to be more accurate and consistent through time and across countries (see (Berman, 2000) and (Atkinson & Brandolini, 2001)). The GDP data and CPI data are adopted from The Bank of Korea and KOSTAT (Statistics Korea). Table 1 shows the descriptive statistics of the data.

In Table 1, LogGini, LogCPI, and LogGDP are the log value of Gini, CPI and GDP respectively. DlogGini, DlogCPI, DlogGDP are the change of the corresponding data between two successive years. Table 2 shows the correlation matrix of DlogGini, DlogCPI and DlogGDP.

Table 1. The descriptive statistics of data.

	Gini	LogGini	DlogGini	CPI	LogCPI	DlogCPI	Dinflate	GDP	LogGDP	DlogGDP
Mean	37.38500	1.572577	-0.000962	59.24500	1.753370	0.020597	-0.003336	481.0235	2.654699	0.019263
Median	37.11500	1.569548	-0.001593	58.25000	1.765100	0.019812	0.000671	529.6350	2.723861	0.027672
Maximum	39.62000	1.597914	0.012853	88.30000	1.945961	0.038558	0.016273	712.7800	2.852956	0.118427
Minimum	36.07000	1.557146	-0.012679	36.60000	1.563481	0.003678	-0.054322	229.0800	2.359987	-0.214807
Std. Dev.	0.907858	0.010450	0.007257	17.89697	0.133602	0.009472	0.015752	161.3708	0.165621	0.068821
Skewness	0.823768	0.774924	0.064472	0.219108	-0.014279	0.180226	-1.798355	-0.260447	-0.610296	-1.864794

Table 2. Correlation matrix of variables

	DLogGini	DLogGDP	DLogCPI
DLogGini	1.000000	-0.537445	0.314579
DLogGDP	-0.537445	1.000000	-0.307401
DLogCPI	0.314579	-0.307401	1.000000

Gini, CPI, and GDP are the Gini coefficient, the Consumer Price Index, and the Gross domestic product of Korea respectively. LogGini, LogCPI, and LogGDP are the log value of Gini, CPI and GDP respectively. DlogGini, DlogCPI, DlogGDP are the change of the corresponding data between two successive years. Dinflate is the change in DlogCPI between two successive years.

The Gini coefficient of Korea ranges from 36.07 to 39.62 with an average of 37.48. The coefficient changes less than 1% per year in average, it represents that income distribution in Korea is rather stable in these two decades.

The consumer price index of Korea ranges from 34.2 to 88.3 with an average 58.05. Korea has a mild inflation (DlogCPI) with average of 2.4% per year during 1980 – 2002. Dinflate is defined as the change of DlogCPI between two successive years. The values of Dinflate range from -0.05 to 0.01 with an average of -0.003. In other words, inflation rate in Korea is stable.

The GDP of Korea changes from 228.73 billion US dollars to 496.01 billion US dollars in these two decades. In average, the GDP of Korea increases 1.72% per year.

3.2 Unit root test on the data

Before performing regression on the data, ADF unit root test is used to test the whether LogGini, LogCPI, LogGDP, and DLogCPI are integrated of order 1 (I(1)). Table 3 shows the results of ADF unit root test. From the results, LogGini, LogCPI, LogGDP, and DLogCPI cannot reject the hypothesis of having a unit root. On the other hand, DLogGini, Dinflate, and DLogGDP reject the null hypothesis that there is a unit root at 5% significant level. I conclude that LogGini, DLogCPI, and LogGDP are I(1).

Because using non-stationary variables directly in regression may be resulted in spurious regression, it is crucial to ensure that all the variables used in the regression are stationary. According to the results of the ADF unit root test, LogGini and DLogCPI are non-stationary variables. Therefore, it is not suitable to use them as regression variables. I argue that studies using the Gini coefficient and inflation directly in the regression ((Li, 2002), (Ahn, 1997)) may have the problem of spurious regression. In this study, error-correction model which suggested by Granger and Weiss (1983) and Engle and Granger (1987) is used to analyze the co-integration relation among income distribution, economic growth, and inflation rate.

Table 3. ADF Unit root test results

Testing Variable	ADF Test Statistic	1% Critical Value	5% Critical Value
LogGini	-0.166162	-4.5000	-3.6591
DLogGini	-2.258952*	-2.6968	-1.9602
LogCPI	-1.788945	-4.4691	-3.6454
DLogCPI	-2.791325	-3.8067	-3.0199
Dinflate	-5.037111**	-2.6968	-1.9602
LogGDP	-1.484318	-4.4691	-3.6454
DLogGDP	-3.050091**	-2.6889	-1.9592

**: significant at 1% level. *: significant at 5% level.

3.3 Empirical results

Error correction model which proposed by Engle and Granger (1987) is a two-step approach to check whether dependent variable is co-integrated with independent variables. In the first step, OLS is used to estimate the variables in levels. The regression equations are:

$$LogGDP_t = \beta_1 LogGini_t + C_1 + u_t \quad (1)$$

$$LogGini_t = \beta_2 DlogCPI_t + C_2 + e_t \quad (2)$$

In the above equations, C_1 and C_2 are the constant terms. Moreover, u_t and e_t are the estimated residuals at time t for the equations. The regression results of equation (1) and (2) are show in Table 4.

Table 4. Regression results on the data
Dependent Variable: LogGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C_1	23.684**	2.6727	8.8614	0.000
LogGini	-13.373**	1.6976	-7.8780	0.000

Adjusted R-squared: 0.7441
Durbin-Watson stat: 0.8716
Prob(F-statistic): 0.0000

Dependent Variable: LogGini

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C_2	1.570**	0.0044	357.9597	0.000
DlogCPI	0.162	0.1532	1.0553	0.305

Adjusted R-squared: 0.0057
Durbin-Watson stat: 0.3773
Prob(F-statistic): 0.3045
**: significant at 1% level. *: significant at 5% level.

After the first step, estimated residuals, u_{t-1} and e_{t-1}, are used in analyzing the long term co-integration of the variables. OLS is used to estimate the coefficients in equation (3) and (4). A negative and significant coefficient associated with the estimated residuals represent that there is a long-term co-integrated movement between variables.
Table 5 shows the regression results of equation (3) and (4). In the equations, C_3, C_4 are the constant terms and u_{t-1}, e_{t-1} are the estimated residuals of equations (1) and (2) at time t-1 respectively.

$$DLogGDP_t = \beta_3 DLogGini_t + \beta_4 u_{t-1} + C_3 \quad (3)$$
$$DLogGini_t = \beta_5 Dinflate_t + \beta_6 e_{t-1} + C_4 \quad (4)$$

Table 5. Regression results of the data using Error-Correction model
Dependent Variable: DLogGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLogGini	-5.300**	1.5436	-3.4338	0.0030
u_{t-1}	-0.379*	0.1346	-2.8133	0.0115

Adjusted R-squared: 0.4512
Durbin-Watson stat: 1.9753
Prob(F-statistic): 0.0018

Dependent Variable: DLogGini

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Dinflate	0.076	0.1031	0.7389	0.4701
e_{t-1}	-0.256	0.1434	-1.7848	0.0921

Adjusted R-squared: 0.1357
Durbin-Watson stat: 2.6724
Prob(F-statistic): 0.1125
**: significant at 1% level. *: significant at 5% level.

According to the regression results, coefficients of both DLogGini and u_{t-1} are negative and significant at 5% significant level. Therefore, the regression results suggest that GDP and Gini cofficient are co-integrated with each other. On the other hand, the regression results of equation (4) does not provide evidence on the co-integrateion between inflation and Gini cofficient.
To summarize the empirical results, it suggests that there is a long-term co-integration between economic growth and income inequality. My findings agree with previous studies (see (Perotti, 1993) and (Alesina & Roderick, 1994)). In other words, income inequality obstructs economic growth.
Furthermore, there is no evidence showing that income inequality is related to inflation in Korea. Although some studies suggest that there is relation between inflation and income distribution (Li, 2002), empirical results on Korea do not provide evidences on such relationship.

4. Conclusion
This paper examine the relation between economic growth, income distribution, and inflation using data of Korea. Empirical results suggest that an increase in income inequality obstructs economic growth. Morever, there is no empirical evidence to support that inflation is related to income distribution in Korea. This conclusion agress

with previous study from Ahn (1997). In his study, empirical evidences show that there is no relation between increases in consumer price index and income distribution. However, the rate of increase in land price worses income distribution. According to The Bank of Korea, the avergae increase in personal disposable income of Koera is around 10% in the past twenty years. When compare with the inflation rate, which is only around 2% annually in Korea, inflation is not likely to hurt the income of Korean. Therefore, inflation does not affect income distribution in the case of Korea.

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