Kuznets Inverted U Theory Applied to Analyzing Big Income Gap between China's Urban and Rural Areas

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Abstract: In order to analyze the expansion of the urban-rural gap in China, based on building a model of the analytical framework., this paper has carried out the empirical research on economic development, the dual structure, the level of openness and the level of urbanization and the other factors. The results showed that the four factors affecting the urban-rural gap in China are macroeconomic factors, and the trend of urban-rural gap has obvious Kuznets "inverted U" effect.

Key words: the gap between urban and rural areas; "inverted U theory; the dual structure; opening; urbanization

1 Introduction

In recent years, with the academia research on the reasons concerning about the expansion of the urban-rural income gap deepening and increasing, to some extent, many scholars in their research work will be exposed to Kuznets inverted U theory which focuses on income inequality. Is China's income gap between urban and rural areas related to Kuznets Effect? What are the other main causes of the expansion of the urban-rural gap? In this paper, this topic will be discussed thoroughly.

2 The Causes Concerning About China's Expansion Of The Urban-Rural Income Gap

The analysis of the causes of the trend of urban-rural income gap in China has been extensively discussed in recent years.The results of this research can be described as voluminous. In general, the study about the causes of the expansion of the urban-rural income gap is concentrated in economic development, the dual structure, the level of openness and urbanization level.

2.1 economic development and urban-rural income gap

According to Kuznets inverted U theory, with the economic development from a lower to a higher stage, the income gap will first become wide and then narrow. Is China's urban-rural income gap in line with this rule? Jia Xiaomei and Zhou Ying (2006) believe that, "urban-rural income gap is the inevitable phenomenon of economic development and the inverted U theory basically applies to China's situation." Cheng Zongsheng (2002) and Wang Shaoguo (2006) agree with that. Through empirical research, Wang Ren (2006) concludes that Kuznets inverted U theory still applies to China's situation. Actually, both economic openness

and urbanization have "inverted U" effect on the change of urban-rural income gap in a certain area. Zhang Qi, Liu Mingxing, Tao Ran, Vincent and Yiu Por Chen (2003) study the development of China's financial intermediaries and urban-rural income gap. Through empirical research they find that the relation between China's economic growth and urban-rural income gap has obvious Kuznets "inverted U" effect. After crossing the turning point, China's economic development will narrow urban-rural income gap.

2.2 the dual structure and urban-rural gap

Many scholars believe that the dual structure, which is the obvious feature of China's economic development, is the root of urban-rural income gap of our country. Jia Xiaomei and Zhou Ying (2006) think that the urban-rural dual structure of our country hasn't radically changed. The urban-rural dual structure brings the inequality of economic benefit and urban-rural income, which makes the urban-rural income gap wider. Li Shi and Yue Mingxi (2001) believe that the dual economic structure exists in every developing country, however, the strengthening of dual economy in our country causes immense urban-rural gap. Agriculture survey office research group of the national bureau of statistics and Chen Zongsheng believe that the dual structure is the main cause of urban-rural differences.

2.3 opening, the level of urbanization and urban-rural gap

Opening and the level of urbanization are also main causes of urban-rural gap. Hou Yongzhi (2003) believes that opening strategy has both good and bad effect on urban-rural gap. The general effect depends on its influence on domestic price structure and competition power structure. There are many remainder labour force in the countryside of China and capital liberalization brings about severe competition while capital substitutes labor, under these circumstances, the urban-rural income gap of our country will be wider.

Seeing from the current research document, the analysis of the cause of urban-rural gap seldom talks about the factor of economic development. Most of the studies pay attention to only one factor, either to the cause of dual structure or to the cause of urbanization. Does China's urban-rural income gap have Kuznets "inverted U" effect? Is the main cause of urban-rural income gap one part of it or the whole parts? In order to probe into this issue, this paper will discuss what effects the above macro factors have on the urban-rural income gap, combining the study of the economic development factors.

3 Model Framework

Making a general survey of the discussion about macro causes of changing trend in the urban-rural income gap, the influences of the above factors all theoretically exist. Therefore, the ignorance of any factor in the empirical research may impact the rigor of analysis. In order to avoid this situation, referring to various theory research achievement, this paper will construct comprehensive analysis framework. This framework consists of economic development, the dual structure, the level of openness and the level of urbanization. The mathematical model is as follows:

$$G_{CX} = A * g(GDPP(+/-), DU(+), OPEN(+), UR(-)) + \mu$$

Among them,GCX stands for the Gini coefficient of urban-rural income gap; GDPP means level of economic development; DU stands for the dual structure; OPEN stands for the level of openness; UR stands for the urbanization level of our country; A represents an uncertain multiplier; μ is the disturbance term, which stands for the other elements besides the main four factors and the uncertainty of the addition. The codes in brackets stands for the possible effect of corresponding variables on urban −rural gap. The level of economic development and urban-rural gap may have Kuznets "inverted U" effect, therefore, the level of economic development may have a positive or negative effect on urban-rural gap. The inequality of opportunity between urban and rural areas caused by dual structure widens the urban-rural gap, so the effect is positive. In the process of reform and opening up, marketization reform makes the market highly competitive and enhances the Matthew Effect between urban and rural areas which leads to big urban-rural gap, so the effect should be positive. Urbanization decreases rural population and rural per capita resources increase. And meanwhile, urban competition becomes more severe, which can narrow the urban-rural gap to some extent. So urbanization has the negative effect.

Under this analytical framework,he econometric model is designed as follows:

$$G_{CX} = \alpha + \beta_1 * GDPP + \beta_2 * GDPP^2 + \beta_3 * DU + \beta_4 * OPEN + \beta_5 * UR + \mu$$

Among them, α、β_1、L 、β_5 are solve-for parameters and the other variables have the same meaning as the first formula. This model brings in the quadratic term of $GDPP^2$, aimed at inspecting whether the trend of urban-rural gap has Kuznets "inverted U" effect.

4 The Empirical Study Of The Cause Concerning About The Urban-Rural Gap

4.1 data selection and processing

We mainly use the timing data since the reform and opening up for the empirical study of the above model. Theoretically，we should use the data since the foundation of People′s Republic of China to study the urban-rural gap. However, the data before the reform and opening up is not complete and unfindable. So we have to use the data since the reform and opening up. From most of the study, we can see that many experts and scholars do so, but they use the data including that of the year 1978. In my opinion, the 3rd session of the 11th congress, which was held in December 1978, is the symbol of China's reform and opening. The year of 1978 is the beginning of reform and opening. However, in both name and essence, the year of 1978 was still in the planned economy period. We should not include the date of 1978 and should begin from the year 1979.

4.1.1 urban-rural gap

The measure of urban-rural gap is not the same according to different calculating calibers. Some scholars measure with urban residents living income and rural per capita net income; some adjust city

residents′ income and believe that city residents′ income should be urban per capita disposable income added by subsidy (Li Shi and Yue Ximing, 2003) orxthe disposable income should adopt the standard of the United Nations income guidelines(Agriculture survey office research group of the national bureau of statistics ,1994; Cai Jiming, 1998); some other scholars (Guo Xingfang, 2001) thinks that income equals deposit added by expense. All of the analysis is reasonable. Therefore, if we use the income of urban and rural residents ratio to reflect urban-rural gap, the data we chose will directly lead to the difference of urban-rural gap and impact the result of empirical studies. To avoid this result, we use Urban and rural Gini coefficient to reflect urban-rural gap. The computational formula is as follows:

$$G_{CX} = |P_R - Y_R|$$

G_{CX} stands for Gini coefficient between the rural and urban areas; P_R stands for the proportion of the rural population of the total population; Y_R stands for the proportion rural residents income accounting for the residents of total revenue.

4.1.2 the level of economic development

As the per capita GDP in a certain sense reflects the stage and degree of the development of a country's social and economic development, the per capita GDP represents the level of economic development.

4.1.3 the dual structure

The dual structure of urban and rural is the significant characteristic of our country's economy, and it is also the fundamental reason that the gap between urban and rural areas is widened. Here, we reflect the urban and rural two element structure coefficient, and the formula is as follows:

$$\text{urban - rural dual structure coefficien t} = \frac{\dfrac{\text{total output val ue of urban society (secondary and tertiary industry)}}{\text{urban employment population}}}{\dfrac{\text{total output val ue of agricultur al society (primary industry)}}{\text{agricultur al employment population}}}$$

4.1.4 degree of openness

The foreign trade of a country partly reflects the degree of openness of the country to the outside world. The more frequent the foreign trade and the greater the transaction volume, the more open the country is to the outside world. In terms of this index, most scholars such as Wang Qiang (2006) and Zhang Qi (2003) used the export volume as a reflection of the proportion of GDP. However, we believe that foreign trade includes both exports and imports, which can only partly reflect the degree of openness to the outside world, but cannot fully reflect it. If a country imports only foreign goods, and does not export goods, we cannot say that it is not open to the outside world. In view of this, we use the total import and export volume as a proportion of gross domestic product.

4.1.5 urbanization level

Whether it is from the academic perspective, or from the development experience of countries around the world, the higher the urbanization level, the less agricultural population and the smaller the gap between urban and rural areas. Because, as long as there is a gap between urban and rural areas, the labor force will flow (Todaro,1969), and the labor force will flow to the city to narrow the urban-rural gap (Yao Yajun, 2005) through the equalization of factor compensation. In order to reflect the urbanization process, we represent the proportion of urban population in the total population.

4.2 empirical results and analysis

Does development trend in urban-rural gap in China features "inverted U" effect proposed by Kuznets? Is the widening urban-rural income gap is a result from the mentioned four factors or the combination of some of them? Order to clarify this issue, based on design models Giving give full consideration to the factors of economic development, empirical research is made on variant combinations of variables on the basis of the the research model. The regression result is achieved through Eviews3.1 regression(refer to table 1).

Table 1. Information table on cause analysis model of China's urban-rural gap

Item	Model							
	I	II	III	IV	V	VI	VII	VIII
α	9.94×10^{-2}	-5.81×10^{-2}	8.59×10^{-3}	7.85×10^{-1}	-8.55×10^{-3}	-5.89×10^{-2}	1.19×10^{-1}	-2.33×10^{-1}
t	5.71^{***}	-1.54	4.84^{***}	1.26	12.80^{***}	-1.05	1.19^{*}	-0.57
GDPP	1.14×10^{-4}	1.23×10^{-4}	7.45×10^{-5}	1.02×10^{-4}	7.58×10^{-5}	1.22×10^{-4}	8.94×10^{-5}	1.08×10^{-4}
t	4.12^{***}	5.95^{***}	2.27^{***}	2.25^{**}	3.72^{***}	3.60^{***}	2.09^{**}	4.45^{***}
GDPP^2	-1.80×10^{-8}	-2.53×10^{-8}	-1.60×10^{-8}	-1.74×10^{-8}	-2.35×10^{-8}	-2.53×10^{-8}	-1.68×10^{-8}	-2.55×10^{-8}
t	-2.02^{*}	-3.72^{***}	-1.90^{*}	-1.88^{**}	-4.37^{***}	-3.56^{***}	-1.93^{*}	-5.03^{***}
DU		3.50×10^{-2}			3.75×10^{-2}	3.50×10^{-2}		3.96×10^{-2}
t		4.45^{***}			6.03^{***}	4.33^{***}		6.77^{***}
OPEN			1.79×10^{-3}		2.15×10^{-3}		2.05×10^{-3}	2.73×10^{-3}
t			1.98^{***}		3.81^{***}		1.99^{*}	4.63^{***}
UR				1.24×10^{-3}		5.21×10^{-5}	-2.05×10^{-3}	-4.48×10^{-3}
t				0.35		0.02	-0.55	-2.12^{**}
R^2	0.81	0.90	0.84	0.81	0.94	0.90	0.84	0.91
Adjust $-$ R^2	0.79	0.88	0.81	0.78	0.93	0.88	0.81	0.89
F	47.75^{***}	64.51^{***}	37.17^{***}	30.66^{***}	81.74^{***}	46.19^{***}	27.08^{***}	62.84^{***}

Notes: 1. The top is the estimated coefficients, below the corresponding t-test values.

2. *, **, *** denote significance on the statistical level of 10%, 5%, 1%, absence of * denotes not passing the 10% significant test.

The model I considers only the factors of economic development. For the regression results, the quadratic coefficient is negative, indicating that the fitting curve is "inverted U"-shaped. In addition that the quadratic coefficient passes 10% significant test, the rest of the coefficients passes the 1% significant test. As to the fitting results, the adjusted coefficient of determination $Adjusted - R^2 = 0.79$ indicates the fitting results of the equation and the sample data fitting results are more satisfactory. Viewing from the whole equation, the regression equation passes the test of significance, with corresponding P value at 0 and the The regression

results are better. Model I indicate the trend of urban-rural gap in China corresponds to Kuznets "inverted U" effect, and economic development factors contributes to 79% of the rural-urban gap.

The model II considers the factors of economic development and the dual structure of urban and rural areas. For the regression results, the quadratic coefficient is negative, indicating that the fitting curve is "inverted U"-shaped. In addition that the quadratic coefficient passes 10% significant test, the rest of the coefficients passes the 1% significant test. As to the fitting results, the adjusted coefficient of determination $Adjusted - R^2 = 0.88$ indicates the fitting results of the equation and the sample data fitting results are relatively satisfactory. Viewing from the whole equation, the regression equation passes the test of significance and the regression results are fairly satisfactory.. Model II indicate the trend of urban-rural gap in China corresponds to Kuznets "inverted U" effect, and economic development factors and dual structure contributes to 88 of the rural-urban gap.

The modelIII considers the factors of economic development and opening up to the outside. For the regression results, the quadratic coefficient is negative, indicating that the fitting curve is "inverted U"-shaped. All the coefficients pass the 1% significant test. As to the fitting results, the adjusted coefficient of determination $Adjusted - R^2 = 0.88$ indicates the fitting results of the equation and the sample data fitting results are relatively satisfactory. Viewing from the whole equation, the regression equation passes the test of significance and the regression results are fairly satisfactory. Model III shows opening up to the outside world has led to widening of the gap between urban and rural areas, which indicates that the urban and rural residents benefit from the reform and opening up, but urban residents derive greater benefits. The trend of urban-rural gap in China corresponds to Kuznets "inverted U" effect, and economic development and opening-up factors explained 81% of the urban-rural gap.

Model IV considers the factors of economic development and urbanization level. For the regression results, the quadratic coefficient is negative, indicating that it fits "inverted U"-shaped curve; for the coefficients, the coefficient of the economic development level passes 5% significance test and the fitting results of equation and sample data are satisfactory. Model IV indicate the trend of the gap between urban and rural areas in China corresponds with Kuznets' inverted U "effect.

The model V considers the factors of economic development, the dual structure and opening-up . For the regression results, the quadratic coefficient is still negative, indicating that trend of urban-rural gap in China corresponds with Kuznets "inverted U" in an obvious way .All coefficients pass the 1% significant test; regression equation passes 1% significant test with satisfactory regression results. Dual structure and opening-up factors affect the gap between urban and rural areas in a positive way.

The model VI and model VII consider the factors of economic development, dual structure, urbanization and economic development, opening-up and urbanization respectively. For the regression results, both the coefficients and the whole equation pass the test of significance. The quadratic coefficient is still negative, indicating that trend of urban-rural gap. Both models indicate the trend of the gap between urban and rural areas in China corresponds with Kuznets' inverted U "effect.

The modelVIII considers the factors of economic development and opening up to the outside as well as urbanization. For the regression results, the quadratic coefficient is negative, indicating that the fitting curve is "inverted U"-shaped. For coefficients, the urbanization passes the 5% significant test and the the coefficients pass the 1% significant test. As to the fitting results, the adjusted coefficient of determination $Adjusted - R^2 = 0.89$ indicates the fitting results of the equation and the sample data fitting

results are fairly satisfactory. Model III indicates that the trend of urban-rural gap in China corresponds to Kuznets "inverted U" effect, and the influence of all the factors agree with the theoretical analysis and the empirical research based on models. The conclusion that urbanization plays a significant role in narrowing urban-rural gap in China coincides with most research results alike（Todaro,1969；Yao Yaojun，2005）。

5 Conclusion and Suggestion

The results of the empirical study based on eight models in the results indicate that the   impact of the level of economic development on the change in urban-rural gap is huge, Kuznets "inverted U" effect still works in China where the development trend of urban-rural gap shows apparent "inverted U" type. In addition, the dual structure, the opening-up and urbanization are the main factors affecting the change of China's urban-rural gap. Among them, for every one percentage point change in the dual structure coefficient Gini coefficient gap between urban and rural areas increases approximately 3.5 percentage points; for every one percentage point change in the opening-up level, Gini coefficient gap between urban and rural areas increases approximately 2.00×10^{-3} percentage points; for every one percentage point change in the urbanization, Gini coefficient gap between urban and rural areas increases approximately 4.48×10^{-3} percentage points. Therefore, the level of economic development, the dual structure, the level of urbanization and opening-up affect the change of China's urban-rural gap in a decreasing way. The trend of urban-rural gap in China is under the influence of composite factors, such as economic development, the dual structure, opening up and the process of urbanization. In the long term, the urban-rural income gap in China will increase first and then begin to decrease after the peak value. This corresponds to the Kuznets "inverted U" path.

In view of the above conclusions, we should make the following efforts to alleviate the urban-rural gap in the long run.

First of all, insist on putting economic development first unswervingly strive to improve the quality of economic development, and alleviate the large urban-rural gap in the process of development.

Second, insist on the unitary transformation of the dual economy, make efforts to implement strategy that balance the urban and rural development, and eradicate the root causes of the urban-rural income gap.

Third, insist on the urbanization strategy; make efforts to promote the development of small towns to facilitate the transfer of rural surplus labor.

Finally, unnervingly adhere to the strategy of reform and opening up by deepening the reform, while seeking for a specific program to solve the urban-rural income gap in the process.

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