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# The Influence of Urbanization Development on Farmers' Income Growth in Wuhan City

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**Abstract** Over the past three decades, with the development of urbanization in Wuhan, farmers' income has been substantially increased in Wuhan City, and urbanization has played an important role in farmers' income growth. By the empirical analysis of the data related to the level of urbanization development and farmers' income in Wuhan City during 1993–2013, this paper finds that there is a long-term stable equilibrium relationship between urbanization development and farmers' income growth in Wuhan City, and urbanization development has become an important driving force for farmers' income growth. Finally, this paper puts forth some policy recommendations for promoting farmers' income by urbanization development in Wuhan City on the basis of empirical analysis.

**Key words** Urbanization, Farmers' income growth, Empirical analysis

## 1 Introduction

The Third Plenary Session of the 18th Central Committee of the Chinese Communist Party proposed adhering to the road of new urbanization with Chinese characteristics and promoting people-centered urbanization. In the next 10 years, or even 20 years, urbanization will be the most important task and engine for China during the construction of a moderately prosperous society and realization of modernization. This historic process will make hundreds of millions of people move from rural to urban areas, which will undoubtedly lead to profound changes in China's economy and society. Farmers are the "protagonist" in urbanization, and their income growth will also usher in a more significant historical opportunity. In terms of urbanization development and farmers' income growth, Wuhan City has made important achievements since the reform and opening up, but it is relatively slow from the level or growth rate, and Wuhan is gradually lagging behind the first-tier cities. Therefore, Wuhan must firmly seize the opportunity of urbanization promoted by the state and effectively develop urbanization to increase farmers' income. Through the statistical data on urbanization and farmers' income in Wuhan City during 1993–2013, we perform the relevant econometric analysis to study the mechanism of urbanization promoting farmers' income growth in Wuhan City, analyze the problems in current urbanization development, and finally set forth some policy recommendations.

## 2 Empirical analysis of the influence of urbanization development on farmers' income growth in Wuhan City

**2.1 Current situation** Wuhan City has jurisdiction over 7 central districts (Jiang'an District, Jianghan District, Qiaokou

District, Hanyang District, Wuchang District, Qingshan District, and Hongshan District) and 6 districts far from urban areas (Dongxihu District, Hannan District, Caidian District, Jiangxia District, Huangpi District, and Xinzhou District). In recent years, with rapid economic development and urbanization, farmers' income in Wuhan City has been significantly increased. As can be seen from Table 1, over the past two decades, Wuhan's urbanization rate has been rapidly increased, from 55.96% in 1993 to 67.59% in 2013. Over the same period, per capita net income of farmers in Wuhan has also achieved rapid development. In 1993, the farmers' per capita net income in the city was only 1015 yuan, but it soared to 12367.18 yuan in 2013. From the farmers' income structure, the family operating income has long held a dominant position. It was 10481 yuan in 2013 (accounting for 8.13%). It is followed by wage income, which was 5852.48 yuan in 2013 (accounting for 32.46%). The unproductive income is lowest, which was 1697.06 yuan in 2013 (accounting for 9.41%). As can be seen from Fig. 1, farmers' income grows in pace with urbanization in Wuhan City. Meanwhile, the correlation coefficient between the two is 0.948, indicating that there is a significant correlation between the two. To facilitate the demonstration, this paper brings up the following three hypotheses based on the influence of Wuhan's urbanization on farmers' income growth:

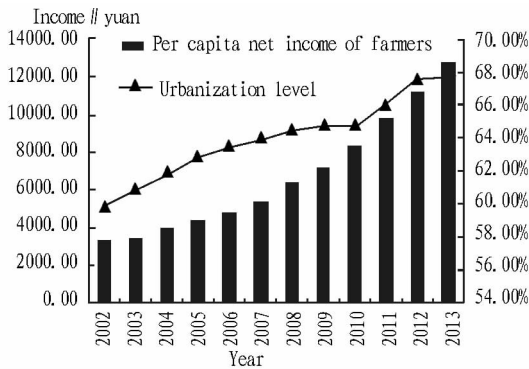
**H<sub>1</sub>:** Farmers' income growth in Wuhan City is closely related to its urbanization development, and urbanization development can significantly increase farmers' income;

**H<sub>2</sub>:** Farmers' income structure in Wuhan City is closely related to its urbanization development, and urbanization development can significantly promote farmers' income structure adjustment;

**H<sub>3</sub>:** Regional differences in farmers' income in Wuhan City are closely related to regional differences in urbanization development, and the level of farmers' income is higher in the regions with higher level of urbanization development.

**Table 1** The level of urbanization development and per capita net income of farmers in Wuhan City during 1993 – 2013

Year	Urbanization rate//%	Per capita net income of farmers//yuan	Year	Urbanization rate//%	Per capita net income of farmers//yuan
1993	55.96	1015.00	2004	61.67	3954.50
1994	56.48	1351.00	2005	62.78	4341.00
1995	57.28	1842.00	2006	63.39	4748.00
1996	58.04	2210.00	2007	63.83	5371.00
1997	58.38	2555.00	2008	64.48	6349.00
1998	58.55	2730.00	2009	64.75	7161.00
1999	58.69	2845.00	2010	64.69	8294.81
2000	58.88	2845.00	2011	66.07	9813.59
2001	59.20	3100.00	2012	67.54	11190.44
2002	59.80	3296.00	2013	67.59	12713.46
2003	60.80	3497.00			

**Fig. 1** The growth trend of farmers' income and urbanization development in Wuhan City during 2002 – 2013

## 2.2 Empirical test

### 2.2.1 Cointegration analysis. In this paper, the proportion of

urban population to total population ( $X$ ) is used to measure the level of urbanization development and per capita net income of farmers ( $Y$ ) is used to measure farmers' income. Data are from *Wuhan Statistical Yearbook* (1993 – 2013), and with 1993 as the base year, the per capita income excludes the price factor. In order to reduce the data fluctuations and heteroscedasticity, the analytical data are under logarithmic processing. (i) We perform the unit root test on data to avoid spurious regression of model. In this paper, we use ADF unit root test method to test the stationarity of time-series data, and the test results are shown in Table 2. From Table 2, it is found that the time series of  $LN Y$  and  $LN X$  are non-stationary series. Only after the first-order and second-order difference can the two series be stationary. Thus, the two series can be determined as integrated of 2, denoted as  $I(2)$ .

**Table 2** ADF unit root test results

Variable	ADF statistic	Critical value			Conclusion
		1%	5%	10%	
$LN Y$	-0.91178	-3.80855	-3.02069	-2.65041	Non-stationary
$\Delta LN Y$	-2.52334	-3.83151	-3.02997	-2.65519	Non-stationary
$\Delta^2 LN Y$	-5.10423	-4.00443	-3.0989	-2.69044	Stationary
$LN X$	2.07697	-3.92035	-3.06559	-2.67346	Non-stationary
$\Delta LN X$	-3.53494	-3.92035	-3.06559	-2.67346	Non-stationary
$\Delta^2 LN X$	-4.33571	-4.00443	-3.0989	-2.69044	Stationary

(ii) We perform the cointegration analysis on data. To further analyze the existence of long-term equilibrium relationship between urbanization and farmers' income in Wuhan City, now we perform cointegration analysis on the two variables.  $LN Y - I(2)$  and  $LN X - I(2)$  meet the cointegration test premise, so the Engle-Granger two-step method can be used to test the cointegration relationship between the two variables.

The first step; by estimating the regression equation of  $LN Y$  to  $LN X$ , we get the cointegration regression model:

$$LN Y_t = \beta_0 + \beta_1 LN X_t + \varepsilon_t$$

Through the OLS estimation based on the data during 1993 – 2013, we get the cointegration regression model:

$$LN Y_t = 13.8535 + 11.4788 LN X_t \quad (1)$$

where  $R^2 = 0.9469$ ;  $F$ -statistic = 338.7315;  $DW = 0.3625$ .

By calculating the residuals of OLS estimates, we get the series:

$$LN Y_t - 13.8535 - 11.4788 LN X_t$$

The second step; by testing the residuals of above model, we determine whether it is stationary series, namely testing whether  $\varepsilon$  is stationary series. The ADF test results are shown in Table 3. According to the ADF test results of residuals of cointegration model estimates, it is found that there is a cointegration relationship between  $LN Y$  and  $LN X$ , and  $(1, -11.4788)$  is the cointegration vector. According to the Engle-Granger two-step method,

the cointegration regression equation not only reveals the influence of urbanization development on farmers' income in Wuhan City, but also indicates that there is a long-term equilibrium relationship between them. From equation (1), it can be seen that for each additional unit of urbanization level in Wuhan City, farmers' income will increase by 11.4788 units, and urbanization construction has become a major force for farmers to cast off poverty and become better off.

Table 3 ADF test results of residuals

Variable	ADF statistic	Critical value			Conclusion
		1%	5%	10%	
	-3.46351	-2.71751	-1.96442	-1.6056	Stationary

(iii) We perform Granger causality test on the equilibrium relationship. According to the above cointegration test results, it is found that there is a long-term equilibrium relationship between urbanization development and farmers' income in Wuhan City, but whether this equilibrium relationship is causal relationship requires further verification. Test results are shown in Table 4. As can be seen from Table 4, there is an one-way causality between the level of urbanization development and farmers' income in Wuhan City, that is, the level of urbanization development has effectively increased farmers' income, but farmers' income growth is not necessarily the reason for enhancement of urbanization level.

Table 4 Granger causality test results

Causality hypothesis	Lag	F statistic	P value	Conclusion
LNX does not Granger cause LNY	2	7.5868	0.0059	Rejected
LNY does not Granger cause LNX		0.3396	0.7177	Not rejected

**2.2.2 Grey relational analysis.** From the changes in urbanization development and farmers' income structure in Wuhan City, with the advancement of urbanization development, farmers' income structure in Wuhan City has showed remarkable changes. As can be seen from Fig. 2, the proportion of wage income closely associated with urbanization development and unproductive income is gradually increasing, while the proportion of family operating income is steadily declining. According to the above premise, the urbanization development in Wuhan City has promoted the changes in farmers' income structure to some extent. From the average annual growth rate of farmers' income, the growth rate of unproductive income (19.98%) was highest during 2003–2013, followed by wage income (17.48%), and family operating income (11.28%). This shows that over a decade, farmers' income in Wuhan City is more dependent on non-farm income, property income and transfer income. To further analyze the relationship between urbanization development and farmers' income structure, this paper uses grey relational analysis to analyze the correlation between the level of urbanization development and farmers' income (including wage income, family operating income and unproductive income) in Wuhan City. As can be seen from Table 5, the correlation coefficient of farmers' income indicators is positive, in-

dicating that the urbanization development has a positive impact on farmers' income growth in Wuhan City. There is highest correlation between family operating income and urbanization rate in Wuhan City, followed by wage income. This shows that the urbanization development in Wuhan City has significantly improved the family operating income and also greatly increased wage income. However, the quality of urbanization development is low, making it difficult to provide more jobs and wage incomes for farmers.

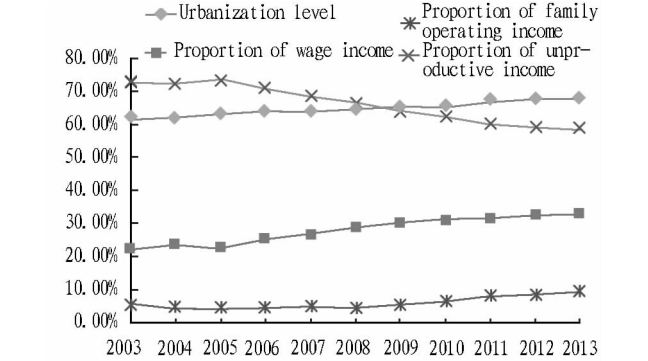
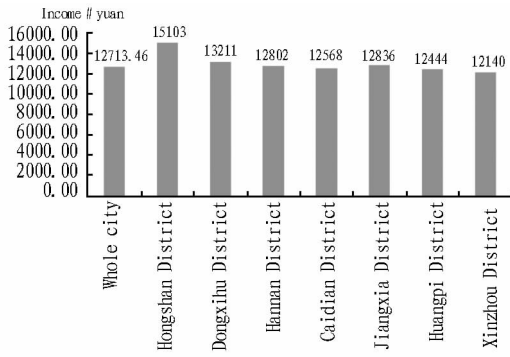


Fig. 2 The changes in the proportion of various sources of farmers' income and urbanization development

Table 5 The degree of correlation between various sources of farmers' income and urbanization rate during 2002–2013

Source of income	Wage income	Family operating income	Unproductive income
Degree of correlation	0.6177	0.7331	0.5647

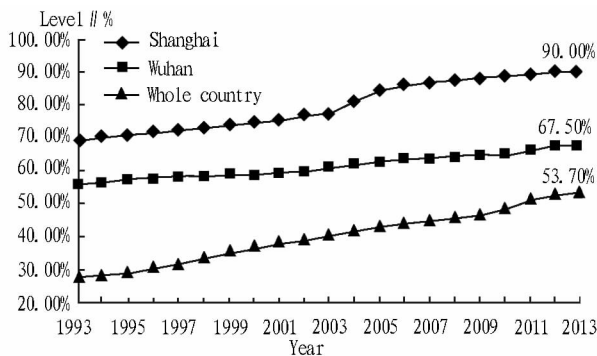
**2.2.3 Regional differences.** As can be seen from Fig. 3, the farmers' income in the central district of Wuhan City (Hongshan District) is much higher than in the districts far from urban areas. The per capita net income of farmers in the whole city is 18030.54 yuan, and the average per capita net income of farmers in the districts far from urban areas is 2666.83 yuan. We can calculate the average per capita net income of farmers in the districts of Wuhan City at 23394.25 yuan. In the same period, the number of rural residents in central districts of Wuhan City accounts for only 1% of the total urban population, so it is obvious that there is a large gap of farmers' income between central districts and the districts far from urban areas. Meanwhile, through the analysis of the urbanization level in 2013 and the average urbanization level during 2009–2013 in various districts of Wuhan City (Table 6), we can see that there are great differences in the level of urbanization development between central districts and the districts far from urban areas. In 2013, the total population of the central districts reached 4757800, accounting for 57.88% of total urban population; the urbanization level of each central district was over 90%, and the average urbanization level reached 98.10%. The total population of the districts far from urban areas reached 3482700, accounting for 42.37% of total urban population, but the urbanization level of each district was lower than 50%, and the average urbanization level was only 25.11%. The urbanization level of central district (with the highest urbanization level) is 2.8 times as high as that



**Fig. 3** The per capita net income of farmers in the whole city of Wuhan and various districts in 2013

**Table 6** The level of urbanization development in the whole city of Wuhan and various districts in 2013

Urban area/indicators		Total population 10 <sup>4</sup>	Urbanization rate // %	Average level in recent five years // %
Whole city		822.05	67.59	66.13
Central districts	Overall situation	475.78	98.10	96.24
	Jiang'an District	72.02	97.00	98.41
	Jiangnan District	48.56	100.00	99.87
	Qiaokou District	52.87	99.00	98.86
	Hanyang District	56.72	99.51	97.13
	Wuchang District	108.64	99.94	99.07
	Qingshan District	44.24	98.44	98.36
	Hongshan District	92.73	94.28	86.39
The districts far from urban areas	Overall situation	348.27	25.51	25.11
	Dongxihu District	27.64	33.14	32.08
	Hannan District	11.16	27.06	25.99
	Caidian District	44.91	28.86	27.98
	Jiangxia District	58.36	36.07	36.49
	Huangpi District	111.25	18.89	18.33
	Xinzhou District	94.95	22.79	22.57

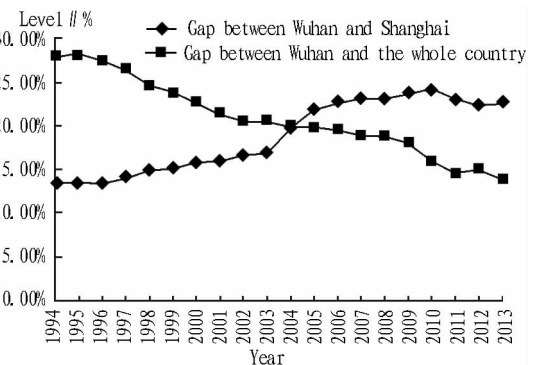


**Fig. 4** The level of urbanization development in Wuhan City, Shanghai City and the whole country during 1993–2013

## 2.3 Problems

**2.3.1** Sluggish development of urbanization in Wuhan City. As can be seen from Fig. 4, the growth rate of urbanization in Wuhan City is relatively slow. During 1993–2013, Wuhan's urbanization

of the districts far from urban areas (with the highest urbanization level), indicating that there are great differences in the urbanization level between central districts and the districts far from urban areas in Wuhan City, and the urbanization level in the districts far from urban areas is still in its infancy. According to Fig. 3, Table 6 and the above cointegration analysis conclusions of urbanization development and farmers' income, it is found that an important reason for low income of farmers in the districts far from urban areas lies in its sluggish urbanization development. Therefore, it can be inferred that the regional differences in urbanization level are closely related to the regional differences in farmers' income in Wuhan City.



**Fig. 5** Comparison of urbanization level between Wuhan and Shanghai or the whole country during 1994–2013

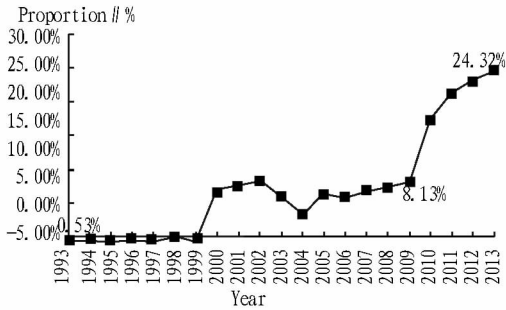
rate increased by only 11.63%, with the average annual growth rate of 0.99 percentage points. In the same period, Shanghai's urbanization rate increased by 21%, with the average annual growth

rate of 1.45% ; China's urbanization rate increased by 25.71% , with the average annual growth rate of 4.37% . At the same time, compared with Japan and South Korea with the annual average urbanization growth rate of 1.5 – 2% in the process of rapid economic development, Wuhan's urbanization development lags far behind. Fig. 5 shows that there is a growing gap in the level of urbanization between Wuhan City and Shanghai City, while there is a shrinking gap between Wuhan City and the whole country. It can be seen that the urbanization development in Wuhan City is still relatively lagging behind.

**Table 7    The changes in the proportion of various sources of income of farmers in Wuhan and Shanghai during 2002 – 2013**

Year	Wuhan City			Shanghai City		
	Proportion of wage income//%	Proportion of family operating income//%	Proportion of unproductive income//%	Proportion of wage income//%	Proportion of family operating income//%	Proportion of unproductive income//%
2002	22.30	72.18	5.52	79.20	12.50	8.30
2003	22.35	72.10	5.56	79.40	12.20	8.40
2004	23.60	72.09	4.32	78.50	12.10	9.40
2005	22.63	73.11	4.25	76.30	9.70	14.00
2006	24.95	70.43	4.62	74.80	8.30	16.90
2007	26.87	68.38	4.74	73.30	7.40	19.30
2008	28.68	66.27	5.05	71.90	6.20	21.90
2009	30.31	63.95	5.74	70.80	4.80	24.40
2010	31.43	61.93	6.64	69.90	4.30	25.80
2011	31.71	60.14	8.16	67.10	5.60	27.30
2012	32.49	58.63	8.88	66.10	5.20	28.70
2013	32.46	58.13	9.41	64.40	4.80	30.80

**2.3.3    Low quality of urbanization development in Wuhan City.** From the change in the proportion of permanent population without residence booklet to permanent population of residence booklet in Wuhan City during 1993 – 2013 ( Fig. 6 ) , it can be found that the permanent population from 2002 started to exceed the population of residence booklet, and presented a rising trend. In 2013, the non-permanent population reached nearly two million, its share was close to 25% , and its size showed no downward trend. This shows that the attractiveness of Wuhan City is rising, but the permanent population has not been changed into the population of residence booklet, and the quality of urbanization in Wuhan City needs to be improved significantly.



**Fig.6    The proportion of permanent population without residence booklet to permanent population of residence booklet in Wuhan City during 1993 – 2013**

**3    Conclusions and policy recommendations**

**3.1    Conclusions** There is a long-term equilibrium relationship

**2.3.2    Low level of urbanization development in Wuhan City.** Through the comparative analysis of farmers' income structure in Wuhan and Shanghai ( Table 7 ) , we see that the change in farmers' income structure in Wuhan lags behind. Farmers' income structure in Shanghai was changed from 10 years ago: wage income became dominant, followed by transfer income and property income, and the proportion of family operating income dropped to less than 5% . This fully shows that the urbanization of Shanghai is fully developed, while the urbanization of Wuhan has just begun.

between urbanization and farmers' income in Wuhan City, and urbanization development is an important reason for farmers' income growth. For each additional unit of urbanization level in Wuhan City, farmers' income will increase by 11.4788 units, and urbanization construction has become a major force for farmers to cast off poverty and become better off. Farmers' income growth in Wuhan City is closely related to its urbanization development, and urbanization development can significantly promote farmers' income structure adjustment. And urbanization development has a more significant impact on farmers' family operating income, followed by wage income. Regional differences in farmers' income in Wuhan City are closely related to regional differences in urbanization development, and the level of farmers' income is higher in the districts with higher level of urbanization development. The urbanization development of Wuhan City lags behind that of the developed regions, and its development quality needs to be improved, which will have a direct impact on the enhancement of farmers' income level and transformation of farmers' income structure.

**3.2    Recommendations**

**3.2.1    Continuing to accelerate the development of urbanization.** It is necessary to accelerate the urbanization of floating permanent urban population, and gradually raise the level of urban construction, to effectively meet the demand for employment and basic necessities arising from urbanization development, and provide a broader space for population transferred from agriculture. At the same time, it is necessary to pay more attention to the quality of urbanization, such as the reform of the household registration system and improvement of social security system. The development

cial character, group endeavoring, regarding the talents as fortune of company but not too yielding to talents, developing the core technology system cooperatively and creatively based on self-contained, broadcasting innovation and professionalism, holding enthusiasm to country, people, business and life, not letting fine employees lost, forming the interest community between customers, employees and cooperator ". Because of recording culture in the law, Huawei enhance its core-competitiveness by continuous innovation and development. Chinese agriculture enterprises should not copy the constructing experience in advanced non-agriculture enterprises. Namely, we should create more value for customers and more self-developing chance for employees and higher profits for society. In this way, employees in agriculture enterprises will manage the fortune of the company like in their homes, treat their work as their own life. This will contribute to forming strong and perpetual developing power and updating it in time in Chinese agriculture enterprises.

#### 4 Conclusions

Japanese culture is featured by its group-first team spirit, emphasizing interpersonal relationship, absorbing advanced foreign culture and strong rational spirit and some outward manifestations, such as "lifetime employment, annual merits, decision making on

(From page 89)

of urbanization can well absorb rural surplus labor force, and the improvement of social security system can better make farmers shift into the urban population, thus contributing to increasing farmers' income.

**3.2.2** Expanding channels for farmers' income growth. It is necessary to focus on promoting farmers' wage income and property income growth, actively develop vocational education in rural areas, and increase technical training for farmers, in order to improve the employability of farmers and increase the wage income of farmers; improve the rural land property rights system, and promote the reasonable and lawful rural land transfer, in order to increase farmers' property income.

**3.2.3** Expanding the employment effects of urbanization development. It is necessary to actively formulate the fiscal and monetary policy that can promote the development of labor-intensive industries; increase investment in human capital, and vigorously develop urban and rural vocational education and training; increase investment in higher education and achieve the urbanization of rural youth population through higher education; increase policy support to help the migrant workers to return home to start up an undertaking.

**3.2.4** Effectively protecting the interests of farmers during urbanization. It is necessary to continue to improve urban and rural residents' income distribution system, increase support and protection for agriculture, and establish a sound and effective farmers' interests protection mechanism to promote urbanization

application, cooperative management. " The cultural construction in agricultural enterprise in China isn't so optimistic especially compared with developed countries. In 2015, as the Party Central Committee in China put forward strategy of building a moderately prosperous society in all aspects, it is necessary for Chinese agricultural enterprise gain implications for cultural construction by studying Japanese culture. Chinese agriculture enterprise should imitate the quintessence of Japanese culture " establishing coincident value concept, absorbing advanced culture wildly " to improve the employees' recognition. Advanced enterprise culture constructing experience, such as " exhibiting character and public image by culture, influencing belief and objective " enhancing core-competitiveness and forming strong and perpetual developing and innovating power for Chinese agriculture enterprises.

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and farmers' income growth; try to avoid the negative impact arising from " polarization effects " and " enclosure movement " in the process of urbanization development.

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