

Can Rural E-Commerce Become the Adhesive Between Urban and Rural Areas in the Digital Age?

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ABSTRACT

The most difficult job still rests in rural areas: promoting rural regeneration extensively and building a socialist modernized nation. The development of rural and agricultural regions must be given priority in the future, in addition to facilitating the transfer of urban and rural components and integrating urban and rural development. The Taobao village and Theil index provincial panel data from 31 Chinese provinces between 2014 and 2022 as the foundation for our investigation. Using a fixed effects model and multiple linear regression approach, the effects of expanding rural e-commerce on the income gap between urban and rural regions and the return of the rural population are explored. The findings demonstrate that e-commerce in rural areas expanding may raise the return on investment for rural populations while also reducing the difference in income between those living in cities and rural areas. Nonetheless, there remains a considerable disparity in wealth between the countryside and the cities in several of our nation's provinces, and these inequalities vary greatly from year to year. The level of development of rural e-commerce varies significantly between different locations, with the general level of development falling between moderate and poor.

KEYWORDS

Rural e-commerce; Urban-rural integration; Rural population return; Rural revitalization

1. INTRODUCTION

Rural e-commerce, as an indispensable part of the digital economy, not only injects new vitality and potential into rural industries, but also becomes a key force in promoting the construction of digital countryside. The digital economy is a new economic paradigm that has its roots in the leading edge of information and communication technology. It is distinguished by its ability to transcend time and space, operate with efficiency, and use minimal amounts of resources. A comprehensive plan for rural e-commerce demonstration and promotion has been implemented at the national level from 2014. This multipronged approach seeks to develop and enhance e-commerce service stations at the village level, optimize and construct a complete service platform network for e-commerce at the county level, and build an effective and seamless logistics distribution network system. The plan also focuses on supporting the cultivation and development of online agricultural product brands, conducting entrepreneurship education and skills training projects in the e-commerce industry, strengthening monitoring and guarantee measures for agricultural product quality. The research by Yang Liu and Mi Zhou shows that: Urban citizens are better able to share the growth of rural e-commerce than are rural residents, which contributes to the widening of the income gap between urban and rural areas. Second, working-class people's return to the countryside and the migration of rural families who have benefited from e-commerce to cities are two elements that are making the wealth gap between urban

and rural areas wider. [1] Taobao Village, as a new economic model, has proven to be highly advantageous in fostering rural economic growth, enhancing rural government, and fostering social interactions. Taking "China Taobao Village" in Daji Town, Cao County as an example, 200000 individuals have started enterprises and found jobs thanks to e-commerce, including 50,000 homegrown company owners. [2] Through e-commerce platforms, farmers can open online stores, engage in e-commerce logistics and services, and achieve employment and entrepreneurship at their doorstep, thereby solving the problem of surplus rural labor and improving farmers' income levels and quality of life. Furthermore, the digital economy not only speeds up the process of modernizing rural infrastructure, but it also greatly improves the standard of living for rural populations and encourages population growth.

Consequently, thorough investigation into the efficiency and role of rural e-commerce in closing the economic gap between urban and rural areas, encouraging talent migration to rural regions, and fostering rural economic rejuvenation, as well as exploring its potential growth potential and value, is of great strategic significance for continuously promoting the stable development of rural e-commerce in the wave of digital economy. This can not only provide guidance for the in-depth development of the e-commerce industry in rural areas in the future, but also contribute to the comprehensive revitalization of rural areas.

2. LITERATURE REVIEW

2.1. Investigation of How E-Commerce Affects The Disparity in Wealth Between Urban and Rural Populations

Yin Zhichao and Wu Zishuo (2017) utilized data from the Chinese Household Finance Survey to explore e-commerce's place in rural household consumption inequality. Studies have indicated that the consumption gap between rural families can be considerably reduced by e-commerce to rural regions, especially for those with low income, middle-aged and elderly, low educational level, and low social capital. [3] Zhang Lei and Han Leiyan (2023) believe that the role of e-commerce in narrowing the income gap between urban and rural residents is not significant. E-commerce, as a cutting-edge business model, has the potential to greatly increase people's involvement in economic activities, which will positively and significantly affect people's income status and raise it for both urban and rural populations. But it has not brought about a narrowing of the income gap between urban and rural residents in China. [4] Guo Junjun and Ye Ying (2023) believe that e-commerce can promote innovation and industrial structure upgrading to increase the overall income level and wealth of residents. However, it may also contribute to the growing wealth disparity between urban and rural populations. [5] Fang Shile et al. (2024) believe that rural e-commerce, while promoting the overall income level of farmers, will also lead to the widening of differences between high-income and low-income farmers in non-agricultural entrepreneurship, agricultural entrepreneurship, and planting structure, thereby widening the income gap within rural areas. [6] While researching how important e-commerce is to the rural economy. Songster (2022) examined how e-commerce may support rural development, including its positive role in promoting agricultural product sales, increasing farmers' income, and providing employment opportunities. [7] Chen Yi and Tao Xiaoying (2023) studied how e-commerce can help Chinese households alleviate multidimensional relative poverty by increasing income through online sales. [8] Wei Xiaohai, Zeng Chenyu, Yu Lingzheng et al. (2024) believe that rural e-commerce can significantly alleviate relative poverty among low-income farmers by increasing their comprehensive income, expanding rural employment, and increasing the number of part-time jobs [9].

2.2. The Relationship Between Rural Population and Rural Economy

Zhou Junhua and Zhang Ruihao (2024) found that the implementation of rural land transfer policies under the background of rural revitalization has promoted the intensive management of rural land, which in turn promotes the development of agricultural industrialization. The steady development of the agricultural industry and the growth of economic effects continue to increase the demand for employment in industrial clusters, thereby attracting surplus rural labor to flow to these clusters, forming a phenomenon of rural population "township township" mobility. [10] Zou Likai, Liang Qiang, and Song Lihong (2024) used China's Taobao Village as an example to study the process of rural e-commerce entrepreneurship's rise as seen through the lens of the entrepreneurial ecosystem. They discovered that many villagers have opportunity to engage in e-commerce due to the low barrier of e-commerce platforms, and that the social influence of friends in rural regions prompts and encourages additional villagers to swiftly mimic [11].

3. THEORETICAL BASIS AND HYPOTHESIS

From an internal perspective, e-commerce plays an undeniable role in enhancing farmers' sense of identity. In the past, one of the common reasons for migrant workers to go out for work was limited employment opportunities in rural areas, low salary levels, and outdated living environments and infrastructure. As e-commerce has grown in popularity and depth in rural regions, it has created more employment opportunities, optimized the rural industrial structure, and provided a broad platform for online sales for rural residents. For rural migrant workers who find it difficult to integrate into urban work life, returning to their hometowns to start businesses and participating in rural e-commerce construction has become their new choice. For rural college students, the rise of Taobao Village and Taobao Town not only promotes industrial decline and technological development, but also drives the improvement of rural residents' living standards and consumption levels, thereby attracting more industrial industries to enter rural areas and form deep integration with agricultural production.

Based on the above theory, hypothesis one is proposed: The positive development of rural e-commerce can attract the return of rural migrant workers.

The objective of decreasing the urban-rural divide may be accomplished via increasing the income of rural inhabitants and transforming and upgrading the rural economy. These two factors can also promote the expansion of the rural economy. Since 2014, the entire nation has been gradually introducing the full demonstration policy of e-commerce into rural areas. This demonstration program has made it possible to transform excess agricultural labor on-site and has substantially raised farmers' incomes, which has effectively strengthened the rural economy and narrowed the income gap between urban and rural areas. This strategy not only fully utilizes the potential of rural elements, expands investment and development channels in rural regions, and encourages the prosperous growth of the rural economy. [12] E-commerce's introduction into villages and the government's strong backing for it have progressively upgraded rural regions' dilapidated infrastructure, raised their degree of information, and helped to propel the rural economy to close the income gap with metropolitan areas.

Hypothesis 2 is proposed: The income gap between urban and rural people can be reduced in the digital era by improving rural e-commerce growth.

4. EMPIRICAL RESEARCH

4.1. Variable Selection

(1) Dependent variable

Theil index is used to calculate the income difference between urban and rural people (URAG). The calculation method of the Theil index is usually to sort income by size, then calculate the proportion of total income occupied by the top n% of the population, and then calculate the proportion of total population occupied by the top n% of the population. Dividing the two results in the Theil index, this has a range of 0 to 1. The distribution of income is increasingly uneven the higher the value.

Population Return (PR). In order to measure population mobility, the difference between the number of people who went to work this year and last year is chosen. Logarithmic processing is used to remove the influence of dimensionality, and the result is an indicator that is negative—that is, the higher the PR, the lower the population return.

(2) Explanatory variables

Each province's ownership of Taobao villages serves as a gauge for the rate of expansion of rural e-commerce. A company must be situated in a rural region, have an annual e-commerce transaction volume of at least 10 million yuan, have more than 100 active online businesses, or represent more than 10% of the local household population to be classified as a Taobao village. To eliminate the influence of dimensionality, it is logarithmized and denoted as RE.

(3) Control variables

This article draws on previous research and relevant studies to introduce urbanization rate (UR), the Engel coefficient (EC) and the ratio of agricultural spending to fiscal expenditure (IGR) as the model's control variables.

4.2. Model Construction

This study employs multiple linear regression analysis and builds the following model to examine the effects of rural e-commerce on the income gap between urban and rural inhabitants, the disposable income of rural people, and population return:

$$Y_{i,t} = \beta_0 + \beta_1 RE_{i,t} + \gamma \sum \text{control}_{i,t} + \sum \text{Year} + \sum \text{Province} + \varepsilon_{i,t} \quad (1)$$

The degree of development of rural e-commerce in province I in year t is one of them. As the dependent variable, it represents the income gap and population return between urban and rural residents in province i in year t; For the corresponding control variable, for the random interference term.

4.3. Sample Selection and Data Sources

This article selects 31 provinces in China from 2014 to 2022 as the research sample, removes some missing values and outliers, and supplements some missing data using linear interpolation. The relevant data is mainly based on the list of Chinese Taobao villages released by Alibaba Research Institute and the statistical yearbooks of various provinces. In the data analysis and processing process of this article, Excel and Stata data analysis software were mainly used, and a total of 268 data points from 31 cities were obtained.

4.4. Descriptive Statistical Analysis

Table 1. Descriptive Results

Variable Name	Average of Observations	Average value	Standard deviation	Minimum	Median	Maximum
URIG	268	0.081	0.037	0.017	0.075	0.211
PR	268	1.974	2.106	-5.253	2.591	5.704
RE	268	2.248	2.227	0.000	1.609	7.794
UR	268	0.607	0.122	0.258	0.595	0.896
IGR	268	11.466	3.534	4.040	11.475	20.341
EC	268	32.140	1.355	30.000	32.700	34.200

The descriptive data in Table 1 shows that the urban-rural income gap (URI) has an average value of 0.081, a standard deviation of 0.037, and maximum and minimum values of 0.211 and 0.017, respectively. It may be concluded that there is still a considerable economic disparity between urban and rural areas in many Chinese provinces, and that these inequalities vary significantly from year to year. The population return (PR) has a standard deviation of 2.106 and an average value of 1.974. A significant population outflow scenario is shown by the greatest and minimum readings, which are 5.704 and -5.253, respectively, with just a few provinces seeing a population return. The average level of rural e-commerce development (RE), as seen through the lens of explanatory factors, is 2.248, with a standard deviation of 2.227. The minimum and maximum values of 0 and 7.794, respectively, show that the general level of rural e-commerce development is at a fairly low position with significant regional differences in rural e-commerce development levels. The distribution of control variables such as urbanization rate (UR), proportion of agricultural expenditure to fiscal expenditure (IGR), and Engel coefficient (EC) is detailed in Table 1.

4.5. Correlation Analysis

The fundamental presumption of regression analysis must be satisfied before performing any regression analysis, namely that there is no significant collinearity between the explanatory variable and other variables. Strong correlation (usually greater than 99%) between two variables is referred to as collinearity. As a result, one variable may truly describe all of these variables. In addition, the inclusion of these factors will skew the regression analysis. Using correlation analysis on the chosen variables, this article avoids these issues prior to regression. The correlation coefficient analysis's findings are presented in Table 2's correlation coefficient matrix.

Table 2. Correlation Analysis of Main Variables

	URIG	PR	RE	UR	IGR	EC
URIG	1.000					
PR	0.017	1.000				
RE	-0.480***	-0.269***	1.000			
UR	-0.842***	-0.115*	-0.377***	1.000		
IGR	0.655***	-0.075	0.537***	-0.705***	1.000	
EC	-0.012	0.021	0.066	-0.030	-0.077	1.000

According to the correlation coefficient matrix in Table 2, there are no variable combinations with significant coefficients exceeding 0.9. So there is no obvious collinearity among these variables.

Assuming that hypothesis one is correct, Table 2's results show a substantial association between the degree of rural e-commerce development and population return, suggesting that this activity can encourage population return. The degree of rural e-commerce growth and the disparity in wealth

between urban and rural populations are significantly correlated. Both of the hypotheses essentially satisfy the variable selection criteria, therefore hypothesis two is correct.

4.6. Empirical Results Analysis

The regression findings in Table 4's first column show that the negative impact of RE has passed the 5% significance level test, with the matching p-value being less than 0.05. This shows that the income difference between urban and rural populations may close with the growth of rural e-commerce. The expansion of rural e-commerce may boost population return, according to the regression findings in the second column, where the matching p-value is less than 0.01 and indicates that the negative impact of RE has passed the 1% significance threshold test.

Table 3. Results of Benchmark Regression Analysis

	(1)	(2)
	URIG	PR
RE	-0.0027** (-2.46)	-0.3132*** (-3.32)
UR	-0.2817*** (-5.52)	-4.6035** (-2.36)
IGR	0.0005 (0.79)	-0.0465 (-0.64)
EC	0.0093 (1.65)	0.6634 (1.38)
_cons	-0.0747 (-0.34)	-17.5883 (-1.03)
N	268	268
R ²	0.644	
adj. R ²	0.582	
F	37.4012	
Year	YES	YES
Province	YES	YES

Note: The t-values are in parenthesis and show significance at the 1%, 5%, and 10% levels, respectively, for ***, **, and *. (Same below)

4.7. Robustness Test

This article chooses to conduct robustness testing with a lag of one period. Due to the lag of economic effects, this article considers the generation of explanatory variables with a lag of one period. Re regression of RE results is shown in Table 4, and the associated significance agrees with the baseline regression, suggesting that the results of the baseline regression are often reliable.

Table 4. Delayed Phase Processing

	(1)	(2)
	URIG	PR
L.RE	-0.0028**	-0.2909***
	(-2.14)	(-2.74)
UR	-0.3166***	-4.8033**
	(-4.88)	(-2.16)
IGR	0.0006	-0.0571
	(0.82)	(-0.71)
EC	0.0442	1.8241
	(1.19)	(0.61)
_cons	-1.2028	-55.5008
	(-0.95)	(-0.56)
N	236	236
R ²	0.608	
adj. R ²	0.530	
F	30.3778	
Year	YES	YES
Province	YES	YES

5. RESEARCH CONCLUSION

Rural e-commerce offers a dependable way to boost farmers' revenue in the digital era, encourage the return of rural residents, and improve the integration of rural and urban areas. This article uses a fixed effects model and multiple linear regression analysis to examine provincial-level panel data of Taobao villages and Theil index from 31 Chinese provinces between 2014 and 2022. Upon examination, it is evident that while the general state of rural e-commerce growth is quite low, there exist notable variations in the development state of this sector across various geographical areas. Overall notwithstanding, the income difference between urban and rural dwellers has shrunk due to the growing development of rural e-commerce. The growth of rural e-commerce is strongly positively connected with the state of rural population return, which helps to partially offset the negative effects of population outflow on the rural economy.

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