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Research on the Influence Factors of Urban-Rural Income Disparity Based on the Data of Shandong Province

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Abstract: *This article has analyzed the influence factors of urban-rural income disparity in Shandong Province from two aspects: the development factors and the dual economy factors..The result indicates that along with the economy development in Shandong Province, urban-rural income disparity has the further expanded tendency. The influence of economic development factors is at the rising stage of Kuznets invert U curve; Dual economy factors, population structure and policy deviation are the key factors which result in the enlargement of urban-rural income disparity.*

Keywords: *Urban-rural income disparity; Development factor; Dual economy factor; Principal components.*

1. INTRODUCTION

Along with the fast development of national economy, urban-rural income disparity has also been gradually enlarging. Chinese Gini's coefficient in 2008 has reached as high as 0.47. The problem of urban-rural income disparity has become the prominent issue which affects Chinese economy sustainable development and social stability. Shandong Province is at high level of economy development in China. In recent years, urban-rural income disparity has been expanding continuously: In 1989, urban-rural income disparity broke through 2 and it reached 2.91 in 2009. Although it was lower than the national average level 3.31 at the same time, it was at the high compared to the eastern coastal provinces. If considering the various kind of welfare, subsidy and preferential measure provided by government, the actual urban-rural income disparity was greater than this numeral by far. Speaking of Shandong Province, it has extremely vital practical significance to study urban-rural income disparity and the coordinate mechanism to adjust the development structure, realize urban and rural coordinated development, tap the potential ability of economy development, promote farmer to increase income and maintain regional stability.

2. LITERATURE REVIEW

Wherever Times is specified, Times Roman or Times Ne The expansion of urban-rural income disparity has aroused scholar's widespread interest. Lin Yifu (2003) thought that the improper developmental strategy of government was the main cause of income disparity. Ren Taizeng (2008) analyzed the reason from the angle of city deviation system which resulted in expanded income disparity. He thought the self-strengthened function of city deviation system could cause urban-rural income disparity to expand through accumulation, meanwhile could destroy its self-correct mechanism and suppress its reduction process. Chen Anping (2009) did empirical research and drew the conclusion that in the short term Chinese urban-rural income disparity is useful to promote economic growth in certain degree, but in the long term, if income disparity can't be suppressed, it will hinder the step of economy growth. He Jianfeng, Liu Jianping (2010) made dynamic econometrics analysis about urbanization, open policy and urban-rural income disparity based on VAR model and found urbanization and open policy are the main cause of income disparity. Han Qinghua, Xie Qiuyue (2010) proved that there existed long-term equilibrium relationship between urban-rural income disparity and economic growth in Shandong province through co-integration analysis and Granger test. This article will carry on empirical analysis to the influence factors of urban-rural income disparity in Shandong Province in order to provide decision basis for the related department to reduce the disparity.

3. Empirical Analysis about Urban - Rural Income Disparity in Shandong Province

3.1. Variables Choice

3.1.1. Dependent Variable Choice

When we want to study the influence factors to urban-rural income disparity, dependent variable should be used to reflect urban rural disparity. Urban-rural income disparity can be measured by absolute target and relative target. Because absolute target usually has dimension to affect the analysis result, it is not adopted in the research. The commonly used relative targets are Gini's coefficient, Theil target and ratio of urban income to rural income. Mix urban-rural income disparity investigation data should be provided to compute Gini's coefficient. But in the past years, Chinese Statistics Department never carried on the mix urban-rural income investigation. It is unable to obtain real Gini's coefficient data. Theil target measures income disparity through entropy value number. It is used to judge the difference between integrated data and overall data. Ratio of urban and rural income equals to the disposable income of citizens divide by the pure income of countryside inhabitant. This target is easy to compute and direct-viewing. The data is accurate and feasible. Therefore this article chooses ratio of urban rural income to reflect urban-rural income disparity.

3.1.2. Independent Variable Choice

There are a lot of factors to result in urban-rural income disparity. These factors can be classified into two types: one is development factor and the other is dual economic factor. On the aspect of development factor, we choose economic growth rate, average GDP per person, fixed asset investment amount, foreign investment proportion, employment rate and so on to carry on the research. On the aspect of dual economic factor, we choose ratio of industrial structure of city and countryside, ratio of employment structure, ratio of population, relative price of industry and agriculture, comparison of urban and rural investment and so on. Among the above targets, some can reflect dual economic structure directly and some can reflect policy and mechanism indirectly. After comparison and screening, considering feasible principle to gain data, we finally choose 16 statistical targets which Table I arranged in order to take the model as the main reference target.

Table1. *Statistic Targets To Influence Urban-Rural Income Disparity And Their Symbols*

Influence factors	Main target	symbol
Development factors	GDP	X_1
	Average GDP per person	X_2
	Fixed asset investment amount	X_3
	Total income from financial	X_4
	Ratio of industry added value to GDP	X_5
	Ratio of employment population in industry and service department	X_6
		X_7
	Unemployment rate in urban city	X_8
	Dependent degree of foreign trade	X_9
Dual economic factor	Proportion of urban population to total population	X10
	Added value of industry to that of agriculture	X11
	Added value of to that of industry	X12
	Ratio of investment amount in city and countryside	X13
	Ratio of unstated investment to total investment	X14
	Related price of industry and agriculture product	X15

3.2. Research Technique- Factor Analysis

There are many targets which influence urban-rural income disparity, which can provide sufficient information for the research. But it will increase the complexity of analysis because of the relevance among the targets. Factor analysis method can solve this problem effectively. Its basic principal is to combine the original variables through analyzing internal structure of variable correlation coefficient

matrix, explaining the information included in the multitudinous original variables with minority independent common factor variable, thus finding the primary factors which influence observation data, determining its weight objectively and avoiding subjective capriciousness. Suppose the number of samples is n, each sample observes p variables, Xij is expressed the jth target data of the ith sample. Record $X_i = (X_{i1}, X_{i2}, \cdots, X_{ip})^T$ .The extraction public factors (also are called principal factors) are expressed by F1, F2,…, Fm (m is the number of primarily factor, m<p). Factor analysis model may be described by the following model:

$$\begin{cases} X_1 = a_{11}F_1 + a_{12}F_2 + \cdots a_{1m}F_m + \varepsilon_1 \\ X_2 = a_{21}F_1 + a_{22}F_2 + \cdots a_{2m}F_m + \varepsilon_2 \\ X_p = a_{p1}F_1 + a_{p2}F_2 + \cdots a_{pm}F_m + \varepsilon_p \end{cases} \quad (1)$$

Its matrix formation is:

$$X = AF + \varepsilon \quad (2)$$

Where,

$$A = \begin{pmatrix} a_{11} & \cdots & a_{1m} \\ \cdots & \cdots & \cdots \\ a_{p1} & \cdots & a_{pm} \end{pmatrix} \quad (3)$$

A is called component matrix. ε is called special factor matrix, $\varepsilon = (\varepsilon_1, \varepsilon_2, \cdots, \varepsilon_n)^T$. After establishing the factor model, each sample can be inspected in turn. Suppose the linear combination between Fi and X is:

$$F_i = \beta_{i1}X_1 + \beta_{i2}X_2 + \cdots \beta_{ip}X_p \ (i = 1, 2 \cdots m) \quad (4)$$

The equation (4) is called factor score function, $\beta = (\beta_{i1}, \beta_{i2} \cdots \beta_{ip})^T$ is called factor score matrix, which can be estimated by regression analysis method. Finally, taking the following ratio (% of variance of principal factor Fi/∑% of variance of principal factor) as the weight, we can construct the synthesis score function of the sample:

$$F = \delta_1 F_1 + \delta_2 F_2 + \cdots \delta_m F_m \quad (5)$$

According to the synthesis score, we can compare and analyze the sample.

3.3. Empirical research

3.3.1. Analysis of Development Factor

We can get original data of development factor from 1996 to 2010 through Shandong Statistical Year book.

Table2. *Original Data Of Development Factors*

Year	X1	X2	X3	X4	X5	X6	X7	X8	X9
2000	8337	9326	2543	464	0.35	46.9	3.2	0.25	0.31
2001	9195	10195	2808	573	0.36	47.7	3.3	0.26	0.32
2002	10276	11340	3509	610	0.36	49.9	3.6	0.27	0.34
2003	12078	13268	5328	714	0.34	53.1	3.7	0.31	0.39
2004	15022	16413	7629	828	0.32	55.6	3.4	0.33	0.43
2005	18367	19934	10542	1073	0.32	59.8	3.3	0.34	0.46
2006	21900	23603	11136	1356	0.33	60.9	3.3	0.35	0.51
2007	25777	27604	12537	1675	0.33	62.75	3.2	0.36	0.51
2008	30933	32935	15436	1957	0.33	62.6	3.5	0.36	0.54
2009	33897	35893	19031	2199	0.35	63.5	3.4	0.28	0.56
2010	39170	41106	23277	2749	0.37	64.5	3.4	0.33	0.55

Applicability Detection

Table III lists KMO and Bartlett's test results. From it we can see KMO= 0.564 >0.5, which satisfies the feasible standard of factor analysis. The significant value of Bartlett sphere examination is

0.000<0.005, therefore the hypothesis that the correlation coefficient matrix is unitary matrix is rejected. So the data are suitable for factor analysis.

Table3. *KMO and Bartlett's Test*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	Bartlett's Test of Sphericity		
	Approx Chi-Square	df	sig.
0.564	223.271	36	0.000

Extraction of principal factor

There are many approaches to extract principal factor, such as maximum likelihood method, factor extraction method and so on. We selected the principal components analytic method in this study. The results calculated by SPSS17.0 are shown in table IV and table V.

Table4. *Total Variance Explained*

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
X1	6.172	68.575	68.575
X2	1.634	18.154	86.729
X3	.971	10.793	97.522
X4	.179	1.990	99.511
X5	.027	.302	99.813
X6	.014	.159	99.971
X7	.002	.024	99.996
X8	.000	.004	100.000
X9	2.716E-7	3.018E-6	100.000

Extraction Method: Principal Component Analysis

Establishing component matrix

We established primitive component matrix of F11, F12, and found it was not easy to explain their connotation. (Because of article length limit, analysis result is left out). In order to make economic significance of the principle factors to be more obvious, we use varimax method to rotate and after 4 iterations, rotated component matrix is shown as table 4.

Calculation factor score and synthetic score

The component score coefficient matrix can be obtained using SPSS default regression analysis. The result is shown in table VI.

Table5. *Rotated Component Matrix*

INDEX	COMPONENT	
	1	2
X1	.978	.199
X2	.980	.189
X3	.972	.202
X4	.962	.265
X5	-.123	.965
X6	.979	-.161
X7	-.079	.241
X8	.685	-.632
X9	.984	-.105

Table6. *Component Score Coefficient Matrix*

INDEX	COMPONENT	
	1	2
X1	.158	.123
X2	.158	.117
X3	.157	.126
X4	.155	.165
X5	-.020	.599
X6	.158	-.100
X7	-.013	.149
X8	.111	-.392
X9	.159	-.065

According to the score matrix, we can calculate synthetic score of the two components by formula (4).

Table7. *Component Score of Development Factors*

Year	F_{11}	F_{12}
2000	-1.3439	0.34232
2001	-1.23832	0.66968
2002	-1.08214	1.00797
2003	-0.71085	0.08442
2004	-0.29061	-1.34157
2005	0.09245	-1.23807
2006	0.38253	-0.97291
2007	0.68743	-0.85349
2008	0.96426	-0.23051
2009	1.02581	0.99721
2010	1.51334	1.53494

3.3.2. Analysis of dual economic factor

According to the above analysis method of development factor, we can obtain the synthetic score of dual economic factor.

Table8. *Component score of dual economic factors*

Year	**F_{21}**	**F_{22}**
2000	-1.72322	1.47288
2001	-1.42122	-0.57381
2002	-0.85376	-0.50636
2003	-0.37456	0.0119
2004	-0.25282	-1.06517
2005	0.17538	-0.34666
2006	0.65675	0.18762
2007	0.85558	-0.23752
2008	0.96522	-1.28065
2009	0.93105	0.29543
2010	1.0416	2.04233

Principal components regression analysis and result

Here we take F_{11}, F_{12}, F_{21}, F_{22} as independent factor and ratio of urban income to rural income to make regression analysis. The regression equation is:

$$Y = C + a_1F_{11} + a_2F_{12} + a_3F_{21} + a_4F_{22} + \xi$$

Calculated by eviews6.0, the result is as the following:

Table9. *Regression Analysis Result*

	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
F1	-0.014141	0.051066	-0.276927	0.0011
F2	0.029235	0.012324	2.372107	0.0554
F3	0.180219	0.050807	3.547123	0.0121
F4	-0.019961	0.013350	-1.495211	0.0255
C	2.718182	0.009488	286.4962	0.0000
R-squared	0.978503	Mean dependent var		2.718182
Adjusted R-squared	0.964171	S.D. dependent var		0.166242
S.E. of regression	0.031467	Akaike info criterion		-3.776797
Sum squared resid	0.005941	Schwarz criterion		-3.595935
Log likelihood	25.77238	Hannan-Quinn criter.		-3.890804
F-statistic	68.27645	Durbin-Watson stat		1.902112
Prob(F-statistic)	0.000039			

The regression equation is

$$Y = 2.72 - 0.014 * F_{11} + 0.029 * F_{12} + 0.18 * F_{21} - 0.02F_{22} + \xi$$

In order to study the effect of each variable to urban-rural income disparity, we express the principal factors with each variable and get the following equation:

$$Y = 2.72+0.0011x_1 +0.0013x_2 +0.0012x_3 + 0.0005x_4$$
$$+0.0223x_5 - 0.0092x_6 + 0.0070x_7 - 0.0183x_8 +0.0081x_9$$
$$+0.0741x_{10} + 0.0774x_{11} + 0.0695x_{12} + 0.0790x_{13}$$
$$+0.0700x_{14} + 0.0533x_{15} +0.0508x_{16}$$

4. CONCLUSION

The model demonstrates that economic development has promoted the enlargement of urban –rural income disparity, which conforms to the general rule of inverse U curve most scholars agreed. That is in the preliminary stage of economic development, economic growth will increase urban-rural income disparity. When economy develops to some certain degree, it can reduce income disparity. This result has also shown that since reform and open policy, urban –rural income disparity has expanded with the fast development in Shandong Province. In the short period, economic development still has the possibility to cause urban-rural income disparity to continue to expand. In the dual economic factor, the ratio of added value in non-agricultural production to agricultural production reflects the dual economical characteristic, the bigger the ratio is, the greater the disparity between urban and rural income is. The ratio of urban investment to rural investment can reflect city policy deviation from certain degree and it will result in the lag development of rural economy which enlarges the urban-rural income disparity. The regression coefficient of urban to rural population is positive, which shows that urbanization has intensified the urban-rural income disparity.

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