

A Study on the Dynamic Relationship between Wealth Gap and Economic Growth in China

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Abstract

With the economic globalization, the relationship among all countries has become more and more closed (this phenomenon is often called “global village”). The wealth also flows more freely than that of before in the world. Due to this, there is a better improvement in our everyday life. But it also raises many livelihood issues such as the wealth gap. At present, the wealth gap problem has become one of the biggest serious problems in each country, especially, in the developing countries. Because of this, quantities of scholars and economists spare no effects to explore the dynamic relationship between wealth gap and economic growth. In this, this paper sets China who is the biggest developing country in the world with bigger wealth gap as an example. The annual time series data from 1980 to 2016 is applied to analyze the dynamic operating mechanism between wealth gap and economic growth in China. All datum are sourced from the National Bureau of Statistics of the People’s Republic of China. Using the vector error correction model to conduct an empirical analysis, the dynamic operating mechanism between them will be fully understood. Then, the results of this empirical study will provide some ideas as reference for China’s government to settle the wealth gap.

Keywords: Wealth Gap, Economic Growth, Vector Error Correction Model

1. Introduction

With the high-speed economic development and continuous improvement of living standards, people are not satisfied with their present wealth level. And new demands have been put forward to wealth distribution. In the economic sphere, economists are increasingly interesting in the dynamic linkage between wealth gap and economic growth. Unfortunately, they have not reached a consensus about what kind of relationship they should have, even though they have conducted quantities of empirical analyses based on objective datum from all over the world. Ncube, Anyanwu and Hausken (2014) use a cross-sectional time series datum of Middle Eastern & Northern Africa country from 1985 to 2009 to perform an empirical analysis, they

find that income inequality makes a reduction in the economic growth and increases poverty in that region. Apergis, Dincer and Payne (2014) also utilize U.S. as an example to investigate the causal relationship between income inequality and economic freedom. They apply the period 1981 to 2004, and conduct an empirical analysis within a panel error correction model framework. They find that there is a bidirectional causality between income inequality and economic freedom in both the short and the long run. Brunori, Ferreira and Peragine (2013) find that inequality may, in turn, affect the economic growth, dating back at least to Kaldor (1956). Halter, Oechslin and Zweimüller (2014) introduce a simple theoretical model to study how changes in inequality affect economic growth over different time horizons. They empirically investigate the relationship between inequality and economic growth, thereby relying on specifications derived from the theory. Their empirical findings are in line with the theoretical predictions. Namely, higher inequality helps economic performance in the short term but reduces the growth rate of GDP per capita farther in the future. The long-run (or total) effect of higher inequality tends to be negative. Fixler, Johnson, Craig and Furlong (2017) focus on the importance of the income measure underlying the inequality measure when examining the relationship between GDP growth and inequality.

Since the reform and opening-up, much has been change on the operating mechanism between wealth gap and economic growth in China. The mode of distribution according to work and multi-distribution ways running parallel has gradually replaced that of distribution of extreme equalitarianism under the planned economic system. This transformation greatly liberates the productive forces and arouses labor's enthusiasm, which can rapidly promote the economic growth. The wealth gap, however, is also enlarging a lot in China. The negative effect of the continuous increase in the wealth gap on economic growth has become more and more significant, which results in many concerns in economic field. Zhang and Dang (2014) use the datum from 1978 to 2014 to explore correlation between wealth gap and economic growth based on the smooth transition regression. Their results show that there exists a significant non-linear characteristic between wealth gap and economic growth. Moreover, the wealth gap has a positive effect on economic under non-linear condition. Ma and Mi (2017) take use of datum from 1988 to 2013 to conduct an empirical analysis based on vector error correction model. Their findings indicate that there exists a long-run co-integration and short-run dynamic relationship between wealth gap and economic growth in Xinjiang province (a province of China). Enlargement of wealth gap has a negative effect on reducing poverty. Wang (2017) investigates the relationship between economic growth and wealth gap via an empirical study. The empirical analysis results demonstrate that the economic structure leads to wealth gap in China. Along with the reform of economic system, the wealth gap turns to decreasing even though the scale of economic aggregate keeps increasing.

After reviewing the related researches, this paper takes advantage of vector error correction model to explore the dynamic relationship between wealth gap and economic growth in China. Then, according to the empirical analysis, some suggestions will be put forward to improve wealth gap, increase economic growth and balance two of them.

2. Theoretical Framework

2.1 Kuznets curve

Simon Smith Kuznets presents the inverted U-shaped curve hypothesis of the relationship between economic development and income inequality via speculation and experience. Based on the transition from a traditional agricultural industry to a modern industrial industry, Kuznets analyzes the relationship between economic growth and income inequality. He believes that the process of industrialization and urbanization is the process of economic growth. In this process, the distribution gap will be changed. His idea is that the creation and destruction of economic development changes the social and economic structure and affects the income distribution. Kuznets uses data from various countries to conduct comparative studies. He comes into a conclusion that in the stage which the economy is not fully developed, Income distribution will go along with economic development towards inequality. Thereafter, the period of income distribution is temporarily unchanged. In the stage that economy is fully developed, the income distribution will tend to be equal. Assuming the horizontal axis represents some of the indicators of economic development, usually per capita output and the vertical axis represents the index of income inequality, the relationship reveals by this hypothesis is the inverted U-shaped curve. It is called the Kuznets curve just as <Figure 1 shown>.



Figure 1: Hypothetical Kuznets Curve

2.2 Model

This paper uses time series to testify the Kuznets curve hypothesis. The Gini coefficient represents the wealth gap and GDP per capita represents the economic growth. They are from 1980 to 2016 and adopted to build model to explore whether the evolution of wealth gap is in keeping with the Kuznets curve hypothesis or not in China. All datum are sourced from the National Bureau of Statistics of the People's

Republic of China. It can be assuming that the Kuznets curve hypothesis exist between wealth gap and economic growth in China. Namely, along with the economic growth, the wealth gap will be increased first. Then, it will be diminished. More specifically, there is a quadratic function relation between wealth gap and economic growth. In order get rid of heteroscedasticity, the logarithm is taken in the both sides of quadratic function.

The model gives:

$$\log \text{wealth} = \alpha + \beta \log \text{GDP.per.capita} + \gamma \log \text{GDP.per.capita}^2 + \varepsilon \tag{1}$$

Where α is the constant; β and γ are the coefficients; ε is the white noise.

In summary, all datum will be shown in <Table 1>.

Table 1: Variables

Variable	Definition	Source
$\log \text{wealth}$	It is represented by Gini coefficient	National Bureau of Statistics of the People's Republic of China
$\log \text{GDP.per.capita}$	It is represented by real GPD per capita	National Bureau of Statistics of the People's Republic of China

3. Empirical Analysis

3.1 Unit Root Test

In the classical regression model, the sequence of explanatory variable and explained variable should satisfy the stationarity. Namely, their expected value is zero and their variance is a constant. If the sequence is not stationary, it is east to lead to spurious regression.

The Augmented Dickey-Fuller test is applied in this paper. There are three basic models.

Model 1 gives:

$$Y_t = \gamma Y_{t-1} + \sum_i \beta_i \Delta Y_{t-i} + \varepsilon_t \tag{2}$$

Model 2 gives:

$$Y_t = \alpha + \gamma Y_{t-1} + \sum_i \beta_i \Delta Y_{t-i} + \varepsilon_t \tag{3}$$

Model 3 gives:

$$Y_t = \alpha + \gamma Y_{t-1} + \sigma t + \sum_i \beta_i \Delta Y_{t-i} + \varepsilon_t \tag{4}$$

Where Y_t is the time series; α is constant; t is the time trend; Y_{t-i} is the term in lag i^{th} . γ is the lagged number.

The hypotheses of Augmented Dickey-Fuller test give:

Null hypothesis: $H_0 : \gamma = 0$ means that unit root exists. Alternative hypothesis: $H_1 : \gamma < 0$ means that unit root does not exist. More specifically, if ADF statistic is less than its corresponding critical value, the null hypothesis will be rejected. It indicates that there is no unit root (time series is stationery). Conversely, if ADF statistic is greater than its corresponding critical value, the null hypothesis will be accepted. It indicates that there is an unit root (time series is non-stationery). The results of unit root test will be shown in <Table 2>.

Table 2: Results of unit test

Variable	T-Statistic	Test critical value	Prob.*	Result
<i>log wealth</i>	-1.552	-2.946	0.497	Non-stationary
<i>log GDP.per.capita</i>	-1.131	-2.957	0.691	Non-stationary
<i>log GDP.per.capita²</i>	-1.131	-2.957	0.691	Non-stationary
<i>D log wealth</i>	-4.844	-2.954	0.000	Stationary
<i>D log GDP.per.capita</i>	-3.755	-2.957	0.008	Stationary
<i>D log GDP.per.capita²</i>	-3.755	-2.957	0.008	Stationary

Note: *D* represents the first difference of all variables

*MacKinnon (1996) one-sided p-values.

<Table 2> indicates that all variables are non-stationary in their real levels. However, after first difference, all variables become stationary under 5% significant level. It illustrates that they are integrated of order 1, which provides the precondition of co-integration test.

3.2 Co-integration Test

There are two methods to process a co-integration test. They are the Engle-Granger and Johansen co-integration tests. This paper uses the Johansen co-integration test to analyze the relationship between wealth gap and economic growth in China. The results of co-integration test will be shown in <Table 3> and <Table 4>.

Table 3: Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.503	54.868	29.797	0.000
At most 1 *	0.316	26.941	15.495	0.001
At most 2 *	0.255	11.769	3.841	0.001

Note: Trace test indicates 3 co-integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

<Table 3> indicates that the trace statistic values are greater than 0.05 critical values. It means that there are three co-integrations at the 0.005 level.

Table 4: Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.503	27.927	21.132	0.005
At most 1 *	0.316	15.173	14.265	0.036
At most 2 *	0.255	11.769	3.841	0.001

Note: Max-eigenvalue test indicates 3 co-integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

<Table 4> indicates that the max-eigen statistic values are greater than 0.05 critical values. It also means that there are three co-integrations at the 5% level. Combined <Table 3> and <Table 4>, it can be concluded that there is a long-run relationship among them. Their co-integrating equation is shown in <Table 5>.

Table 5: Co-integrating Equation(s)

Variable	$\log wealth$	$\log GDP.per.capita$	$\log GDP.per.capita^2$
Coefficient	1	1.820	-0.815

		(0.139)	(0.146)
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Note: Normalized co-integrating coefficients (standard error in parentheses)

Specifically equation gives:

$$\log wealth = 1.820 \log GDP.per.capita - 0.815 \log GDP.per.capita^2 \tag{5}$$

Equation (5) demonstrates that the coefficient of $\log GDP.per.capita^2$ is negative. Namely, the Kuznets curve hypothesis exists between wealth gap and economic growth in China. Along with an increase in GDP per capita, the wealth gap shows a tendency to scale first and then shrink. Due to the long-run existence of binary economic structure in China, the relationship between wealth gap and economic growth is still located in the left side of inverted U-shaped curve.

3.3 Vector Error Correction Model

The previous tests verify the cointegration relationship between wealth gap and economic growth in China. Namely, there is a long-run equilibrium relationship between two of them. However, if this kind of long-run equilibrium relationship wants being supported, the error correction operating mechanism of short-run dynamic process should be being adjusted. The vector error correction model gives:

$$D \log walth_t = \alpha D \log GDP.per.capita_t + \beta D \log GDP.per.capita_t^2 + \lambda ec_{t-1} + C \tag{6}$$

By performing estimation, the coefficients of equation (6) gives in <Table 5>.

Table 6: Coefficients of Vector Error Correction Model

Coefficient	α	β	λ	C
Value	1.541 (0.218) [7.063]	-0.548 (0.224) [-2.442]	0.002 (0.003) [0.752]	0.009 (0.040) [0.233]

Note: Standard errors in () & t-Statistics in []

Specifically, the estimation of vector error correction model gives:

$$D \log walth_t = 1.541 D \log GDP.per.capita_t - 0.548 D \log GDP.per.capita_t^2 + 0.002 ec_{t-1} + 0.009 \tag{7}$$

Equation (7) reflects the short-run relationship between two of them. Compared with long-run relationship, the Kuznets curve hypothesis still exists between wealth gap and economic growth in China in the short run. When the short-run equilibrium

relationship deviates from the long-run equilibrium relationship, there will be an ability of adjustment (0.002) from the non-equilibrium relationship to that of long-run equilibrium.

4. Conclusion

The relationship between wealth gap and economic growth in China is always a heated issue in the world. Quantities of scholars have tried to use many kinds of ways to explore the operating mechanism between them. This paper provides a new scope to study this proposition. Also, this paper uses datum from 1980 to 2016 to analyze the relationship between wealth gap and economic growth in China. Via co-integration analysis, the results show that the relationship between wealth gap and economic growth satisfies the Kuznets Inverted U-hypothesis. Namely, the wealth gap in China enlarges at first and then narrows along with the economic growth.

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