

# The Influence of Fiscal Support Agriculture on Urban-rural Income Gap: A Case of Yangtze River Delta

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## Abstract

Based on the spatial and temporal data of 27 major cities in the Yangtze River Delta from 2008 to 2019, a systematic GMM model was used to investigate the influence of fiscal support to agriculture on the Urban-rural income gap. The basic research conclusions are obtained: First, both the scale and efficiency of fiscal support for agriculture can substantially reduce the Urban-rural income gap. Second, increasing the scale and scale efficiency of fiscal support for agriculture can significantly reduce the Urban-rural income gap in economically developed areas and underdeveloped areas, but the degree of impact differs. Improving the pure technical efficiency of fiscal support for agriculture helps economically developed areas narrow the Urban-rural income gap, but the effect on economically underdeveloped areas is not evident. Based on the research conclusions, policy recommendations such as increasing the scale of fiscal support for agriculture, improving the management of funds, and establishing and improving the related performance evaluation mechanism and supervision system are proposed.

## Keywords

Fiscal Support for Agriculture; Expenditure Scale; Expenditure Efficiency; Urban-rural Income Gap; Yangtze River Delta.

## 1. Introduction and Literature Review

Recently, the continuous promotion of the strategy of rural revitalization and the goal of common prosperity has brought more improvement for rural areas in China. While the rural economy is growing at a rapid pace, the income gap between urban and rural areas is reducing year by year. However, the narrowing of the Urban-rural income gap does not indicate that the problem of Urban-rural income inequality has been solved. On the contrary, the current Urban-rural income gap in China maintains a high level in numerical terms, such as the absolute ratio of the disposable income of urban and rural residents in 2020 is 2.5, which shows that the issue of an Urban-rural gap in China still exists. Promoting rural economic growth and solving the problem of income inequality cannot be achieved without the guarantee of government fiscal expenditure. In order to promote the development of the rural economy, China has established a fiscal input mechanism of fiscal support for agricultural expenditure. Therefore, it is of great importance to study how fiscal support for agriculture can work to reduce the Urban-rural income gap.

Regarding the relationship between fiscal support for agriculture and the Urban-rural income gap, domestic scholars have conducted a large number of studies, and the results fall into two categories. One group of scholars believed that increasing fiscal support for agriculture could reduce the Urban-rural income gap. Tang, Zhuchang et al. (2007) demonstrated that the scale of fiscal support for agriculture has a strong relationship with farmers' income, and the Urban-rural income gap can basically be reduced if fiscal support for agriculture is increased[1]. Liang Wenfeng et al. (2013), based on panel data from 1978 to 2012 in China, found that as far as the

Urban-rural income gap is concerned, both fiscal support for agriculture and urbanization can exert a convergence effect on it in the short run, and fiscal support for agriculture plays a greater role than urbanization[2]. Wang Xuan et al. (2019) concluded that expanding the scale of fiscal support to agriculture plays an important role in reducing the Urban-rural income gap. Another group of scholars argued that increasing fiscal support for agriculture can widen the Urban-rural income gap[3]. Wen Tao et al. (2005) believed that the key factor promoting the growth of farmers' income is not fiscal agricultural funds, but an agricultural investment. There may be inefficiencies in the process of using fiscal support funds for agriculture[4]. Shang Xiaohu (2012) believed that although there was a negative relationship between the proportion of fiscal support for agriculture and the Urban-rural income gap, the empirical results are insignificant, which means that the increase in the proportion of fiscal support for agriculture does not have an obvious effect on reducing the Urban-rural income gap[5]. Yang Siying et al. (2020) concluded from an empirical analysis that fiscal support to agriculture would hinder the transfer of rural labor, and therefore arranging this expenditure might widen the Urban-rural income gap[6].

Most of the above studies by many scholars have focused on studying the impact of the scale of fiscal support to agriculture on the Urban-rural income gap, without paying attention to whether the efficiency of fiscal support for agriculture has an impact on it. Therefore, this paper chooses the Yangtze River Delta as the object of observation to empirically investigate whether the expanding scale and increasing efficiency of fiscal support for agriculture can reduce the Urban-rural income gap in the Yangtze River Delta, and further discusses the heterogeneity of the impact of fiscal support for agriculture on Urban-rural income gap under different economic development backgrounds. And finally, some policy suggestions for the Yangtze River Delta to solve the issue of Urban-rural gap.

## 2. Theoretical Analysis

### 2.1. The Mechanism of Fiscal Support for Agriculture to Narrow the Urban-rural Income Gap

Firstly, the government can arrange fiscal funds for improving rural infrastructure and introducing advanced agricultural technology, which can eventually increase food production and farmers' income by creating better conditions for agricultural development. Secondly, the government can use fiscal funds to support agriculture such as providing a living allowance, grain planting allowance, and natural disaster allowance, to directly improve farmers' living conditions and reduce the Urban-rural income gap. Finally, the arrangement of fiscal support for agriculture is indispensable for the overall improvement of rural economic growth and the development of rural industries, which helps farmers' income gradually increase in a steady upward trend.

### 2.2. The Regional Heterogeneity of Fiscal Support of Agriculture to Narrow the Urban-rural Income Gap

In the face of the Urban-rural income gap, the scale and efficiency of fiscal support for agriculture may differ between regions in the background of various levels of economic development. On the one hand, different levels of economic development may correspond to various proportions of fiscal support for agriculture. Compared with the economically developed areas, the economically developed areas have lower economic development levels and pay more attention to the development of agriculture. So the proportion of fiscal support for agriculture in economically underdeveloped areas is relatively high. On the other hand, different levels of economic development also correspond to various efficiency of fiscal support for agriculture. Generally speaking, economically developed areas have higher levels of science

and technology and fund management, so the pure technical efficiency of financial support to agriculture is likely to be higher.

### 3. The Current Situation of Fiscal Support for Agriculture in the Yangtze River Delta

#### 3.1. The Analysis of the Scale of Fiscal Support for Agriculture

Combined with the previous analysis, the Yangtze River Delta is now divided into economically developed areas and economically underdeveloped areas using the method of systematic clustering, to further study the difference in the distribution of fiscal support to agriculture among areas. The classification results are shown in Table 1.

**Table 1.** Classification results of systematic clustering

	City
Economically developed areas	Yangzhou, Shaoxing, Nantong, Zhenjiang, Zhoushan, Hefei, Huzhou, Tongling, Taizhou, Jiaxing, Wuxi, Suzhou, Nanjing, Shanghai, Changzhou, Hangzhou, Ningbo
economically underdeveloped areas	Chizhou, Xuancheng, Anqing, Chuzhou, Yancheng, Wenzhou, Jinhua, Taizhou, Wuhu, Ma Anshan

**Table 2.** The proportion of fiscal expenditure for agriculture in the Yangtze River Delta to total fiscal expenditure from 2008 to 2019

year	Yangtze River Delta	Economically developed areas	economically underdeveloped areas
2008	7.92	7.25	9.07
2009	9.10	8.17	10.69
2010	9.19	8.19	10.91
2011	10.18	8.87	12.40
2012	10.25	9.25	11.94
2013	10.75	9.77	12.42
2014	10.18	9.11	12.00
2015	10.70	9.55	12.65
2016	10.63	9.61	12.36
2017	9.36	8.65	10.56
2018	8.79	8.18	9.81
2019	8.10	7.49	9.12
mean	9.60	8.67	11.16

Next, this paper uses the results of classification to study the scale of fiscal support for agriculture in the Yangtze River Delta. First of all, from the overall data of the Yangtze River Delta, the absolute scale of fiscal support for agriculture continued to expand from 2008 to 2019, increasing from 60.275 billion yuan to 204.139 billion yuan, a cumulative growth of 3.39 times over the past 12 years. It can be seen from Table 2 that the average proportion of fiscal support for agriculture in total fiscal expenditure is 9.60%. From the perspective of changing trends, from 2008 to 2013, the proportion of fiscal support for agriculture in total fiscal expenditure continued to expand, from 7.92% in 2008 to 10.75% in 2013, decreased to 10.18% in 2014, and then increased, reached 10.70% in 2015, and continued to decline from 2016 to 2019. In 2019, fiscal support for agriculture accounted for 8.10% of total fiscal expenditure. Overall, the relative scale of fiscal support for agriculture is relatively small and has a decreasing trend. Secondly, from the regional data under different economic development backgrounds, from 2008 to 2019, the average share of financial support for agriculture in economically developed

areas and underdeveloped areas in total fiscal expenditure was 8.67% and 11.16%, respectively. It can be seen that the proportion of fiscal support for agriculture in economically developed areas in total fiscal expenditure is smaller than that in economically underdeveloped areas.

### 3.2. The Analysis of the Efficiency of Fiscal Support for Agriculture

To measure the efficiency of fiscal support for agriculture in the Yangtze River Delta, it is necessary to build an index system for the efficiency of fiscal support for agriculture. Referring to Mao Hui et al(2018), the total amount of fiscal support for agriculture is taken as an input index, and the disposable income of farmers, as well as the total output value of primary industry are taken as the output indexes[7], and the DEA method is used to measure the efficiency of fiscal support for agriculture in the Yangtze River Delta region through Deap2.1 software. The measurement results are shown in Table 3. The measurement results are shown in Table 3. First, from the perspective of pure technical efficiency, the overall regional average value of the Yangtze River Delta is 0.877. The annual average pure technical efficiency of fiscal support for agricultural expenditure in economically developed areas and economically underdeveloped areas is 0.921 and 0.801, respectively, which indicates that economically developed areas have higher efficiency in managing funds. Second, from the perspective of scale efficiency, the overall regional average value of the Yangtze River Delta is 0.700. The average annual scale efficiency of the fiscal support for agriculture in economically developed areas and underdeveloped areas is 0.624 and 0.830 respectively, which shows that the fiscal support for agriculture in economically underdeveloped areas is close to the optimal scale, while the efficiency of the scale of fiscal support for agriculture in economically developed areas still has space for improvement.

**Table 3.** The efficiency of fiscal agricultural expenditure in the Yangtze River Delta from 2008 to 2019

year	The Yangtze River Delta		Economically developed areas		economically underdeveloped areas	
	vrste	scale	vrste	scale	vrste	scale
2008	0.866	0.628	0.902	0.519	0.804	0.815
2009	0.861	0.679	0.900	0.586	0.796	0.837
2010	0.853	0.738	0.907	0.664	0.761	0.864
2011	0.828	0.724	0.899	0.642	0.706	0.865
2012	0.848	0.724	0.913	0.638	0.736	0.869
2013	0.854	0.767	0.899	0.707	0.779	0.868
2014	0.893	0.785	0.922	0.730	0.842	0.879
2015	0.894	0.562	0.952	0.506	0.795	0.657
2016	0.904	0.764	0.944	0.702	0.837	0.869
2017	0.899	0.718	0.937	0.644	0.834	0.843
2018	0.910	0.632	0.949	0.547	0.844	0.776
2019	0.911	0.682	0.934	0.601	0.873	0.819
mean	0.877	0.700	0.922	0.624	0.801	0.830

## 4. Empirical Model Construction and Variable Selection

### 4.1. Empirical Model Construction

This paper chooses a dynamic panel data model to study how fiscal support for agriculture plays a role in the Urban-rural income gap. The model expressions are as follows:

$$tr_{it} = \alpha_0 + \alpha_1 tr_{it-1} + \alpha_2 fie_{it} + \alpha_j cont_{it} + \varepsilon_{it} \tag{1}$$

$$tr_{it} = \alpha_0 + \alpha_1 tr_{it-1} + \alpha_2 vrste_{it} + \alpha_j cont_{it} + \varepsilon_{it} \tag{2}$$

$$tr_{it} = \alpha_0 + \alpha_1 tr_{it-1} + \alpha_2 scale_{it} + \alpha_j cont_{it} + \varepsilon_{it} \tag{3}$$

In these three formulas, *tr* denotes the Urban-rural income gap, and *cont* denotes the control variables, which are the level of economic development, the level of opening to the outside world, the level of human capital, and the level of urbanization, respectively.

## 4.2. Variable Selection

### 4.2.1. Explained Variable

Urban-rural income gap (*tr*). The Urban-rural disposable income ratio is used to express the Urban-rural income gap.

### 4.2.2. Explanatory Variables

The article explores the influence of fiscal support for agriculture on the Urban-rural income gap from two perspectives: the scale of fiscal support for agriculture (*fie*), measured by the share of expenditure on agriculture, forestry, and water affairs in total fiscal expenditure; pure technical efficiency of fiscal support for agriculture (*vrste*), measured by the pure technical efficiency in DEA measurement results; and scale efficiency of fiscal support for agriculture (*scale*), measured by the scale efficiency in DEA measurement results.

### 4.2.3. Control Variables

The real GDP per capita of each city is used to measure the level of economic development (*gdp*). The proportion of total imports and export of each city to regional GDP is used to measure the level of opening to the outside world (*open*). The number of students enrolled in general higher education institutions in each city as a proportion of the total regional population is used to express the level of human capital (*lev*). The urbanization level is calculated by using the proportion of the urban population in each city to the total regional population (*urb*).

The data used in this paper were obtained from the statistical yearbooks of 27 cities in the Yangtze River Delta. The descriptive statistics of the variables are listed in Table 4.

**Table 4.** Descriptive statistics of variables

variables	mean	Std. dev.	Min	Max	Observations
tr	0.056	0.027	0.010	0.161	324
fie	0.096	0.038	0.030	0.258	324
vrste	0.877	0.129	0.517	1.000	324
scale	0.700	0.257	0.035	1.000	324
gdp	7.390	3.637	1.191	19.318	324
open	0.431	0.367	0.039	2.207	324
lev	2.377	2.135	0.133	10.327	324
urb	0.624	0.108	0.351	0.896	324

## 5. The Empirical Analysis of Fiscal Support for Agriculture to Narrow the Urban-rural Income Gap

### 5.1. Empirical Analysis

The article chooses the two-step system GMM method to estimate the model. The empirical results are listed in Table 5, model (1) - (3) is the regression result of Equation (1) - (3) respectively. From the empirical results, the scale, pure technical efficiency, and scale efficiency of fiscal support for agriculture are significantly negative at the significance level of 1%, which indicates that the scale of fiscal support to agriculture, pure technical efficiency and scale efficiency can all bring out the convergence effect of fiscal spending on the Urban-rural income gap. In addition, the coefficient values of the scale, pure technical efficiency, and scale efficiency of fiscal support to agriculture are -0.3703, -0.013, and -0.0055 respectively. The smallest coefficient value of the scale of fiscal support for agriculture indicates that increasing the scale of this expenditure contributes more to the reduction of the Urban-rural income gap. Among the control variables, The level of economic development plays a converging role in the Urban-rural income gap, showing that the more the economy develops, the more it focuses on the promotion of common prosperity. The level of opening to the outside world also has a regressive effect on the Urban-rural income gap, which indicates that the higher the level of openness, the better the rural development, and the higher the income of farmers. The level of human capital can exacerbate the problem of income inequality between rural and urban areas. Although human capital is enhanced, most of it flows to urban areas, bringing more benefits to cities than to rural areas. The level of urbanization can significantly alleviate the problem of Urban-rural income inequality. The increase of urbanization implies the effective transfer of surplus rural labor, which helps to reduce Urban-rural income inequality.

**Table 5.** Empirical results

variables	model (1)	model (2)	model (3)
l.tr	0.7516*** (0.007)	0.6522*** (0.007)	0.8329*** (0.008)
fie	-0.0373*** (0.005)		
vrste		-0.0130*** (0.001)	
scale			-0.0055*** (0.001)
gdp	-0.0006*** (0.000)	-0.0005*** (0.000)	-0.0001*** (0.000)
open	-0.0015*** (0.001)	-0.0014** (0.001)	-0.0026*** (0.000)
lev	0.0003*** (0.000)	0.0005*** (0.000)	0.0006*** (0.000)
urb	-0.0296*** (0.004)	-0.0388*** (0.007)	-0.0312*** (0.004)
cont	0.0381*** (0.003)	0.0563*** (0.004)	0.0312*** (0.002)
AR(1)	0.122	0.132	0.121
AR(2)	0.274	0.286	0.252
Hansen test value	0.683	0.420	0.164

## 5.2. Regional Heterogeneity Analysis

**Table 6.** Regional heterogeneity results

variables	economically developed areas			economically underdeveloped areas		
	model (4)	model(5)	model(6)	model(7)	model(8)	model(9)
l.tr	0.7635*** (0.019)	0.4108*** (0.007)	0.6904*** (0.036)	0.6079*** (0.194)	0.7182*** (0.110)	0.5999*** (0.119)
fie	-0.0327*** (0.008)			-0.0672*** (0.020)		
vrste		-0.0162*** (0.004)			-0.0194 (0.013)	
scale			-0.0108*** (0.004)			-0.0124* (0.007)
gdp	-0.0001** (0.000)	-0.0009*** (0.000)	-0.0005*** (0.000)	-0.0020* (0.001)	-0.0012* (0.001)	-0.0016** (0.001)
open	-0.0004 (0.001)	-0.0032* (0.002)	-0.0057*** (0.002)	0.0115* (0.007)	0.0057 (0.006)	0.0084* (0.005)
lev	0.0004*** (0.000)	0.0005** (0.000)	0.0005*** (0.000)	0.0015* (0.001)	0.0011** (0.000)	0.0028*** (0.001)
urb	-0.0253*** (0.008)	-0.0323*** (0.006)	-0.0210*** (0.007)	-0.0991* (0.053)	-0.0426* (0.022)	-0.1110*** (0.039)
cont	0.0286*** (0.005)	0.0703*** (0.005)	0.0391*** (0.006)	0.0947** (0.043)	0.0606*** (0.023)	0.1016*** (0.030)
AR (1)	0.263	0.269	0.272	0.056	0.022	0.059
AR (2)	0.300	0.287	0.289	0.801	0.896	0.682
Hansen test value	0.717	0.340	0.598	0.542	0.872	0.243

The empirical results of regional heterogeneity are shown in Table 6. Models (4)-(6) are the results of regressing equations (1)-(3) separately for economically developed regions as the study subjects, and models (7)-(9) are the results of regressing equations (1)-(3) separately for economically less developed regions as the study subjects. In terms of the scale of fiscal support for agriculture, the impact coefficients of both economically developed areas and economically underdeveloped areas are significant at -0.0327 and -0.0672, respectively. In contrast, increasing the scale of fiscal support for agriculture has a more pronounced effect on reducing the Urban-rural income gap in economically underdeveloped areas. Combined with the previous analysis, it is found that the economically underdeveloped areas have a comparatively higher proportion of fiscal support for agriculture and also pay more attention to the development of agriculture, so increasing the scale of this expenditure in the economically underdeveloped areas is more useful to shrink the Urban-rural income gap. In terms of pure technical efficiency, the pure technical efficiency of fiscal support for agriculture in economically developed areas has a more evident impact on the Urban-rural income gap, while the pure technical efficiency of fiscal support for agriculture in economically underdeveloped areas has no significant influence on the Urban-rural income gap. This suggests that improving the management efficiency of fiscal support for agriculture in economically developed areas is beneficial to reducing the Urban-rural income gap. although the proportion of fiscal support for agriculture in economically underdeveloped areas is relatively high, the level of production technology and capital management is relatively backward, so the investment of fiscal support for agriculture has not achieved ideal results. In terms of scale efficiency, the effect of scale efficiency of fiscal support for agriculture in economically developed areas and economically

underdeveloped areas has an important impact on the Urban-rural income gap, with coefficients of -0.0108 and -0.0124, respectively. In contrast, improving the scale and efficiency of fiscal support for agriculture has a more obvious effect on reducing the Urban-rural income gap in economically underdeveloped areas. Combined with the previous analysis, it can be seen that the mean value of the scale efficiency of fiscal support for agriculture in economically underdeveloped areas is higher, indicating that the scale of fiscal support for agriculture in economically underdeveloped areas is relatively large, and the scale of expenditure reaches the optimal state.

## **6. Research Conclusions and Policy Recommendations**

### **6.1. Research Conclusions**

From the perspective of the Yangtze River Delta as a whole, improving the scale and efficiency of fiscal support for agriculture is contributive to shrinking the Urban-rural income gap. From the results of regional heterogeneity, improving the scale and scale efficiency of fiscal support for agriculture in both economically developed areas and economically underdeveloped areas can reduce the Urban-rural income gap, but improving pure technical efficiency can only powerfully reduce the Urban-rural income gap in economically developed areas.

### **6.2. Recommendations**

First, the government needs to increase the scale of fiscal support for agriculture and improve the level of fund management. From the previous analysis, we can see that the increase in the scale of fiscal support for agriculture can alleviate the problem of Urban-rural income inequality. Therefore, local governments should ensure that fiscal funds are constantly tilted toward supporting agriculture, and guarantee the improvement of rural economic development levels and farmers' income levels by increasing the scale of fiscal support for agriculture. At the same time, relevant departments should clarify their respective responsibilities, reasonably arrange the amount and scope of fiscal support for agriculture according to the actual situation, and establish a fund management system of fiscal support for agriculture.

Second, the government should perfect the performance evaluation mechanism of fiscal support for agriculture. Local governments should strengthen the performance management of fiscal agricultural expenditure, and establish a complete set of fiscal agricultural expenditure efficiency index systems to help them timely find the problems existing in the use of fiscal agricultural funds, to gradually improve the quality of work. In addition, it is essential to continue to improve the performance appraisal system of governments, incorporate the performance evaluation results of fiscal support for agriculture into the government performance appraisal system, and guide local governments to give more consideration to improving the efficiency of capital use of fiscal support for agriculture.

Third, the government should improve the supervision system of fiscal support for agriculture. The whole process of the use of fiscal support for agriculture is fully disclosed, for example, the expenditure items such as agricultural technology development funds, rural development funds, and special subsidies for farmers are fully disclosed to the public according to the division of categories, application criteria, application amounts and application results. At the same time, it can ensure the transparent management of the fiscal expenditure funds for agriculture in the form of legislation, strengthen the supervision of the use of fiscal funds for agriculture by all sectors of society.



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