The Basic Research of Income Distribution and Economic Growth in China

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Summary: The distribution of income and economic growth has been the hot spots of the economics and also one of the quite disputable questions in the research fields of economics.Up till now people have not given out a satisfactory and very effective explanation yet theoretically. With the rapid development of China's economy, there have some new factors make new influences in the distribution and income. The theory research is as a whole behind the reality assignment change. Consequently, it is necessary to use the scientific mode of thinking and research approach to deepen the analysis and discussion systematieally again as to this question according to realistic economic condition and environments.

The paper is basic on neo Cambridge growth model, to Established econometric model to do Co-integration test and Granger Causality Test for the Correlation between income and Savings, investment, Gini coefficient and economic growth in China. Come to the conclusion that model and Status of the effect between income distribution and economic growth are Coincided, and According to the results I give the Conclusions and policy recommendations.

1. Introduction

The relation between income distribution and economic growth is not just a leading academic topic of modern economic theories, but also a basic theme with common concerns of modern international society. Many economists have already realized that it is a must to review the relation between economic growth and income distribution. The relation roots in the relation between production and distribution which is a kind of interaction and reciprocity. In different development stages, economic conditions and system backgrounds, production and distribution plays different roles and functions in economic development. In planned economic system, the dominance

of production may be stronger while under the economic and market system background with relative overproduction, distribution plays more dominant role. Even in some special situations, distribution may play certain dominant role in the growth of production and economy.

As for now, while economists around the world are discussing about the topic of keeping economic level, they often make many specific plans which are supported by very rigorous academic knowledge. However, when adjusting income distribution structure in large scale and there is the possibility to change the growth mode of global economy, it is very hard to find suitable theories to support the economy of developing countries. Therefore, the economic transformation of developing countries is also in great need of the guidance of forward-looking and pragmatic theories, especially for a great country like China. To solve problems surrounding the relation between income distribution and economic growth is not only critical to domestic economic development, but also instructive to the economy of developing countries. So, we can say that it is very significant to the academic research of problems in economy and society.

2. Model introduction

This paper is basic on neo Cambridge growth model which is an economic growth model designed by neo Cambridge school of modern Keynesianism. Neo Cambridge growth model was pointed by Joan Robinson and N. Nardor from UK and L. Pasinetli from Italy.

Basic assumption of model:

1. capital productivity is unchanged, namely a constant;

2. equilibrium condition: $I = S$;

3. Social members can be divided into wage-earners (workers) and profit-earners (capitalists); the saving rates of both are constant and the profit-earners have greater rate than wage-earners. P means capital profit; W refers to wage; Y refers to national income, then:

$$Y = P + W ? W = Y - P$$

sp refers to the saving rate of profit-earner, sw being the saving rate of wage-earner, and s refers to total saving rate, then:

$$s = P/Y . sp + W/Y . sw =$$
$$= P/Y . sp+(1-P/Y) . sw =$$
$$= P/Y .sp+sw - P/Y . sw =$$
$$= P/Y(sp - sw) + sw \qquad (1)$$

$$k = K/Y \qquad (2)$$

Put formula (1) and (2) into Harrod-Domar model, then:

$$G = [P/Y(sp - sw) + sw] . 1/k =$$
$$P/K(sp - sw) + sw/k \qquad (3)$$

P/K is profit rate, with π as representative, then:

The above formula is neo Cambridge growth model. The model means under given technical level, economic growth rate is determined by profit rate and the saving trend of capitalist and worker. Because when economy has balanced growth, saving is equal to investment, namely saving rate being equal to investment rate, economic growth mainly rests with the growth of investment rate when capital productivity is constant. From the above, we can draw the following conclusion: when the income of profit-earner occupies higher proportion of total income, the investment rate of the whole society will

be improved and thereby promote economic growth; when the income of wage-earner occupies higher proportion of total income, it will be bad for the improvement of social investment rate and thereby hinder economic growth. From the above analysis, we can draw the following conclusion: when capital productivity is constant, economic growth rate rests with income distribution. Improving the proportion of income of profit-earner in total income will increase economic growth rate; but, improving the proportion of income of wage-earner in total income may make economic growth rate decline and thereby lead to economic depression. Therefore, the society may adjust the proportion of income to achieve long-term steady economic growth.

3. Setting of model

According to the research of neo Cambridge growth model, in national income, the proportion between the shares of wage-earner and profit-earner is the key factor of economic growth. But, the data about the proportion of income of Chinese profit-earner in national income is hard to be available. Basic on the practical situations of China, we think the key factors of economic growth are wage share p, share of financial income z, Gini coefficient j, saving rate s, investment rate i.

We have empirically validated the influence of income distribution on economic growth by the data collected from 1989 to 2008 in China. We assumed that there are three distribution bodies in market, government, citizen and enterprise; national income distribution share influences economic growth by fluctuation of saving rate and investment rate. The model with the growth rate of Chinese economy as an independent variable and with financial share, wage share, Gini

coefficient, saving rate and investment rate as explanatory variables is as follow:

$$g = A_0 + A_1 i + A_2 s + A_3 p + A_4 j + A_5 z + \mu$$

In which:
g – GDP growth rate
i – investment rate
s – saving rate
p – ratio of wage income and GDP
j – Gini coefficient
z – L ratio of financial income and GDP

A_1, A_2, A_3, A_4, A_5 are parameters respectively denoting investment rate, saving rate, wage income rate, Gini coefficient and economic growth flexibility of financial income rate; g is an explained variable and others are explanatory variables, μ being a random disturbance term reflecting the influence of omitted variables to a certain extent.

Basic data: (1) economic growth rate: GDP growth rate is an internationally recognized effective indicator of economic growth, data sourcing from "Chinese Statistical Database"; (2) proportion of employee wage in gross national income p, including state-own enterprises, collective units in towns and other units; we treated employee wage as personal income of residents in this paper, data sourcing from "Database of Northeast University"; (3) saving rate s: proportion of savings in gross national income, including fixed deposit and current deposit of urban and rural residents, data sourcing from "China Statistical Yearbook"; (4) Gini coefficient j: overall Gini coefficient is basic on original statistical data published in past years; (5) investment rate i: proportion of fixed assets investment in GDP, data sourcing from "China Statistical Yearbook"; (6) proportion of financial income in GDP z: including expenditure of economic construction, culture and education, national defense, administration and so on.

4. Preliminary evaluation and validation of model and parameters

We firstly established regression equation basic on current sample data and did regression analysis by least-square method. The evaluation of each parameter in model is as follow:

$G = 0.056 \times I + 0.755 \times J + 1.00 \times P + 0.117 \times S - 0.961 \times Z - 0.345$

P Value
(0.730) (0.111) (0.174) (0.483) (0.020) (0.179)

T Value
(0.354) (1.732) (1.455) (0.727) (-2.72) (-1.435)

In which:
$R^2 = 0.593208$,
Adjusted $R^2 = 0.408302$,
$F = 3.208165$

Thus, it can be seen that the t value of i and s is not significant; besides, correction coefficient of determination is 0.408302, F value being 3.208156, not very high. So, we validated the above model by the theory of econometrics and revised to see whether it was possible to improve the equation of model.

5. Further validation to model

5.1. Validation of multi-collinearity

We adopted EVIEWS software and got the matrix of correlation coefficients of variables:

Through validation of EVIEWS 5.0, we can see that the correlation coefficient between explanatory variables, s and j, s and p is very large, which proves a serious multi-Collinearity. Saving is closely correlated with wage and income difference, so they have very strong

Table 1 Matrix of correlation coefficients of Variabes

	g	i	s	j	p	z
g	1	0.281716	0.024471	0.092242	0.017101	0.064122
i	0.281716	1	0.343232	0.589500	0.265347	0.069051
s	0.024471	0.343232	1	0.744861	0.909173	0.204454
j	0.092242	0.589500	0.744861	1	0.629127	0.360566
p	0.017101	0.265347	0.909173	0.629127	1	0.084879
z	0.064122	0.069051	0.204454	0.360566	0.084879	1

correlation. This proves the description of neo Cambridge growth model.

In the following, we will adopt stepwise regression (variable elimination method) to revise the original model and get the following model:

$$G = 0.9454275512j+1.077049171p - 0.9413053353z - 0.2569418613$$

P Value
(0.0027) (0.0394) (0.0031) (0.0717)

T Value
(3.6850) (2.2901) (-3.6234) (-1.9607)

F = 5.619896

At this time, the t values of all parameters are already very significant and F value also has certain increment, so we will not eliminate any variable and treat this model as modified model.

Through above analysis, we can draw the following conclusions:

(1) Gini coefficient and wage share have positive output elasticity. Wage share has the most significant contribution to economic growth, which indicates that domestic demand will strongly drive economic growth.

(2) When the flexibility of Gini coefficient is positive, it confirms Kuznets's reverse U assumption of income distribution difference. In early stage of economic growth, income distribution and economic growth rate rise together.

(3) When public finance expenditure shows significant negative effect, it reflects that economic growth becomes more and more dependent to market, "an intangible hand", during marketization process, and excessive intervention of government will only affect economic growth.

5.2. Stationarity test

As the time sequence of real economy is not non-stationary, namely there is time trend, when we give regression treatment to these variables, there may be a spurious regression. To avoid this kind of problems, we need to test the stationarity of variable sequence. A stationary sequence fluctuates around average value and tends to get close to it. The method of testing the stationarity of variable sequence is unit root test. We adopted EVIEWS5.0 to test the stationarity of variable sequence. The result is as shown in Table 2.

The critical value of original sequence in ADF test is -2.67 and statistical test value is -2.35, being larger than critical value, which indicates they are non-stationary sequences. The difference sequence D (G) of original sequence is stationary sequence. Their relation can be tested by co-integration method.

Table 2. ADF Test Result Table (Stationarity Test)

Variable Sequence	ADF Value	Critical Value (10 %)
G	-2.346160	-2.67
D(G)	-2.789404	-2.68

Data is gained by EVIEWS5.0

Table 3. ADF Test Result Table (Co-Integration Test)

Variable Sequence	ADF Test Value	Critical Value (10 %)
Residuals	-5.1759	-2.69

Data is gained by EVIEWS5.0.

5.3. Co-integration test

Though two or more than two variable sequences are non-stationary sequences, their linear combination shows stationarity, which means there is co-integration relation between them (long-term stability). We adopted the co-integration test method pointed out by Engle and Granger (1987) here. This co-integration test method gives unit root test to the residuals of regression equation. As variables cannot form a residual sequence by explained section of independent variables, this residual sequence should be stationary.

Test result is shown in Table 3.

Statistical value of test is -5.0104 which is smaller than critical value -2.75. It indicates that they are stationary sequences and there is stable equilibrium relationship between dependent variables and explanatory variables of regression equation, and there is a long-term equilibrium relationship between economic growth and set factors. Linear regression equation has reasonable and stable settings and such a regression is significant.

5.4. Granger causality test

Granger causality test is required to determine whether the equilibrium relationship between economic growth and each factor forms causality. This test can determine whether a variable helps to forecast another variable. If variable X helps to forecast variable Y, namely when giving an autoregression to Y according to the past values of Y, if the past values of X are added, the explanatory ability of regression can be significantly enhanced, then we call X is the JdoesnoIGrangerCause of Y. Here, we adopted the above method to test the causality of G, Z, J and P and the result is in Table 4.

According to test result and practical situation of China, we did the following analysis on the causality of economic growth and income

Table 4. Granger Causality Test Table

Sequence	Statistical P Value
JdoesnoIGrangerCauseG	0.92945
GdoesnotGrangerCause	0.08l2l0
PdoesnotGrangerCauseG	0.26894
GdoesnotGrangerCauseP	0.92569
ZdoesnOtGrangerCauseG	0.08529
GdoesnotGrangerCauseZ	0.62082

Data is gained by EVIEWS5.0.

distribution since 1989: in the driving mechanism between income distribution and economic growth, Gini coefficient J is not refused by the Granger Causality of economic growth rate G from the P value of causality. This indicates that the enlargement of income difference promotes economy, which fully confirms the importance of stimulus created by income difference to economic growth and is also the main reason for the rapid development of Chinese economy. The conclusion that economic growth didn't widen income gap is accepted, which indicates that the rise of Gini coefficient is not caused by economic growth in China, so economic growth didn't weaken income gap like what many theories forecasted. Economic growth G is also identified as the cause to income share p. The rise of income share is the main reason for economic growth. This indicates that when the cake, national income, is made bigger, wage-earning class will gain more benefits.

6. Conclusion and suggestion

From the above test results, we can see that (1) among many factors of economic growth, investment, wage income and saving show positive flexibility to economic growth and wage income makes most significant contribution to economic growth with its economic growth elasticity being 1.077, namely with wage income increasing 1 % in national income, economic growth rate increasing by 1.077 %. Wage income is the main component of domestic demand. Result of empirical analysis also proves that domestic demand provides political support for economic growth. (2) Gini coefficient and economic growth rate show a positive correlation and the elasticity coefficient is 0.9454, which reflects that in the early stage of economic growth, the enlargement of income gap cannot be avoided for the need of capital accumulation. This result fits reverse U assumption and confirms the conclusion of neo Cambridge growth model – income distribution

gap promotes economy. Income share is positively correlated with Gini coefficient, which seems a self-contradictory conclusion. With the growth of economy, income share is increasing and income gap is getting larger, but the increase of income share will make up income gap, which is the conflict caused by the special dual structure of Chinese economy. In Chinese economy, for various reasons, economy is obviously divided into two bodies, urban and rural areas. Chinese Gini coefficient is mainly pulled up by the income difference of the two bodies. Inside the two bodies, wage-based income gap is enlarged with economic growth. With the growth of economy, the gap between urban and rural areas is getting larger. This result shows that we need to change this dual structure of economy and reduce the difference of urban and rural areas. From validation result of practical data, the growth path described by neo Cambridge growth model basically fits the practical situations of China, but is opposite to the mechanism of increasing economic growth rate by increasing capital income share. The increase of share of wage-earner can significantly pull up domestic demand, and thereby drive economic growth with multiplier effect. Data from China shows that Gini coefficient shows positive elasticity to economic growth, which fits the assumption of some scholars that income gap is positively correlated with economic growth in early economic period. But, what we cannot neglect is that income gap will have negative pulling effect on economy through unfair education opportunity and political stability. Though it can positively affect economic growth through deposit and investment, it does no good to the long-term and steady development of economy. So, in current stage, we should reasonably adjust income distribution while not affecting economic growth to provide a good social environment for the long-term development of Chinese economy. In current stage, income distribution may endanger the sustainable development of economy through unfair education opportunity

and political stability from being as a stimulus to economy before. So, we must pay much attention to income distribution. We cannot affect the enthusiasm of economic bodies, and also need to adjust income gap to realize the long-term and sustainable development of economy. Therefore, we give the following suggestions:

(1) Stick to giving first priority to efficiency in the matters of income distribution.

(2) Use re-distribution approaches to adjust income distribution.

(3) Increase the income share of wage-earners.

(4) Reduce the share of financial income in GDP.

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