How Chinese Development Effects Chinese Farmer's Income

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Abstract: The income gap between urban and rural areas is an important issue in macroeconomic research[1]. Since the reform and opening up, although the average growth rate of China's economy has been 9.5%, the low farmers' income is still very prominent. The irrational structure of the agricultural industry, the underdeveloped economy, and the slow growth of farmers' income are bound to become obstacles to the sustained and stable growth of the Chinese economy. At the same time, although the income of farmers has been increasing in recent years, the growth rate is missing continuously decreasing. This has led to a further widening of the income gap between urban residents and rural households. This fact will not only affect the motivation of farmers' production but also limit the stability of rural development. In February 2021, the State Council, China's cabinet, released a policy paper on modernizing agriculture and rural areas by 2025, confirming China's commitment to helping farmers escape poverty[2]. Correctly and effectively solving the rural economic problems is the key to China's economy getting out of the predicament and achieving long-term stable growth. In this case, we apply an appropriate multiple linear regression model to analyze the historical data and status of farmers' income. We will explore the main factors affecting farmers' income. This article focused especially on giving advice about how to increase farmers' income, making corresponding suggestions, and forecasting the future growth trend of Chinese farmers' income.

Keywords: Urban-Rural Income Gap; Macro-Economy; Farmer's Income

1. Selection of variables

In this article, the hypothesis is that the income level of farmers, usually using per capita income indicators, will grow. There are many factors that affect farmers' income growth. It can be summarized as the following aspects. The first is the agricultural product purchase price level. At present, agricultural income is still the main source of income for farmers in the central and western regions of China. The second is the level of agricultural surplus labor transfer. Chinese agriculture is still dominated by decentralized operations whose efficiency is relatively low compared to centralized agriculture. it is very important to transfer surplus labor to other industries as soon as possible. The third is the level of urbanization and industrialization. Urbanization and industrialization mean more machines and more fertilizer for agriculture. The lower level of urbanization and industrialization means lower labor efficiency, which greatly affects the growth of farmers' income. The fourth is the proportion of the agricultural industry structure. The contribution of agriculture, forestry, animal husbandry, and fishery to farmers' income growth is different. Because of the improvement of people's living standards, and the changes in the demand for agricultural products, the proportion of the agricultural structure directly impacts the growth of farmers' income. Fifth, the level of government agricultural investment. There is a significant positive correlation between farmer income and fiscal agricultural expenditure. Agricultural investment is an important source of income for farmers. Therefore, we perform linear regression analysis on the relationship between farmers' income and various influencing factors and establish a mathematical model.Based on the above analysis, we introduce an explanatory variable in the factors affecting farmers' income. Namely: Y: Total income of farmers, X_1: The proportion of rural GDP in GDP, X_2: The proportion of urban population, X_3: The proportion of rural employees in the rural population, X_4: The proportion of the total output value of crops in the total output value of forest, X_5: Crops Sown area, X_6: Rural electricity consumption. We found relevant data from the National Bureau of

Statistics of China. We collected data from 2001 to 2020 to see how the relationship between total farmer's income and factor.

2. Key Questions

Our goal of this article can be summarized as four questions:

Q1: Does urbanization and industrialization (Rural Electricity) affect farmers' income? If not, what factors affect a farmer's income?

Q2: Is there any difference in significant variables for farmers' income before and after the Beijing Olympics? (2008)

Q3: What is the optimal regression model which shows the impact of agriculture index variables on farmers' income and reveals which coefficient of variable has the biggest impact on farmers' income after China's reform and opening up?

3. Data

FI = Farmer's Income

AGDP = The proportion of agricultural production in GDP

PRE = The proportion of rural employees in the rural population

PTA = The proportion of total agricultural output value in the total output value

PUP = Proportion of urban population

SAC = Total sown area of crops (million hectares)

RE = Rural Electricity 100 million (megawatt/hour)

Exhibit 1

3.1 Model 1: Linear regression (Exhibit 2)

Income = $\beta 0 + \beta 1 RE + u$

Income = -3.3495 + 1.81903 RE + u

The model estimation result shows a highly statistically significant result. A significant result indicates that the data are significantly heteroscedastic, and thus the assumption of homoscedasticity in the regression residuals is violated. Hence, we can say that homoscedasticity cannot be assumed. It also means if rural electricity consumption is the only factor in the regression model, then assuming that other explanatory variables remain unchanged, when the rural electricity consumption increases, the income of the rural population will increase.

We can notice from the literature that the main reasons for the increase in rural electricity consumption can be summarized as the significant improvement of rural power supply facilities, the increase of rural population income, and the popularity of electrical equipment. At the same time, the increase in income level is also an important prerequisite for the increase of electricity consumption in rural China. In order to increase the income of farmers, the Chinese government has implemented a policy of photovoltaic poverty alleviation in rural areas. This policy has changed the power supply conditions in rural areas, thus contributing to the increase in rural electricity consumption.n addition, due to the rise in the standard of living in rural areas in recent years and the reduced cost of home appliances. More and more rural households are using electrical appliances, thus increasing the electricity consumption of the rural population[3].

3.2 Model 2: Multiple regression (Exhibit 3)

2000-2008: Income= 35.2085e -0.0387AGDP - 1.0323PRE + 0.0299PTA + 0.6405PuP -0.4648 RE+0.0428SAC+u

2008-2020: Income= 55.4797e -0.0679AGDP - 1.1125PRE -0.1362PTA + 0.5039PuP +0.2921 RE+0.0301SAC+u

In this model, it can be seen that before and after the 2008 Beijing Olympics, the proportion of agricultural production in GDP, the proportion of rural employees in the rural population, the total sown area of crops, and the proportion of the urban population have the same positive and negative effects on farmers' income. But the proportion of total agricultural output value in the total output value and rural electricity have different correlations with farmers' income.

In 2020, the proportion of agricultural production in GDP in China will be 7.1%. This is a decline of 6 percentage points compared to 20 years ago, and the trend is decreasing every year. However, farmers' income continues to rise with the increase in total agricultural production. This is due to the reform of rural taxes and fees. In 2006, the State of China announced the complete abolition

of agricultural taxes, pastoral taxes and other agricultural taxes. This change has not only reduced the burden on farmers but also directly increased their income. In addition, in 2004, China introduced a major policy initiative to provide direct subsidies to agricultural producers. This policy has increased the subsidies for grain cultivation, seed subsidies, subsidies for the purchase of agricultural machinery, and comprehensive subsidies for the price of agricultural production materials from $2.1 billion initially to $18 billion in 2008. This measure has played a huge role in increasing farmers' income and reducing their expenses.

3.3 Model 3: Multiple regression: (Exhibit 4)

Income = β0 + β1(AGDP) + β2(PRE)+ β3(PTA)+ β4(PUP) +β5(RE)+β6(SAC)+u

Model: Income= 10.753e + 0.0346AGDP - 0.7965 PRE + 0.0481PTA + 0.6278PuP -0.4397RE+0.1028SAC+u

In this model, the proportion of the urban population, rural electricity, and the proportion of rural employees in the rural population have the greatest impact on farmer income. The proportion of rural employees in the rural population and Farmer income has a negative correlation. The proportion of agricultural production in GDP, the proportion of total agricultural output value in the total output value, and the total sown area of crops have no significant effect on the regression results. Therefore, in the short term, these factors are considered to have no effect on farmers' income.

The negative correlation between the share of rural workers in the rural population and farmers' income. It is the shift in income patterns that leads to a further widening of the gap between the rich and the poor. On the one hand, in rural areas labor income can only sustain basic survival and can solve the problem of food and clothing. But the price of food grown in the land of rural employees is not going up, and farming is no longer earning money. And it is found that due to the literacy level, although rural employees tend to work more hours per month than urban workers on average. But the monthly and hourly wages of rural employees are lower than those of urban workers[4]. This is also the reason why the proportion of the urban population factor has no significant effect on farmers' income.

Conclusion

We could scrutinize the regression model based on a literature review with data gathered from Chinese statistical years reports, Chinese population income statistical table, Chinese agriculture reports, and Chinese employment reports. Through testing 3 models all key factors have an influence on the farmer’s income.

Thus, we predict that with China's urbanization, population, and economic growth, farmers' incomes will increase. But China continues to face a growing income gap between urban and rural areas. At the same time, there are some potential issues such as environmental issues, late marriage, and the price of a house, for example as temperature constantly increases because of environmental pollution, the production rate of agriculture will constantly decrease which will seriously affect the income of Chinese farmers.

To increase farmers' income, the Chinese government needs to promote rural infrastructure and develop the promotion of urbanization. With urbanization, the most important thing is the improvement of infrastructure. Agricultural science and technology will revitalize the income of the agricultural industry and is an important basis for promoting farmers' income. In addition, expanding peasant employment and reducing discrimination against migrant workers who work in cities is also a priority to increase farmers income.

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Exhibit 1

	Years	AGDP	PUP	PRE	PTA	SAC	RE	FI
1	2001	13	37.7	61.2	55.2	155.7	2.4	2.5
2	2002	12.3	39.1	61.5	54.5	154.6	2.6	2.6
3	2003	10.8	40.5	61.8	50.1	152.4	3	2.9
4	2004	11.2	41.8	62	50.1	153.6	3.4	3.3
5	2005	10.5	43	62.1	49.7	155.5	3.9	3.6
6	2006	9.8	44.3	62	52.7	152.1	4.4	4.1
7	2007	9.1	45.9	62.1	50.2	153	4.9	4.8
8	2008	8.7	47	61.7	48.2	155.6	5.5	5.2
9	2009	8.6	48.3	61.7	50.6	157.2	5.7	5.9
10	2010	8.7	49.9	61.7	53	158.6	6.1	7
11	2011	8.3	51.8	61.8	51.2	160.4	6.6	7.9
12	2012	8.3	53.1	61.1	51.9	162.1	7.1	8.9
13	2013	8.3	54.5	60.7	52.5	163.7	7.5	9.4
14	2014	8.1	55.8	60.2	53	165.2	8.6	10.5
15	2015	7.9	57.3	60	53.2	166.8	8.9	11.4
16	2016	7.5	58.8	59.7	52.3	166.9	9	12.4
17	2017	7	60.2	59	53.1	166.3	9.2	13.4
18	2018	6.7	61.5	58.2	54.1	165.9	9.4	14.6
19	2019	6.7	62.7	57.4	53.3	165.9	9.5	16
20	2020	7.1	63.9	56.5	52.1	167.5	9.5	17.1

Source: National Bureau of Statistics of China

Exhibit 2

	Coefficient	T-statistic	P>t
RE	1.81903	14.843	0
Observation		20	
R-square		0.924	
Adj R square		0.92	
F-Statistic		220.3	
Prob (F-Statistic)		1.54E-11	

Exhibit 3

	Before 2008			After 2008		
	Coefficient	T-statistic	P>t	Coefficient	T-statistic	P>t
AGDP	-0.0387	-1.583	0.524	-0.0679	-1.583	0.212
PUP	0.6405	5.667	0.161	0.5039	5.667	0.011
PRE	-1.0323	-4.25	0.158	-1.1125	-4.25	0.024
PTA	0.0299	-1.71	0.517	-0.1362	1.71	0.186
SAC	0.0428	0.219	0.57	0.0301	0.219	0.841
RE	-0.4648	0.998	0.47	0.2921	0.998	0.392
Observation	15			20		
R-square	0.997			1		
Adj R square	0.989			0.999		
F-Statistic	120.8			1171		
Prob (F-Statistic)	0.00824			3.86E-05		

Exhibit 4

	Coefficient	T-statistic	P>t
AGDP	-0.0346	-1.542	0.147
PRE	-0.7965	-10.002	0
PTA	0.0481	1.8	0.95
PUP	0.6278	8.788	0
RE	0.4397	2.414	0.031
SAC	0.1028	2.568	0.023
Observation		40	
R-square		0.999	
Adj R square		0.999	
F-Statistic		2875	
Prob (F-Statistic)		2.57E-19	