

Poverty Alleviation's Effects on Income Inequality and Income Growth

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ABSTRACT

Poverty, income inequality and poverty alleviation are the outcomes of economic and social development, while the sustainable and harmonious development of economy and society cannot be achieved without overcoming poverty and income inequality through policies of poverty alleviation. For 40 years since the “reform and opening up”, with rapid economic and social development and poverty alleviation development on a large scale, China’s poverty alleviation has achieved a great success. Economic growth’s effect on poverty reduction corresponds to how fast the economy grows and the way of economic growth, and thus it has its limitations. The poverty decline resulting from targeted poverty alleviation is favorable for reducing the income inequality and increasing the entire residential income level. Targeted poverty alleviation is suitable for any stage of economic and social development, and it also acts as a crucial approach for effectively getting rid of poverty and therefore contributing to inclusive growth and harmonious society.

Keywords: Poverty, targeted poverty alleviation, economic growth, income growth, income inequality

1. INTRODUCTION

Poverty, income inequality and poverty alleviation are outcomes of economic and social development, while the sustainable and harmonious development of economy and society cannot be achieved without overcoming poverty and income inequality through poverty alleviation policies. The most fundamental goal of poverty alleviation is to improve the living standard of the poor through effectively increasing the income of the poor. Poverty alleviation is an eternal problem, and targeted poverty alleviation mechanism is expected to effectively increase the efficiency of poverty alleviation and shorten the process of it and thus will make the society and economy developing harmoniously and sustainably.

2. POVERTY ALLEVIATION AND ECONOMIC GROWTH

Income growth, income inequality, poverty and poverty alleviation are outcomes of economic and social development, and income growth is one of the most crucial goals of economic growth. Income level difference leads to income inequality and poverty, while poverty and income inequality, as impediments to economic growth and economic and social development, can constrain the overall residential income, raising living standard as well as the harmonious and sustainable development of economy and society [1]. Therefore, clarifying the relation between poverty alleviation and economic growth and that between income inequality and residential income growth

has vital realistic significance to effectively eliminating poverty, lifting the overall residential income and living standard, and promoting harmonious and sustainable social and economic development.

Ever since the “reform and opening up”, under the direction of a series of poverty alleviation policies, China’s poverty alleviation has achieved a great stage success. With GDP per capita and primary industry added value growing, GNI per capita has also increased and expanded correspondingly, while poverty rate generally decreased during the same period. According to the 1978-based, 2008-based and 2010-based poverty alleviation standards, China’s poverty alleviation can be divided into three stages: from 1978 to 2000, the main goal was to satisfy subsistence, with poverty rate declining by 8.6% annually on average; from 2001 to 2010, the main goal was to cement the outcome of the previous period, with poverty rate declining by 12.7% annually on average; from 2011 to 2018, the main goal was to build up China’s moderately prosperous society, with poverty rate declining by 24.3% average; from 1978 to 2018, poverty rate declined by 12.4% annually on average [2]. Accordingly, with China’s economic growth, residential income and standard of poverty alleviation increasing, annual poverty rate declined in general. Economic growth has become the precondition and key to residential income growth and restricting poverty.

3. EMPIRICAL ANALYSIS

3.1. Data and Variables

This paper utilizes “poverty rate” as the indicator of poverty alleviation, “GDP per capita index” (1978 as base year) and “primary industry added value per capita” as the indicator of economic growth, “GNI per capita index” (1978 as base year) as the indicator of residential income growth, and the difference between medium income level and low income level of “rural residential disposable income” as the indicator of income inequality. All the data comes from National Bureau of Statistics.

It should be noted that due to the three versions of standards as mentioned above, the full sample is from 1978 to 2018, which can be divided into three subsamples: 1978-2000, 2001-2010, 2011-2018. Besides, because the data of “rural residential disposable income” is only available from 2000 to 2018, this is the full sample period of income inequality, with two subsample periods: 2000-2010 and 2011-2018.

Table 1 ADF Test Results

Variables	Test Type (c,t,p)	ADF Value	10% Critical Value	Conclusion
lnp	(c,t,1)	-2.578	-3.206	Not Stationary
d.lnp	(c,N,0)	-6.534	-2.613	Stationary
lngdp	(c,t,3)	-2.72	-3.211	Not Stationary
d.lngdp	(c,N,0)	-3.066	-2.613	Stationary
lngni	(c,t,3)	-2.421	-3.211	Not Stationary
d.lngni	(c,N,0)	-3.195	-2.613	Stationary
Indind1	(c,t,2)	-2.380	-3.209	Not Stationary
d.Indind1	(c,N,0)	-4.337	-2.613	Stationary
lngapml	(c,t,4)	-0.739	-3.240	Not Stationary
d.lngapml	(c,N,0)	-2.600	-2.630	Stationary

3.2. Methodology

3.2.1. Augmented Dickey Fuller Test

In order to avoid spurious regression, we first perform unit root test on each variable by the ADF test (Augmented Dickey Fuller Test) to test their stationarity. The results are shown in Table 1, where *lnp*, *lngdp*, *lngni*, *Indind1*, *lngapml* stand for poverty rate, GDP per capita index, GNI per capita index, primary industry added value per capita, and income inequality respectively, with all the variables flattened by logarithm; d stands for each variable’s first-order difference. As Table 1 illustrates, all variables’ results are not statistically significant, so the null hypothesis cannot be rejected, while the first-order difference results of all variables are statistically significant, so the null hypothesis can be rejected, and

therefore all the variables are “integrated of order one”, i.e. I(1) stationary series.

3.2.2. Johansen Cointegration Test

Based on ADF test results, we then test the cointegration relation between *lnp* and *lngdp*, *lnp* and *lngni*, *lnp* and *Indind1*, *lngapml* and *lnp* by Johansen test, as shown in Table 2.

First, the full sample results reveal that from 1978-2000, *lnp* and *lngdp*, *lnp* and *lngni* have their trace statistics greater than 5% critical value, so the null hypothesis of $R=0$ and $R\leq 1$ can be rejected; *lngapml* and *lnp*’s cointegration test result reveals that the null hypothesis of $R=0$ can be rejected while that of $R\leq 1$ cannot be rejected; *lnp* and *Indind1*’s cointegration test trace statistics value is lower than $R=0$ critical value, so $R=0$ null hypothesis cannot be rejected. Therefore, within the full sample, *lnp* and *lngdp*, *lnp* and *lngni* have multiple cointegration relations, and *lngapml* and *lnp* only have one cointegration relation, while *lnp* and *Indind1* have no cointegration relation.

In subsamples, 1978-2000, *Indind1* and *lnp*’s trace statistics is lower than $R=0$ critical value, so we cannot reject $R=0$ null hypothesis. However, within the subsample 2001-2010 and 2011-2018, the trace statistics value is greater than $R=0$ and $R\leq 1$ critical value, so we can reject the null hypothesis of $R=0$ and $R\leq 1$. Therefore, within these two periods, *Indind1* and *lnp* have multiple cointegration relations.

3.2.3. Unary Linear Regression

First, we test how poverty rate can be affected by economic growth, income growth and primary industry added value’s changes, where *lnp* is the dependent variable and others are independent variables. We regress the *lnp* to each independent variable individually, and the results are shown in Table 3. In all samples, *lngdp* and *lngni* have statistically significant negative correlations with *lnp*. In terms of the elasticity of *lnp* to *Indind1*, the subsample parameters are -1.130 and -3.570, which means primary industry added value growth has obvious positive effects on poverty reduction¹, which are consistent with some previous research [3-5]. Therefore, when the economic growth changes, its effect on poverty reduction changes correspondingly, so economic growth’s effect on poverty reduction has its limitations.

¹ Due to no cointegration relation in 1978-2000 and 1978-2018, we do not perform regression analysis in these two subsamples.

Table 2 Johansen Cointegration Test

Full Sample					
Variable	Period	Null Hypothesis	Trace Statistics	Critical Value	Conclusion
lnp, lngdp	1978-2018	R=0	19.5591	18.170	Multiple Cointegrations
		R≤1	6.5924	3.740	
lnp, lngni	1978-2018	R=0	18.6163	18.170	Multiple Cointegrations
		R≤1	5.1963	3.740	
Indind1, lnp	1978-2018	R=0	9.1845	18.170	No Cointegration
		R≤1	1.8336	3.740	
lngapml, lnp	2000-2018	R=0	24.157	18.170	Only One Cointegration
		R≤1	1.9951	3.740	
Subsample					
Variable	Period	Null Hypothesis	Trace Statistics	Critical Value	Conclusion
Indind1, lnp	1978-2000	R=0	17.0911	18.170	No Cointegration
		R≤1	1.7603	3.740	
	2001-2010	R=0	43.3963	18.170	Multiple Cointegrations
		R≤1	11.2076	3.740	
	2011-2018	R=0	46.0849	18.170	Multiple Cointegrations
		R≤1	10.8139	3.740	

Table 3 Unary Regression Results

Period	lnp			
	1978-2000	2001-2010	2011-2018	1978-2018
lngdp	-1.091 (0.054)***	-1.410 (0.108)***	-4.067 (0.523)***	-0.494 (0.071)***
lngni	-1.102 (0.054)***	-1.388 (0.113)***	-4.076 (0.549)***	-0.494 (0.071)***
Indind1	-	-1.130 (0.067)***	-3.570 (0.600)***	-
Period	lngapml			
	2000-2010	2011-2018	2000-2018	1978-2018
lnp	-0.579 (0.221)**	-0.387 (0.088)***	-0.461 0.288	-

*** p<0.01, ** p<0.05, * p<0.1(With robust standard errors in brackets)

Then, we regress *lngapml* to *lnp* to test on the correlation between poverty rate and income inequality, and the regression results are also shown in Table 3. Theoretically, poverty alleviation should lift the income and living standard level of the poor, which is favorable for reducing residential income inequality and increasing the entire residential income level, but the empirical regression results here do not support this view. As shown in Table 3, despite the full sample’s statistically insignificant results (2000-2018), the parameters of *lnp* in 2000-2010 and 2011-2018 subsamples are statistically significantly negative, so there exists negative correlation between these two variables, which means that with poverty rate

declining, income inequality actually escalating. The main reason could be that in these two periods, the income inequality expands at a higher rate than poverty rate.

3.2.4. Error Correction Model

To test whether there exist long-term or short-term effects between economic growth, income growth and poverty, we estimate the error correction model on *lngdp* and *lnp*,

lngni and *lnp*, *lngapml* and *lnp*². Error correction model's general form is:

$$DY_t = \alpha_1 + \beta_1 EC_{t-1} + \sum_{i=1}^n \varphi_i^1 DY_{t-i} + \sum_{i=1}^n \lambda_i^1 DX_{t-i} + \varepsilon_t \quad (1)$$

$$DX_t = \alpha_2 + \beta_2 EC_{t-1} + \sum_{i=1}^n \varphi_i^2 DX_{t-i} + \sum_{i=1}^n \lambda_i^2 DY_{t-i} + v_t \quad (2)$$

where Y represents dependent variable; X represents independent variable; EC represents the residual term of two cointegrated variables; α_1 and α_2 represent constant term; ε_t and v_t represent error terms; t represents the period. If β_1 is significant, X is deemed to have long-term Granger causality to Y; if β_2 is significant, Y is deemed to have long-term Granger causality to X; if at least one λ_i^1 significant, X is deemed to have short-term Granger causality to Y; if at least one λ_i^2 significant, Y is deemed to have short-term Granger causality to X; if $\beta_1, \beta_2, \lambda_i^1, \lambda_i^2$ are all significant, there exists two-way Granger causality between X and Y in both short and long term.

Table 4 Error Correction Models

$Dlnp = -0.001 - 0.460EC(-1) + 0.153Dlnp(-1) + 0.178Dlnp(-2)$ (0.998) (0.006)*** (0.416) (0.319)		
$+ 1.989Dlngdp(-1) - 1.803Dlngdp(-2)$ (0.477) (0.519)		
$Dlngdp = 0.049 - 0.006EC(-1) + 0.005Dlnp(-1) + 0.007Dlnp(-2)$ (0.000)*** (0.529) (0.655) (0.498)		
$+ 0.820Dlngdp(-1) - 0.405Dlngdp(-2)$ (0.000)*** (0.012)**		
$Dlnp = -0.000 - 0.454EC(-1) + 0.157Dlnp(-1) + 0.164Dlnp(-2)$ (0.998) (0.006)*** (0.402) (0.356)		
$+ 2.317Dlngni(-1) - 2.173Dlngni(-2)$ (0.389) (0.419)		
$Dlngni = 0.050 - 0.004EC(-1) + 0.009Dlnp(-1) + 0.002Dlnp(-2)$ (0.000)*** (0.708) (0.453) (0.842)		
$+ 0.751Dlngni(-1) - 0.356Dlngni(-2)$ (0.000)*** (0.032)**		
$Dlngapml = 0.111 + 0.004EC(-1)$ (0.014)*** (0.015)		
$Dlnp = 0.001 - 0.314EC(-1)$ (0.102) (0.114)***		
*** p<0.01, ** p<0.05, * p<0.1 (With robust standard errors in brackets)		

Results of error correction models are shown in Table 4. According to the error correction models of *lnp* and *lngdp*, where *lngdp* is the independent variable and *lnp* is the dependent variable, there only exists *lngdp*'s long-term negative Granger causality to *lnp*; similarly, according to the error correction models of *lnp* and *lngni*, where *lngni* is the independent variable and *lnp* is the dependent variable, there only exists *lngni*'s long-term negative Granger

causality to *lnp*; according to the error correction models of *lngapml* and *lnp*, where *lnp* is the independent variable and *lngapml* is the dependent variable, there only exists *lngapml*'s long-term negative Granger causality to *lnp*. The evidence shows that the long-term growth of economic growth (*lngdp*) and income growth (*lngni*), and the expansion of income inequality (*lngapml*), can reduce poverty (*lnp*), but poverty reduction cannot affect economic and income growth and income inequality in short or long term.

In summary, we can conclude poverty alleviation's relation with economic and income growth and income inequality as follow: (1) economic growth is the precondition and key factor of lifting the residential income growth and restricting poverty, and the primary industrial growth, dominated by agriculture, has obvious effects on poverty reduction; (2) economic growth's effect on poverty reduction can vary with the changes and the way of economic growth; (3) theoretically, poverty alleviation is expected to lift the income and living standard level of the poor, which is favorable for reducing residential income inequality and increasing the entire residential income level, but the empirical regression results here do not support this view, of which the main reason could be that in these two periods, the income inequality expands at a higher rate than poverty rate; (4) the long-term increase of economic growth and income growth, as well as the expansion of income inequality, can lower poverty rate, but in turn, no evidence shows that poverty variations have short-term or long-term effect on economic and income growth and income inequality.

4. ECONOMIC SIGNIFICANCE AND PROSPECT OF TARGETED POVERTY ALLEVIATION

Poverty alleviation's fundamental goal is to improve and lift the living standard level of the poor by effectively increasing their income. The positive outcomes of poverty alleviation include decrease of poverty rate, elimination of the poor, as well as corresponding income and living standard improvement. After over 40 years' poverty alleviation progress, China is expected to achieve the goal of poverty elimination based on the current standard, and the standard living of the poor will have an income of at least 2 USD per day [6].

However, poverty is the outcome of economic development, and poverty alleviation is a long-term mission. With China's economy and society developing, one the one hand, poverty standard must be raised up, so the appearance of new group of population living in poverty is inevitable; on another, with China's economy growth rate declining, China's economic scale expanding and the portion of agriculture to GDP decreasing, the effect of economic growth on poverty reduction is declining continuously, which leads to new challenges to poverty alleviation. Under the circumstance of the new economic norm and continuously changing economy and

² Because only these variables have cointegration relations within full sample, we only focus on them in this part.

society, it has become the major way of reducing poverty to increase income level and reduce income inequality through targeted poverty alleviation and continuous improvement of social security system.

Policies and measures of poverty alleviation should target at the population truly living in poverty, and through the targeted aid to the poor, government can eliminate impediments from various aspects including psychological factors, economic and social policy implement degree, geological differences and educational and civilizational levels, so as to make the poverty population getting rid of poverty continuously. This series of actions are referred to as targeted poverty alleviation [7]. In contrast to the conventional poverty aid, targeted poverty alleviation has characteristics of clear goals, strong pertinence, fine management, strong applicability. Instead of just geological and regional development level, targeted poverty alleviation is designed to be implemented on individual level, so targeted poverty alleviation is suitable for any stage of economic and social development. It is an important way to increase the income level of the poor, reduce regional income inequality, and therefore achieve inclusive growth and harmonious society. Thus, continuously reinforcing targeted poverty alleviation has crucial realistic and historical significance on completely building up China's moderately prosperous society and achieving harmonious society with common prosperity.

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REFERENCES

- [1] C. Kang, Institute of social science, university of Tokyo, China's income inequality effect on economic growth and corresponding countermeasures, *Social Science Research*, 70 (2) (March 2019) 15-30 (in Japanese).
- [2] C. Kang, X. Kang, The research on the relation of targeted poverty alleviation with income inequality and income growth, *Forthcoming* (2020).
- [3] Q. Wen, Economic growth and poverty alleviation: trend, difference and effect, *Agricultural Technology and Economy*, 3 (2006) 8-13 (in Chinese).
- [4] M. Ravallion, S. Chen. China's (uneven) progress against poverty, *Journal of Development Economics*, Elsevier, 82(1) (January 2007)1-42.
- [5] S. Wang. Defeat poverty through development—summary and comment on China's 30-year poverty reduction on a large scale, *Management World*, 11(2008) 78-88(in Chinese).
- [6] S. Wang, China's current poverty alleviation, Beijing: China Renmin University Press, (2019) (in Chinese).
- [7] C. Kang, Northeast asia +1 regional competition and cooperation. Beijing: China Commerce and Trade Press, (2020) (in Chinese).