

# Empirical Analysis of Urban-rural Income Gap: A Case Tudy in Xinzhou, Shanxi Province

Cuirong Shi\*

School of management, Shanghai University, Shanghai, China

1184405390@qq.com

\*Corresponding author

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**Abstract:** With the rapid development of economy, people's living standards have been significantly improved, but the urban-rural income gap is becoming more and more serious. Xinzhou city, as a city mainly exploiting iron ore in Shanxi Province, has achieved rapid development in recent years, but it still has obvious urban-rural gap. This paper compares urban per capita disposable income and the rural per capita net income in Shanxi Province with that in Xinzhou area from 2005 to 2016. Through the principal component analysis and linear regression model of the factors influencing the urban-rural income gap are conducted. The purpose is to verify the impact of different factors on the urban-rural income gap and put forward relevant measures.

## 1. Introduction

With the steady rise of GDP and the rapid increase of per capita disposable income, the problem of large urban-rural income gap is getting worse. This paper takes Xinzhou city, Shanxi Province as an example, aiming to find out the key factors affecting the urban-rural gap by the principal component analysis and establishment of linear regression model. Meanwhile, it provides suggestions to narrow the urban-rural gap to promote the sustainable development of Xinzhou's economy.

## 2. General overview of income gap between urban and rural areas in Xinzhou

Before the economic crisis, Xinzhou city in Shanxi Province, with iron ore industry as the pillar industry, experienced a period of rapid economic development. After the economic crisis in 2008, the pace of Xinzhou's overall economic growth slowed down, but the development is still considerable.

However, behind xinzhou's economic development, the urban-rural income gap has widened. The urban-rural gap expressed by the per capita disposable income of urban residents and the per capita net income of rural residents has increased from RMB 5,081 per person in 2005 to RMB 17,962 per person in 2016. Therefore, this paper first compares Xinzhou's overall urban-rural income with Shanxi's, and the objective cause of the gap between Xinzhou city and Shanxi Province is analyzed.

### 2.1 Comparing urban and rural income of Xinzhou city with that of Shanxi Province

(1) Although Shanxi is a province with large resources, its overall urban-rural gap is larger than that of other provinces and cities due to the slow development of other industries.

(2) The overall urban-rural gap in Shanxi Province is greater than that in Xinzhou region, except for some years.

(3) The growth rate of urban-rural income in Xinzhou city is higher than that of Shanxi Province.

(4) In general, both Shanxi Province and Xinzhou City, the rural per capita net income and the urban per capita disposable income are increasing year by year. And the urban-rural income gap is also increasing. Therefore, it is urgent to find out the influencing factors of urban-rural gap.

Table. 1. The profiles urban and rural income in Xinzhou city and Shanxi Province

Unit: RMB per person

Particular Year	The urban per capita disposable income in Shanxi Province	The rural per capita net income in Shanxi Province	The urban-rural income gap in Shanxi Province	The urban per capita disposable income in Xinzhou City	The rural per capita net income in Xinzhou City	The urban-rural income gap in Xinzhou City	The difference of urban-rural income gap between Shanxi Province and Xinzhou city
2005	8913.90	2890.66	6023.24	7006.00	1925.00	5081.00	942.24
2006	10027.70	3180.92	6846.78	8114.35	2086.88	6027.47	819.31
2007	11565.00	3665.66	7899.34	9501.30	2516.10	6985.20	914.14
2008	13119.05	4097.24	9021.81	11194.44	2830.41	8364.03	657.78
2009	13996.55	4244.10	9752.45	12195.00	3028.00	9167.00	585.45
2010	15647.70	4736.30	10911.40	13683.00	3446.00	10237.00	674.40
2011	18123.90	5601.40	12522.50	15924.60	4135.00	11789.60	732.90
2012	20411.70	6356.60	14055.10	18317.90	4776.00	13541.90	513.20
2013	22455.60	7153.50	15302.10	20324.00	5426.00	14898.00	404.10
2014	24069.40	8809.00	15260.40	21735.00	6104.00	15631.00	-370.60
2015	25827.70	9454.00	16373.70	23452.00	6550.00	16902.00	-528.30
2016	27352.00	10082.00	17270.00	24987.00	7025.00	17962.00	-692.00

Data source: Shanxi Statistical Information Network, China Statistical Yearbook China, Statistical Communiqu for Xinzhou's National Economic and Social Development

## 2.2 The general trend of urban-rural income gap in Xinzhou, Shanxi Province

In order to understand the overall trend of Xinzhou's urban-rural income gap, this paper analyzes the absolute and relative gap of Xinzhou's urban-rural income. The analysis results are as follows:

Table. 2. Analysis of absolute gap and relative gap

Year	2005	2006	2007	2008	2009	2010
Absolute gap	5081.00	6027.47	6985.20	8364.03	9167.00	10237.00
Relative gap	3.64	3.89	3.78	3.96	4.03	3.97

Year	2011	2012	2013	2014	2015	2016
Absolute gap	11789.60	13541.90	14898.00	15631.00	16902.00	17962.00
Relative gap	3.85	3.84	3.75	3.56	3.58	3.56

From table 2, it can be seen that the urban per capita disposable income in Xinzhou was larger than that of rural per capita net income from 2005 to 2016, and the absolute gap between urban and rural income has been increasing and the relative gap has been existing. From 2005 to 2009, the relative gap showed a trend of rising first, then falling and then rising, and then declining after 2009.

## 2.3 Principal component regression analysis of urban-rural income gap in Xinzhou city

### 2.3.1 Index selection and data processing

This paper has carried on the regression analysis to the index which affects the urban-rural income. The relative gap of urban-rural income gap is selected as the dependent variable  $y$ . Independent variables have per capita gross regional domestic product, urbanization level, financial

support to agriculture expenditure ratio, industrialization rate, the value-added ratio of secondary, tertiary and primary industries. The definition and calculation of variables are shown in table 3:

Table. 3. Definition and calculation of variables

Variable	Definition	Variable calculation
X1	Per capita gross regional domestic product	Gross regional domestic product in that year / Total population in that year
X2	Urbanization level	Total urban population in that year / Total rural population in that year
X3	Financial support to agriculture expenditure ratio	Agricultural expenditure / Public expenditure in that year
X4	Industrialization rate	Gross industrial output / Gross output value in that year
X5	The value-added ratio of secondary, tertiary and primary industries	(Value-added of primary industry + The added value of secondary industry) / The added value of the tertiary industry
Y	The relative income gap between urban and rural residents	The urban per capita disposable income / The rural per capita net income

This paper selects six different data indicators in 2005 -2016 for 12 years. The data are as follow:

Table. 4. Factors affecting the income gap between urban and rural areas in Xinzhou, Shanxi province in 2005 -2016

Year	Y	X1	X2	X3	X4	X5
2005	3.64	3489.77	0.50	2.10	45.30	7.25
2006	3.89	6343.44	0.53	1.90	45.60	7.98
2007	3.78	7983.47	0.55	1.90	45.80	8.70
2008	3.96	10070.22	0.58	1.70	46.10	9.55
2009	4.03	12016.00	0.60	1.50	45.90	7.71
2010	3.97	13606.25	0.62	1.50	45.70	8.23
2011	3.85	18020.00	0.66	1.30	45.70	9.12
2012	3.84	20081.00	0.71	1.10	45.50	9.58
2013	3.75	21021.70	0.76	0.90	45.50	9.29
2014	3.56	21745.25	0.81	0.90	45.30	9.47
2015	3.58	21687.36	0.86	0.70	45.10	9.69
2016	3.56	22697.31	0.92	0.70	44.80	10.31

(1) For the existing data, the data is first standardized so that the principal component analysis can be reduced to the original variable after the central independent variable. The results of the standardization are as follows:

Table. 5. Descriptive Statistical Analysis

	N	Minimum value	Maximum value	Average	Standard deviation
Y	12.00	3.56	4.03	3.78	0.17
X1	12.00	3489.77	22697.31	14896.81	6824.69
X2	12.00	0.50	0.92	0.68	0.14
X3	12.00	0.70	2.10	1.35	0.49
X4	12.00	44.80	46.10	45.53	0.36
X5	12.00	7.25	10.31	8.91	0.93
Effective N listwise	12.00				

(2) Different variables reflect the factors that affect the urban-rural income gap from different perspectives. However, there may be collinear between variables, so it is necessary to detect the colinearity between variables. The results are as follows:

Table. 6. Colinearity Test Results

Model	Allowance	VIF	Model	Allowance	VIF
X1	0.02	46.251			
X2	0.01	96.695	X4	0.17	6.05
X3	0.007	139.097	X5	0.16	6.35

Since the VIF values of the three variables in the table are all greater than 10 and the tolerance is very low, it can be seen that the model has severe collinearity, which requires the processing of multiple collinearity lines through the principal component analysis.

### 2.3.2 Principal Component Analysis

The original data were analyzed by SPSS software, and the results are as follows:

Table. 7. Summary of principal component extraction

Principal Component	Eigenvalues	% of the variance	Cumulative%	Extract item		
				Eigenvalues	% of the variance	Add%
X1	4.06	81.202	81.202	4.06	81.202	81.202
X2	0.672	13.436	94.638	0.672	13.436	94.638
X3	0.238	4.769	99.407			
X4	0.026	0.513	99.92			
X5	0.004	0.08	100			

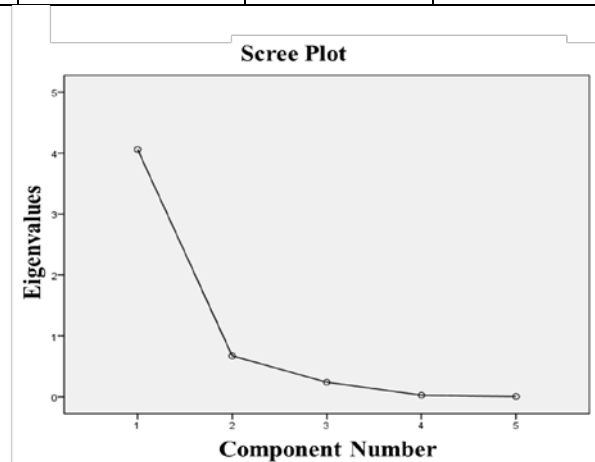


Figure 1. Scree plot

Table. 8. Load matrix

component	1	2
X1	0.956	0.181
X2	-0.992	-0.059
X3	-0.977	-0.074
X4	-0.693	0.709
X5	0.853	0.357

According to table 7, the variance cumulative value of the two principal components is 94.6%, which contains most of the information. Therefore, the two principal components are selected.

The regression results were obtained by using principal components and dependent variables respectively:

$$F1=0.956 *X1-0.992*X2-0.977*X3-0.693*X4+0.853*X5$$

$$F2=0.181*X1-0.059*X2-0.074*X3+0.709*X4+0.357*X5$$

The software SPSS was used to establish the multiple linear regression equation with the first principal component F1 and the second principal component F2 for the relative gap Y between urban and rural income in Xinzhou region. The results are as follows:

Table. 9. Model Summary

Model	R	R square	Adjusted R squared	Standard deviation error
1	0.842	0.708	0.643	0.05

Table. 10. Variability analysis

Model		Quadratic sum	df	Mean square	F	significance
1.00	Regression	8.66	3.00	2.89	9.86	0.005b
	Residual	2.34	8.00	0.29		
	Total	11.00	11.00			

Table. 11. Regression analysis results of variables

Model		Nonstandardized coefficient		T	significance
		B	Standard error		
1	Constant	-2.32E+00	0.02	151.5	0.00
	REGR factor score 1 for analysis 2	-0.614	0.18	-3.409	0.008
	REGR factor score 2 for analysis 2	0.576	0.18	3.196	0.011

From table 9, 10, it can be seen that R=0.842 of the model indicates that the relative gap of urban-income in Xinzhou is significantly correlated with the six variables. The P value of the regression equation is 0.04, indicating that the regression equation can pass the hypothetical test. As for the regression of principal components, it can be seen from the results in the table that both P values of the two principal components are less than 0.1, and both can pass the significance test. The regression equation of the principal component is:

$$Y=-2.32-0.614F1+0.576F2$$

Therefore, according to the regression equation of principal component and dependent variables and the regression equation of principal component, the final regression equation is:

$$Y=2.32-0.483*X1+0.575*X2+0.557*X3+0.83*X4-0.31*X5$$

### 2.3.3 Result analysis

The final regression equation shows that the relative gap between urban-rural incomes is positively correlated with the level of urbanization, financial support to agriculture expenditure and industrialization, while it is negatively correlated with the per capita GDP and the value-added ratio of the secondary and tertiary industries. Take X1 and X2 as an example to explain the practical significance of each regression coefficient.

The regression coefficient of X1 is - 0.483, indicating that the Y value decreased by 0.483 units for each additional unit of X1 while other factors remained unchanged. The regression coefficient of X2 is 0.575, indicating that the Y value increased by 0.575 units for each additional unit of X2 while other factors remained unchanged.

The above results are in line with the normal law. On the one hand, the increase in Per capita gross regional domestic product indicates that the province's economy is developing rapidly, people's living standards are gradually increasing, and the market economy is running smoothly. In this case, employment opportunities or other opportunities for rural people have increased, thus narrowing the

urban-rural gap. The increased level of urbanization means that more and more rural people are going to cities to seek new opportunities. However, compared with urban residents, most rural people are subject to a limited education level, which limits farmers to work in specific fields, thus causing a gradual increase in the urban-rural gap. On the other hand, the proportion of financial support to agriculture expenditure increases, indicating that the country attaches great importance to the development of rural areas. However, due to the large rural population base and insufficient production capacity, the urban-rural income gap still shows an increasing trend in a short time.

### **3. Strategy suggestion**

#### **3.1 Optimize the industrial structure**

(1) We should pay attention to the rational allocation of resources and push resources such as capital, technology and talent to be allocated to rural areas.

(2) We should play to the leading role of the government in economic development, making urban and rural information as symmetrical as possible and better developing the agricultural economy.

(3) We should put the issue of agriculture, rural areas and farmers in an important position of development and support agricultural and rural development with more financial resources and preferential policies.

#### **3.2 Increase investment in Education**

The problem of large urban-rural income gap is not only reflected in income, but also the deficiency of basic education. Children of rural residents and children of urban residents pay different attention to education. In rural families, the economic conditions are relatively poor, and some families' children have dropped out of school to work earlier to make up for their livelihood. In the long run, it will have a certain impact on the urban-rural income gap.

Therefore, the state should increase investment in rural education, attach importance to rural education, and strengthen the training of agricultural operation and use of technology on the basis of popularization of nine-year compulsory education, so that the workers can truly master some practical technologies and realize the real popularization of education in rural areas. In addition, the government should hold some designated activities regularly, arrange professional and technical personnel to go to the countryside to personally guide the farmers.

#### **3.3 Adopt flexible and diversified ways to increase revenue**

In addition to the most basic job employment, to narrow the urban-rural gap, it is necessary to broaden the channels for farmers to increase their income. There are several ways:

(1) Improve the agricultural subsidy system and increase the support for farmers in planting industry.

(2) Strengthen the training of farmers to make them in line with the information age.

(3) The government should help farmers to develop markets, develop special industries and expand sales channels.

(4) Combine agricultural development with non-agricultural production and promote agriculture development with the development of non-agricultural production. The two promote each other and achieve common development.

### **4. Conclusion**

Through empirical analysis, it is found that: the urban-rural income gap in Xinzhou City is mainly with per capita gross regional domestic product, urbanization level, financial support to agriculture expenditure ratio, the industrialization level, the value-added ratio of secondary, tertiary and primary industries, and per capita gross regional domestic product are negatively correlated with the value-added ratio of secondary, tertiary and primary industries, and positively correlated with the

urbanization, financial support to agriculture expenditure ratio, industrialization level. This is mainly because the results of economic growth are mostly reflected in cities and towns. Rural areas do not increase their income because of economic growth, so the urban-rural income gap gradually expands. The income of rural residents mainly depends on agriculture, and the improvement of agricultural output can increase farmers' income and help narrow the gap between urban and rural areas.

Through the regression results, we can conclude that the government can narrow the urban-rural gap by adjusting the industrial structure, improving the rural subsidy system and increasing the investment in rural education.

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