

Rural E-commerce Development and Consumption Upgrading of Rural Residents

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Abstract: The Internet economy and rural e-commerce are undergoing significant transformation, and in this regard, researching how it encourages rural residents to upgrade their consumption has great practical implications for promoting rural rejuvenation and removing the economic cycle's obstruction. Panel data from 31 provinces are gathered for this article between 2011 and 2021. It uses a time-fixed effects model to investigate the connection between rural inhabitants' upgraded consumption and the growth of rural e-commerce. Through three mechanisms—stimulating residents' consumption demand, raising residents' per capita income, and improving the quality of life—rural e-commerce is found to have a considerable beneficial effect on rural residents' consumption upgrading and passes a number of robustness tests. Rural e-commerce development promotes residents' consumption upgrading in the western region most significantly. Rural e-commerce is maintaining a strong development momentum, promoting residents' consumption upgrading, economic transformation, and social change.

Keywords: rural e-commerce, consumption upgrade, time fixed effects, digital financial inclusion.

1. Introduction

After the traditional high-speed economic growth model oriented by investment and export has encountered a bottleneck in the past four decades, it is an inevitable choice for the healthy operation of the economy to look for a brand new economic driving force, which is also an intrinsic requirement for the sustained development of the economy. By 2023, final consumer spending will have contributed 82.5% of economic growth; as the economic structure continues to change, consumption will unavoidably become the primary driver of the economy's high-quality development. To expand consumption and stimulate domestic demand, the most arduous and burdensome task is in the rural areas, which have a large number of low- and middle-income groups, huge consumption potential, and a strong ability to stimulate domestic demand. Therefore, in order to assist rejuvenate the countryside and remove the economic cycle's blockage, it is extremely important to do research on how to increase rural residents' confidence in their consumption, enhance the structure of their consumption, and encourage them to upgrade their consumption.

In the framework of rural revitalization, an increasing number of rural residents are effectively escaping poverty and becoming wealthy through e-commerce thanks to the notable rise in Internet access and the ongoing, methodical growth of the digital economy. The national level also attaches

great importance to e-commerce in rural areas, increasing the deployment of rural e-commerce, in recent years, the grassroots is a large-scale emergence of "e-commerce village", "Taobao village" and several rural e-commerce entity platforms, Pinduoduo, Tiktok have also entered the countryside. The establishment of an e-commerce model provides logistics system layout and live training services. In short, rural e-commerce is maintaining a strong development momentum, promoting rural industrial upgrading, economic transformation, and social change.

E-commerce in the countryside also led to the innovation of rural consumption mode. On supply-side, rural e-commerce integration of various factors of production and resources in rural areas, with the advantage of the Internet to accurately match consumer preferences and demand, cultivate and create a personalized brand of agricultural products network, the use of e-commerce platforms to broaden the sales channels of agricultural products, enhance the intrinsic value of agricultural goods, successfully broaden rural residents' income distribution channels, and raise villagers' income levels to enhance their consumption and lay a solid basis. On consumption side, with the popularization of the Internet rural residents' consumption concepts have been updated, online consumption habits continue to penetrate, rural residents can buy more diversified commodities through the e-commerce platform, including home appliances and furniture and other large-scale commodities, in the trend of residents' consumption to the development and enjoyment of the transition, the e-commerce platform allows rural residents to enjoy a similar shopping experience and convenience of life with urban residents.

Thus, the growth of rural e-commerce will be the main topic of this article to help rural inhabitants play a significant role in encouraging consumer upgrading. The potential novelties and minor additions of this work in comparison to the body of existing literature are as follows: Firstly, the measurement standard of the consumption upgrading index has not yet been unified in the academic world. The degree of consumption upgrading is mainly measured by the two main lines of "goods-services" and "survival, development and enjoyment" consumption, and the population's consumption structure has improved, as seen by the rise in the share of pleasure and development consumption expenses in household consumption expenditures.[1] Du Danqing argues that consumption upgrading encompasses the upgrading of consumption objects, the replacement of consumption patterns, and the alteration of consumption concepts. However, the expansion of the consumption scale is also a valid definition of consumption upgrading. The objective of this paper is to assess the extent of consumption upgrading by considering both the expansion of the consumption scale and the upgrading of the consumption structure at two levels.[2] Furthermore, there is a dearth of empirical evidence concerning the specific mechanism via which the growth of rural e-commerce impacts the enhancement of consumption among rural populations. Wang Chenyuan contends that the progress of rural e-commerce and the upgrading of consumption by rural residents work in tandem.[3] The precise mechanism of influence between the two is still unclear, but this paper will shed light on how the development of rural e-commerce affects upgrading consumption by examining two aspects of rural e-commerce: increasing residents' choices for consumption and supporting their income growth. Third, rural e-commerce is currently experiencing a period of accelerated growth. However, China's research on the extent of rural e-commerce development is still in its infancy. This paper will be combined with the rural digitization index to present a more reasonable and scientific rural e-commerce development measurement index. There is currently no set sound, internationally recognized system for quantitative measurement research on rural e-commerce.

2. Literature Review

Reviewing the existing literature, the definition of the connotation of consumption upgrading has been constantly updated as residents' incomes have gradually increased. Huang Jun and Li Jikai classify the content of consumption into three categories: survival[4], development, and enjoyment,

and see the rise in the share of enjoyment and development in overall consumption spending as an indication of (structural) upgrading in consumption. Tang Qi et al. argued that against the background of the gradual expansion of the middle class and the improvement of the quality of the population[5], urban residents will pay more and more attention to developmental and enjoyment-type consumption, and industries such as medical care, education, culture, and tourism will become the new focus of consumption.

China's rural e-commerce has experienced a rapid development stage, especially in the context of government support and Internet popularization, rural e-commerce has shown explosive growth, for example, "Taobao Village" developed in the basic mode of "farmers + e-commerce platforms + family workshops + modern logistics". The growth of Taobao villages with the basic model of "farmers + e-commerce platform + home workshops + modern logistics" has greatly promoted the integration of backward rural areas into the modern economy.[6] In terms of the development mode, the situation of "industrial products being distributed to rural areas and agricultural products being distributed to urban areas" is presented, and the spatial regional development is unbalanced, and the development path mainly includes the promotion of e-commerce platforms in rural areas and the transformation and upgrading of the original outlets by traditional brick-and-mortar enterprises by utilizing the advantages of their rural outlets and distribution.[7] Regarding development trends, the isolated Taobao villages progressively move toward industrial clusters, while the rural e-commerce industrial agglomeration propels the growth of the region's diverse industries, encourages rural urbanization, and fosters the growth of the rural economy and agriculture.[8]

The academic community acknowledges that rural e-commerce has greatly raised farmers' inclination to consume, raised their earnings, aided in the growth of the rural trade and circulation sector, and produced circumstances that have led to an increase in employment in rural regions.[9] Farmers directly make their living from the sale of agricultural products, therefore the growth of rural e-commerce can support the development of rural infrastructure, increase the number of channels through which agricultural products are sold, and aid in the modernization and transformation of agriculture.[10] It recognizes that agricultural products can move straight to the city and encourages the development of farmers' income by cutting the circulation linkages and transaction costs. The growth of rural e-commerce has the potential to boost farmers' income in various ways as well as encourage entrepreneurship, create new job opportunities, and raise the likelihood of land transfers.[11] Lili Li and Wanhua Zhao contend that the aggregation of the rural e-commerce business greatly encourages rural consumption upgrading when considering the particular mechanism via which rural e-commerce influences consumption upgrading.[12]

3. Mechanism Analysis

There are numerous examples of rural e-commerce in China that have been successful in reviving rural areas and upgrading the consumption of locals by utilizing creative models and tactics. This paper builds on this notion by synthesizing previous research to better develop the theoretical framework of rural e-commerce and encourage the upgrading of rural people's consumption.

First of all, rural e-commerce promotes consumption upgrading by changing the consumption mode and stimulating residents' consumption demand. Considering the demand side level, rural e-commerce has greatly changed the consumption structure of residents, first of all, the emergence of e-commerce platforms has solved the problem of the difficulty of downstream industrial products, and provided rural residents with a wealth of a wide range of goods to choose from, whether it is the same commodities online with more choices, or you can buy the goods that could not be purchased offline in the past, all of which can increase the sense of well-being in life. Secondly, fast logistics and distribution can provide farmers who are far away from cities and inconvenient for shopping with a high-quality consumption experience, which is one of the important ways to directly drive rural

consumption. Finally, rural e-commerce eases the lack of information and asymmetric problems of rural consumers. Before the popularization of e-commerce platforms, information blockage led to constraints on rural consumption, but now consumers can easily compare the goods through the e-commerce platform, choose the most desirable commodities at affordable prices and guaranteed quality, effectively solving the problem of fraud in the commodity trade, and forming a virtuous circle of the rural population's propensity to consume and consumption ability.

Secondly, rural e-commerce promotes consumption upgrading by increasing rural residents' income. From a supply-side perspective, the swift growth of rural e-commerce has increased the reach of agricultural product sales channels and resolved the issue of agricultural product upward mobility. Farmers can directly contact a wider range of markets and consumer groups through the e-commerce platform, reduce intermediate links, reduce the cost of sales, and improve income; live e-commerce, net red with goods, community group purchasing, agricultural travel live broadcasts and other new forms of new modes have emerged, and farmers can build and maintain agricultural brands to enhance the product's market acceptance and consumer trust. Farmers are increasingly using e-commerce to boost the sale of their produce, which helps them combat poverty and boost their revenue. Second, there are a lot of business and job prospects as a result of the growth of rural e-commerce. There are now many roles and occupations available due to the sharp rise in demand for talent in the areas of live sales, e-commerce platform operation and services, logistics and distribution, and agricultural product processing and sales. All things considered, the growth of rural e-commerce not only boosts the sales of agricultural goods but also offers a variety of job options to rural citizens, thereby enhancing both the employment composition and income level of the community.

Lastly, by modernizing consumption concepts and enhancing the consuming environment, rural e-commerce encourages upgrading of consumption. The growth of rural e-commerce is a key component of the strategy for revitalizing rural areas. It enhances network information and logistics facilities, which helps to build the financial and logistics sectors and enhances the rural public service system. The growth of rural e-commerce will unavoidably result in a sharp rise in the demand for credit, transfer payments, and other financial services from rural residents. Since financial support is an integral part of farming's production and operation processes, e-commerce operations can effectively address this issue by introducing Internet tools, particularly digital technology, which can increase farmers' access to digital financial inclusion. In the rural market, for instance, Alipay launched the ant chant for small consumer credit. To a certain extent, it has stimulated consumers' willingness to improve their current consumption level and can benefit the majority of farmers. The development of rural e-commerce promotes the improvement of the logistics system and inclusive finance and provides a wide range of accurate and effective financial services, thus promoting consumption upgrading. Based on this, this paper puts forward the hypothesis

H1: The rise of rural e-commerce significantly boosts the upgrading of consumption among rural populations.

4. Empirical Research Design

4.1. Selection of Indicators

Explained variables: Regarding the indicators of consumption upgrading, the existing studies in the academic world follow the framework analysis of "survival-development-enjoyment", i.e., it is believed that changes in the consumption structure represent consumption upgrading, and by the statistical classification method of China Statistical Yearbook, the consumption expenditures on food, clothing, and housing are categorized as survival-type consumption expenditures, and the rest of the indicators belong to the development-enjoyment-type consumption expenditures. The percentage of expenditures for enjoyment and development is used to calculate the level of consumption upgrading.

In order to measure consumption upgrading from the dimension of consumption scale, taking into account the consumption level and structural characteristics, this paper introduces the indicator of per capita consumption expenditure of rural residents in accordance with the principles of comprehensiveness, comparability, and operability.

The raw data obtained are normalized and the weights of each secondary indicator are determined using the equal-weight method concerning the method of Song Ke et al.[13] The equal weight method is an assignment method that subjectively considers that each index has the same importance as the synthesized index. In the process of synthesizing the total index, the consumption level and the consumption structure also reflect the changes in residents' consumption ability and play the same important role in residents' consumption upgrading, therefore, this paper uses the equal weight method to synthesize the final consumption upgrading index (upgrading) in this process.

Core Explanatory Variables: The development data of Taobao villages and Taobao towns in different regions, released by the Ali Research Institute, has been widely used by academics to assess the development level of rural e-commerce. This article enhances the assessment framework of rural e-commerce by integrating the rural digitization index system from different regions. A fair assessment of the state of progress in rural e-commerce ought to take into account the following factors:

The extent of policy backing for e-commerce in rural areas. determined by the fixed asset investment in software, information technology services, and information transport.

State of development of digital infrastructure in rural areas. The digital environment in agriculture and rural regions is measured by the three sub-indicators of Internet penetration, the number of people with Internet connection, and users of rural broadband access. This is the foundation for the successful development and growth of rural e-commerce.

Rural e-commerce businesses' level. The indicators that can be used to assess the level and extent of rural e-commerce development include the count of Taobao villages, the proportion of enterprises involved in e-commerce, the count of firms engaged in e-commerce trade, and the extent of adoption of e-commerce sales. Improving the caliber of rural digital consumption is also a crucial component of the growth of rural e-commerce.

Degree of rural e-commerce circulation. The proportion of administrative villages that have been connected to the postal service, and the average population served by each postal outlet in rural areas can measure the degree of sophistication of supporting facilities and services when using the e-commerce platform. When the rural logistics and transportation industry and the public service system are constantly upgraded, the consumer consumption experience will be optimized, which is conducive to promoting the further development of rural e-commerce.

To determine the weight of each secondary indicator and calculate the composite indicator score, factor analysis is used to attribute the variables of multiple dimensions to a few unrelated composite factors, determine the indicator weights, and obtain the final score to obtain the indicator rural e-commerce development level (ecommerce).

Control variables: to guarantee the validity of the empirical results, this paper also controls other factors that may affect the consumption upgrade of rural residents, including the following control variables:

The fiscal expenditure on agricultural support (LFEA) is calculated as the proportion of spending on agricultural, forestry, and water affairs out of the overall fiscal expenditure. The Human Capital Level (SIHL) is a measure of the average number of students enrolled in higher education per 100,000 population. Social security, often known as SEI, refers to the total count of individuals, including in urban and rural areas, who are registered and participating in social pension insurance. The GDP per capita (GDP) of each province can serve as a partial indicator of the local economic development

level. Rural Industrial Structure Diversification (RISD) is quantified as the proportion of production from tertiary industries to that of secondary industries in rural areas.

Mediating variables: to test that rural e-commerce development affects rural residents' consumption upgrading through the three mechanisms of stimulating consumer demand, increasing residents' income, and improving the consumption environment, this paper introduces the following three mediating variables.

Total amount of rural consumer products sold at retail. This research chooses the total retail sales of consumer products in rural regions as the mediating variable in the mechanism of generating consumer demand based on the data available.

Level of per capita income in rural areas. This study selects the level of disposable income per capita of rural residents as the mediating variable to investigate the mechanism of rural e-commerce in improving residents' income.

Index of financial development that is inclusive of digital technology. This paper chooses the digital financial inclusion index as the mediating variable to test this mechanism because, according to Yan, Jianjun & Feng, Junyi[14], digital financial inclusion can promote rural residents' subsistence consumption and developmental consumption by promoting the development of the tertiary industry.

4.2. Model setup

$$upgrading_{it} = \alpha_0 + \beta_1 ecommerce_{it} + X'_{it}\varphi + \delta_t + \mu_{it} \quad (1)$$

The subscripts i and t denote province and time, respectively, and the explanatory variable $upgrading_{it}$ is the consumption upgrade measure. $ecommerce_{it}$ is the core explanatory variable of this paper and indicates the level of rural e-commerce development. X'_{it} denotes other control variables that may affect the consumption upgrading of rural residents, and δ_t is the time fixed effect. μ_{it} is the random disturbance term. β_1 is the coefficient of main concern, If the coefficient β_1 is statistically significant and positive, it suggests that a growth in rural e-commerce development can effectively stimulate the consumption upgrade of rural inhabitants. Conversely, if the coefficient is not statistically significant, the conclusion cannot be considered valid.

4.3. Data sources

The Cathay Pacific database was used to gather data for this paper on consumption expenditures of urban and rural residents in each province, as well as the types of consumption expenditure and their structures. The Statistical Report on the Development of the Internet in China, which is released annually, was used to gather data on the rate of Internet penetration and its degree of development, while the China Statistical Yearbook, Local Statistical Yearbook, and City Statistical Yearbook were used to gather data on other control variables. Linear interpolation is utilized to fill in the missing information. The variables' descriptive statistics are displayed in Table 1.

Table 1: Descriptive statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
LFEA	341.000	11.557	3.400	4.110	20.384
SEI	310.000	1,662.902	1,307.793	74.400	5,306.300
SIHL	341.000	2,669.663	835.894	1,082.000	5,613.000
RISD	341.000	1.351	0.722	0.527	5.244
GDP	341.000	55,670.977	28,772.147	16,024.000	187,526.000
upgrading	341.000	0.452	0.147	0.044	0.777
ecommerce	323.000	0.000	0.723	-1.427	3.019

5. Analysis of Empirical Results

5.1. Basic Regression Model

In order to regress the above equation, this study first constructs a fixed-effects model that accounts for province and year effects. It next conducts a preliminary analysis of the influence of the degree of rural e-commerce development on consumption upgrading.

Table 2 displays the regression findings of the baseline model. These include (1) the regression results without the addition of control variables, (2) the regression results with the addition of control variables, (3) the results of the fixed effects model, and (4) the regression findings after time fixed effects are controlled for. Models 1 and 2 demonstrate that the progress of e-commerce in rural areas has a notable and favorable effect on the improvement of consumption among rural inhabitants, with statistical significance at the 1% level. Furthermore, the regression coefficient experiences a little decline when additional control variables are introduced. Upon incorporating time-fixed effects, the regression analysis reveals that the coefficient for rural e-commerce (ecommerce) is 0.022. This suggests that for every 1 unit rise in rural e-commerce development, the index measuring the improvement in rural residents' consumption increases by 0.022 units. This finding is statistically significant at the 5% level. As for the control variables, the level of local financial support for agriculture (LFEA), the level of education of residents (lnsihl). The per capita GDP (lngdp), together with other factors, has a notable and favorable impact on the improvement of rural people' consumption patterns., while the degree of social security (lnsei) and the advanced rural industrial structure (RISD) have a certain inhibitory effect on the consumption upgrade. In conjunction with the earlier theoretical analysis, the growth of rural e-commerce has expanded the product categories accessible to rural residents and reduced transaction costs, allowing them to purchase more abundant commodities at reduced costs and better meet their own material and spiritual needs. This has led to a rise in rural residents' consumption upgrading.

Table 2: Baseline model regression results

	(1) upgrading	(2) upgrading	(3) upgrading	(4) upgrading
ecommerce	0.113*** (13.068)	0.066*** (5.435)	0.046*** (3.817)	0.022** (2.070)
LFEA		0.024*** (13.982)	0.009*** (4.347)	0.012*** (6.642)
lnsei		-0.020*** (-3.029)	0.104*** (2.816)	-0.019*** (-3.588)
lnsihl		0.132*** (5.926)	-0.045 (-1.234)	0.110*** (5.834)
RISD		-0.026*** (-3.191)	0.070*** (4.142)	-0.028*** (-4.194)
lngdp		0.186*** (8.087)	0.295*** (10.620)	0.121*** (6.217)
_cons	0.461*** (73.495)	-2.691*** (-10.381)	-3.300*** (-11.999)	-1.796*** (-7.840)
N	323	323	323	323
Year	No	No	No	Yes
R2	0.347	0.695	0.890	0.807

5.2. Robustness Analysis

To reduce the estimation error, correct the problem of heteroskedasticity that may be caused by the clustering structure of the data, and prevent underestimation of the standard error of the estimate, The clustering robust standard error is employed to enhance the accuracy of estimating the variance of the overall error. This is achieved by partitioning the data into clustered groups and adjusting for the correlation within each group. Consequently, it mitigates the estimation error resulting from heteroskedasticity. The regression coefficients obtained by correcting the panel data using clustering robust standard errors for model (1) in Table 3 are still significant at the 5% level, indicating that for every one unit increase in the level of rural e-commerce development, the index of consumption upgrading of the rural population increases by 0.046 units.

To verify the accuracy of the previous findings, this study adjusts the explanatory variable to represent the per capita consumption spending of residents (consume), and then conducts a regression analysis to examine its relationship with the level of rural e-commerce development. As model (2) illustrates, the regression coefficient remains significantly positive even when time fixed effects are controlled for, supporting the previously stated conclusion that rural e-commerce development promotes rural residents' upgrading of their consumption. The robustness of this paper's modeling is demonstrated by the way that model (3) regresses the independent variable rural e-commerce development level on the dependent variable consumption upgrading index of the previous period, and model (4) adds two new control variables, general fiscal public budget expenditure (fis) and fixed asset investment (FAI), based on the baseline regression. The regression coefficients remain significant, and the magnitudes of the coefficients in the four models exhibit minimal changes.

Table 3: Robustness test

	(1) upgrading	(2) consume	(3) F. Upgrading	(4) upgrading
ecommerce	0.046** (2.594)	0.057*** (6.736)	0.059*** (4.093)	0.056*** (3.248)
LFEA	0.009*** (3.742)	-0.003** (-2.083)	0.005** (2.189)	0.007*** (3.211)
lnsei	0.104*** (2.974)	-0.021*** (-5.020)	0.086** (2.086)	0.120*** (3.362)
lnsihl	-0.045 (-0.730)	-0.041*** (-2.757)	0.011 (0.261)	-0.035 (-0.978)
RISD	0.070** (2.304)	0.018*** (3.362)	0.056*** (2.944)	0.062*** (3.776)
lngdp	0.295*** (6.619)	0.192*** (12.417)	0.235*** (7.177)	0.263*** (9.554)
fis				-0.000 (-0.951)
FAI				-0.001*** (-4.606)
_cons	-3.300*** (-8.962)	-1.365*** (-7.529)	-2.869*** (-8.141)	-3.082*** (-11.410)
N	323	323	293	323
Year	No	Yes	No	No
R2	0.890	0.926	0.858	0.898

5.3. Theoretical Mechanism Test

To analyze the mechanism of the impact of rural e-commerce development on the upgrading of rural residents' consumption, this paper chooses the total retail sales of rural consumer goods, the level of per capita income of rural residents, and the development index of digital inclusive finance as the mediating variables. To avoid the endogeneity problem caused by adopting step-by-step test to analyze the mediating effect, this paper uses a two-step method to test the impact of the explanatory variables on the mediating variables and the causality relationship based on the baseline regression.

Total retail sales of rural consumer goods is the mediator variable in Table 4's model (1), which regresses the explanatory variables using its logarithm. The findings are significant at the 1% level. By offering a wealth of information on consumer goods, resolving the last mile of industrial goods traveling to the countryside, and directly encouraging the upgrading of residents' consumption, the development and popularity of rural e-commerce platforms has significantly altered the way that residents consume.

The results of Model (2), which regresses the level of rural e-commerce development using the per capita income of rural people, demonstrate that, at the 1% level, rural e-commerce development considerably raises per capita income. The growth of rural e-commerce reduces barriers to rural and urban circulation, encourages the sale of agricultural products, increases the amount of agricultural items available on the market, increases resident income, and ultimately boosts rural residents' consumption.

The advancement of rural e-commerce will impact the improvement of farmers' consumption through digital financial channels. Therefore, it is crucial to enhance the growth of rural e-commerce, strengthen the establishment of rural internet access, enhance the fundamental network environment, and elevate the level of inclusive financial development. This will facilitate the emergence of new consumption patterns and stimulate the enhancement of rural residents' consumption by updating their consumption mindset and improving the consumption environment. The regression results of model (3) show that the development of rural e-commerce significantly improves the digital inclusive financial index at the 1% level.

Table 4: Theoretical mechanism test

	(1) lnrscg	(2) lnipc	(3) DFI
ecommerce	0.481*** (6.663)	0.087*** (4.239)	11.030*** (6.278)
LFEA	-0.001 (-0.084)	-0.009*** (-2.709)	-1.385*** (-4.826)
lnsei	0.838*** (23.626)	-0.023** (-2.303)	0.816 (0.945)
lnsihl	0.185 (1.470)	0.095*** (2.669)	0.083 (0.027)
RISD	-0.077* (-1.731)	0.005 (0.396)	6.970*** (6.480)
lngdp	0.534*** (4.081)	0.491*** (13.225)	36.746*** (11.550)
_cons	-6.178*** (-4.030)	3.370*** (7.744)	-332.143*** (-8.902)
N	323	323	323
Year	Yes	Yes	Yes
R2	0.870	0.919	0.991

5.4. Heterogeneity Analysis

The influence of rural e-commerce development on the improvement of rural people's consumption differs between regions, with the western area enjoying the most significant promotional effect. As rural e-commerce has become more popular and widely used, the amount of online consumption by rural residents in the west has gradually increased, alleviating some of the problems associated with information blockage and the scarcity of consumption materials in rural areas and meeting farmers' needs for enjoyable and developmental commodities and services. At the same time, food and other commodities are better suited for offline consumption, and the percentage of people who purchase food and other commodities has been steadily declining. The expansion of rural e-commerce has a somewhat less effect on rural inhabitants' consumption upgrades in eastern regions; at the 1% level, the regression coefficient is only 0.066. According to model (1), there is little effect on rural residents' upgrading of their consumption in the central region. This could be because rural areas in the east and central regions have better infrastructure expansion and more convenient transportation, and the e-commerce platform's after-sales service is still lacking. As a result, rural residents are more likely to visit offline brick and mortar stores to purchase enjoyable and developmental commodities and services, as well as to enjoy the high-quality shopping experience that comes with offline consumption. In the eastern and central regions, the advancement of e-commerce has less of an impact on rural individuals' efforts to upgrade their consumption.

Table 5: Heterogeneity test

	(1) upgrading	(2) upgrading	(3) upgrading
ecommerce	0.066*** (3.632)	0.031 (1.052)	0.113*** (3.995)
LFEA	0.028*** (7.553)	0.011** (2.293)	0.010*** (4.043)
lnsei	-0.007 (-0.609)	-0.007 (-0.388)	-0.060*** (-5.500)
lnsihl	0.373*** (6.916)	0.004 (0.093)	0.125*** (4.174)
RISD	-0.055*** (-4.546)	0.215*** (5.467)	0.158*** (4.922)
lngdp	0.143*** (3.575)	0.219*** (5.974)	0.111*** (2.989)
_cons	-4.217*** (-7.840)	-2.234*** (-3.307)	-1.586*** (-3.921)
N	125	88	110
R2	0.628	0.870	0.846

6. Conclusions and recommendations for response

This study uses a time-fixed effects model to examine the relationship between the growth of rural e-commerce and the upgrading of rural inhabitants' spending patterns using panel data collected from 31 provinces between 2011 and 2021. It is discovered that rural e-commerce significantly improves the upgrading of rural residents' consumption. Rural e-commerce can do this through three mechanisms: boosting per capita income, improving the consumption environment, and stimulating residents' demand for consumption. The western region is the one where rural e-commerce

development has the greatest impact on upgrading residents' consumption. However, the development of residents' upgrading their consumption and income-generating channels is seriously hampered by the rural e-commerce development process's serious product homogenization, lack of systematic brand incubation, scarcity of e-commerce talent, imperfect logistics system, market regulatory chaos, and other issues. Based on the findings of the preceding article, this paper proposes the following policy recommendations.

First, continue to strengthen the top-level institutional design and overall planning. National policies should provide strong support for the development of rural e-commerce, including improving the e-commerce and logistics system, fostering new industries, and promoting agricultural products out of villages and into cities.

Second, develop scenarios for digital consumption in rural areas and broaden the offerings for rural digital convenience. We will digitally transform eligible rural commercial outlets using 5G, AI, mobile payments, and other technologies to offer services like online ordering and pickup, as well as direct delivery of fresh food, to improve the quality of life and satisfy the needs of the locals.

Third, promote the trend of "branding + platformization" of agricultural products online to broaden farmers' income-generating channels. By cultivating specific brands and labels, clarifying brand positioning, establishing a strict quality management system, and utilizing e-commerce platforms to disseminate and promote the brands, brand awareness and influence will be increased. Fourth, strengthen the "soft environment".

Fourth, improve the "soft environment" framework and offer a satisfying online shopping experience. To support the growth of rural e-commerce, encourage the building of infrastructure for the sector, encourage the digital transformation of county-level logistics and distribution centers, township courier outlets, and enhance the effectiveness of village-level distribution.

References

- [1] Yu, Jian & Fang, Fuqian. (2015). *The impact of upgrading the consumption structure of Chinese urban and rural residents on economic growth*. *Journal of Renmin University of China*, 29(5), 68-78.
- [2] Du, Danqing. (2017). *Research on the power mechanism of Internet-assisted consumption upgrading*. *The Economist*, 3, 48-54.
- [3] Wang, Chenyuan. (2020). *Synergistic development of rural e-commerce and rural residents' consumption upgrade*. *Research on Business Economics*, 15, 82-85.
- [4] Huang, Jun & Li, Jikai. (2018). *Characterization, Measurement and Development of Consumption Upgrading in China*. *China Circulation Economy*, 32(4), 94-101
- [5] Tang, Q., Q. J. Xia, & S. Li. (2018). *Analysis of the consumption structure of urban households in China: 1995-2013*. *economic research*, 53(2), 35-49.
- [6] Zhou, Yingheng & Liu, Changyu. (2018). *"Exploring the causes of e-commerce entrepreneurship agglomeration phenomenon of Taobao village farmers - A research based on Shaji Town and Yanji Town*. *Southern Economy*, 1, 62-84.
- [7] Xie, Tiancheng & Shi, Zulin. (2016). *Rural e-commerce development status quo, problems and countermeasures*. *Modern Economic Discussion*, 11, 40-44.
- [8] Mei, Yan & Yuqing Jiang. (2020). *Mechanism of synergistic development of rural e-commerce industry agglomeration and regional economy in the context of rural revitalization: a multi-case study based on the life cycle theory of industrial clusters*. *China Rural Economy*, 6, 56-74.
- [9] Zhang, Chuping. (2019). *Patterns, Problems and Countermeasures of Rural Regional E-commerce Development*. *Research on Business Economics*, 12, 80-82.
- [10] Liu, Genrong. (2017). *Mechanism analysis of e-commerce's impact on rural residents' consumption*. *China Circulation Economy*, 31(5), 96-104.
- [11] Qin, F., Wang, J. C., & Xu, Q. (2022). *How does the digital economy promote farmers' income? --Evidence from rural e-commerce development*. *Economics (Quarterly)*, 22(2), 591-612.
- [12] Li, L. L. & Zhao, W. H.. (2023). *The impact of e-commerce industry agglomeration on rural consumption upgrade under the perspective of rural revitalization*. *Research on Business Economics*, 7, 92-95.

- [13] Song, K., J. C. Fu, & Y. X. Yang. (2024). *Consumption upgrading or downgrading - Internet consumption measurement based on e-commerce big data*. *China Rural Economy*, 3, 42-60.
- [14] Yan, Jianjun & Junyi Feng. (2021). *A study on the impact of digital inclusive finance on residents' consumption upgrade*. *Consumer Economics*, 37(2), 79-88.