

An empirical study on the influence of new quality productivity development on the degree of rural revitalization

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Abstract: *New quality productive forces are the new driving force for rural revitalization. This paper uses panel data from 27 provincial administrative divisions in China from 2011 to 2020 to empirically test the relationship between the development of new quality productive forces and the degree of rural revitalization.*

Keywords: *New quality productivity; Rural revitalization; Scientific and technological innovation; Chinese-style modernization; Digital economy*

1. Introduction

With high gradient characteristics of high-tech, high industrialization and high cross-border integration, it can effectively promote economic efficiency, labor efficiency, production efficiency and resource utilization. In the context of Chinese-style modernization, new quality productive forces are playing an increasingly important positive role in high-quality development.

Under the above background, new quality productivity has increasingly become the endogenous driving force to promote the comprehensive revitalization of rural areas. From the perspective of goals, the sustainability, high innovation and precision contained in the new quality productivity are in line with the path of rural revitalization; From the perspective of the path, the overall goal of the rural revitalization strategy is the modernization of agriculture and rural areas, and the development of new quality productive forces is the internal requirement and important focus of promoting high-quality development. In-depth research on the impact of new quality productivity on rural revitalization has important practical significance for the solid promotion of Chinese-style modernization. This paper explores the influence of new quality productivity on the degree of rural revitalization from the empirical level to provide support for the path of rural revitalization.

2. Literature review

New quality productivity has become a hot topic in domestic academic circles since it was put forward^[1]. Many scholars have conducted a lot of research around new quality productivity, mainly focusing on three aspects: theoretical interpretation, model construction and path practice. The academic circle has also carried out a lot of research on rural revitalization, which is mainly divided into index measurement, mechanism research and effect research. However, existing researches on new quality productivity and rural revitalization or focus on the conceptual connotation, measurement and development path of one of them, only a few empirical studies are also focused on a certain aspect of rural revitalization enabled by new quality productivity, and there are very few thematic empirical analyses on the two. In view of this, this paper tries to deepen and expand from the following aspects: First, establish an indicator system respectively, and use the provincial level data to evaluate the quality of new quality productivity and rural revitalization; The second is to empirically analyze the relationship between the new quality productivity and the quality of rural revitalization, and explore the effect of the new quality productivity on the quality of rural revitalization; The third is to test the indirect effect of new quality productivity on the quality of rural revitalization, and to test the differential impact of digital economy on the quality of rural revitalization through heterogeneity analysis.

3. Theoretical mechanism and research hypothesis

The new quality productivity can directly affect the quality of rural revitalization by driving the modernization and upgrading of rural industries, improving the level of green development of agriculture and rural areas^[2], and promoting the prosperity of farmers' lives. At the same time, it also has an indirect impact on rural revitalization through scientific and technological innovation.

3.1 The direct effect of new quality productivity on the quality of rural revitalization

The new quality productivity mainly promotes rural revitalization from the aspects of industrial prosperity, ecological livable, effective governance and prosperous life^[3]. New quality productivity can improve production efficiency, provide more products for the agricultural industry, and broaden farmers' income channels. Secondly, new quality productivity can attract talents into related industries, improve rural employment, and promote the development of related industries. To achieve the overall goal of promoting rural revitalization, with the development of new quality productivity, digital governance and industrial transformation and upgrading of rural areas are increasingly possible. According to the new quality productivity to rural revitalization four dimensions of empowerment, this paper put forward

Hypothesis 1: New quality productivity plays a positive role in promoting the quality of rural revitalization.

3.2 Indirect effects of new quality productivity on the degree of rural revitalization

New quality productivity helps to provide intellectual support for scientific and technological innovation^[4]. Promoting the improvement of labor quality through the positive interaction mechanism of education, science and technology and talents is the strategic focus of developing new quality productivity, and scientific and technological innovation can promote the modernization of agriculture and rural areas^[5]. It is in line with the goal of "well-off life" in rural revitalization. Therefore, this paper proposes the following

Hypothesis 2: Scientific and technological innovation is an important way for new quality productivity to affect rural revitalization.

4. Model design and variable description

4.1 Measurement model design

In order to examine the impact of new quality productivity on rural revitalization, the following models are established:

$$RRI_{it} = a_0 + a_1 Nqp_{it} + a_2 Controls + \mu_i + v_t + \varepsilon_{it} \quad (1)$$

$$Sti_{it} = \beta_0 + \beta_1 DEit + \beta_2 Controls + \mu_i + v_t + \varepsilon_{it} \quad (2)$$

$$RRI_{it} = \gamma_0 + \gamma_1 Nqp_{it} + \gamma_2 Sti_{it} + \gamma_3 Controls + \mu_i + v_t + \varepsilon_{it} \quad (3)$$

In formula (1), RRI_{it} is the explained variable, representing the comprehensive index quality of rural revitalization in region i in a certain period. Nqp_{it} is the core explanatory variable, which represents the development level of new quality productivity of region i in a certain period. $Controls$ are a set of control variables; μ_i is used to measure the individual fixed effect of the sample, which refers to the unobservable factor that does not change with time but changes with region and affects the explained variable. v_t is used to measure the time-fixed effect of the sample, which refers to the unobservable factor that does not change with the region but changes with time and affects the explained variable. ε_{it} represents the random disturbance term. In formula (2), Sti_{it} represents the scientific and technological innovation level of region i in the t period, which is used to test the new quality productivity on the intermediary variable, and formula (3) is used to test the intermediary test of Sti in the process of the influence of new quality productivity Nqp_{it} on rural revitalization RRI_{it} .

4.2 Variable indicators and data description

The explained variable RRI_{it} rural revitalization index is based on the general requirements of "prosperous industry, livable ecology, civilized village style, effective governance and prosperous life".

With reference to the research of Xu Xue et al, this paper constructs the evaluation index system of rural revitalization from the five sub-systems of rural revitalization, and uses the entropy weight TOPSIS method to measure the quality of rural revitalization.

The core explanatory variable of RRI is new quality productivity, referring to the practice of Lu Jiang and Guo Ziang and other scholars^[6], the evaluation of new quality productivity is based on three first-level indicators of scientific and technological productivity, green productivity and digital productivity, and the improved entropy weight TOPSIS measurement method is used to measure the development level of new quality productivity.

The control variables in this paper are as follows: (1) To (degree of trade openness). The degree of trade openness will affect the index of prosperity by influencing the income of villagers, and then affect the level of rural revitalization, which is measured by the ratio of regional total foreign trade to regional gross national product; (2) Ur (urbanization level), the gap between urban and rural areas will affect the degree of common prosperity and then affect the level of rural revitalization; (3) Isa (Advanced degree of industrial structure), the level of industrial structure will affect the quality of residents' employment and thus the level of rural revitalization. Referring to Zhang Xinyan et al., the advanced degree of industrial structure is measured by the proportion of output value of local secondary industry and tertiary industry. (4) Hp (Human capital), measured by the average years of education, human capital can affect residents' income and affect the level of rural revitalization^[7].

The data were collected from China Statistical Yearbook, China Rural Statistical Yearbook and provincial and municipal statistical yearbooks, and the missing values were supplemented by interpolation method.

4.3 Descriptive Statistics

Table 1 shows the descriptive statistics of the variables. The maximum value of new quality productivity is 0.877, the minimum value is 0.027, the mean value is 0.200, and the standard deviation is 0.178, indicating that there are differences in the development level of new quality productivity in different provinces^[8]. The maximum value of rural revitalization index is 9.019, the minimum value is 0.169, the mean value is 2.946, and the standard deviation is 1.728. There are great differences in the quality of rural revitalization in different regions of China.

Table 1 Descriptive statistics

Variable	Sample	Mean	Standard	min	max
Nqp	299	0.200	0.178	0.027	0.877
RRI	299	2.946	1.728	0.169	9.019
Isa	299	1.325	0.730	0.527	5.244
Ur	299	0.588	0.123	0.35	0.938
Hp	299	9.207	0.893	7.474	12.782
To	300	0.267	0.297	0.008	1.548

5. Analysis of empirical results

5.1 The direct impact of new quality productivity on rural revitalization

Firstly, the Hausman test is carried out on the econometric model. The result rejects the null hypothesis and requires the control bidirectional fixed effect model. Meanwhile, the explanatory variable Nqp passes the stationarity test. The baseline regression results are shown in Table 2. Model (1) The model shows that the new quality productivity has a significant positive correlation with the degree of rural revitalization; After gradually adding control variables to model (1) to model (5), the influence of new quality productivity on the degree of rural revitalization is significantly positive at the 1% confidence level, indicating that new quality productivity has a significant positive effect on the degree of rural revitalization, indicating that new quality productivity can continue to improve and enable high-quality rural development, thus verifying hypothesis H1.

At the same time, the influence of control variables on the degree of rural revitalization is different. In model (2), industrial structure upgrading is added as a control variable, and its impact on rural revitalization is significantly positive at 1% confidence level, which is reflected in the fact that industrial structure upgrading can promote industrial integration, promote the extension of industrial value chain,

and promote the increase of farmers' income, which plays an important driving role in rural revitalization^[9]. The control variables urbanization level and human capital level were added successively in model (3) and model (4), but their effects on rural revitalization were not significant. In model (5), the degree of openness to the outside world is added as a control variable, and its influence on the degree of rural revitalization is positive at the 1% confidence level, which reflects that the level of external development can effectively promote rural revitalization, improve farmers' living standards and increase farmers' income by promoting trade circulation.

Table 2: The direct impact of new quality productivity on rural revitalization

Variable	(1)	(2)	(3)	(4)	(5)
RRI	0.061*** (7.744)	0.096*** (6.560)	0.098*** (6.415)	0.101*** (6.513)	0.076*** (5.223)
Isa		-0.047*** (-2.809)	-0.045** (-2.569)	-0.040** (-2.242)	-0.088*** (-5.032)
Ur			-0.045 (-0.560)	-0.016 (-0.189)	0.270*** (3.169)
Hp				-0.017 (-1.111)	-0.033** (-2.317)
To					-0.256*** (-7.478)
cons	0.020 (0.870)	-0.019 (-0.713)	-0.004 (-0.105)	0.122 (1.019)	0.306*** (2.733)
Fixed	Y	Y	Y	Y	Y
N	299	299	299	299	299
R ²	0.091	0.114	0.112	0.113	0.265

Table 3: Path test of the influence of new quality productivity on rural revitalization

Variable	(6)	(7)	(8)
RRI	0.029*** (5.253)		-0.005 (-1.002)
Isa	-0.039*** (-2.762)	-0.089 (-1.316)	-0.017 (-1.561)
Ur	0.156 (1.194)	1.191* (1.908)	-0.058 (-0.568)
Hp	-0.025 (-1.337)	0.215** (2.405)	-0.027* (-1.847)
To	0.343*** (8.580)	-0.283 (-1.360)	0.270*** (8.693)
Sti		4.225*** (15.839)	0.113*** (14.320)
cons	0.217* (1.856)	10.178*** (18.260)	-1.081*** (-8.470)
Fixed	Y	Y	Y
N	299.000	299.000	299.000
R ²	0.509	0.673	0.710

In order to verify hypothesis 2, this paper adopts the step-up method to test the mediating role of technological innovation in the impact of new quality productivity on rural revitalization in three steps. The results are shown in models (6), (7) and (8) in Table 3. Model (6) represents the total utility of new quality productivity on the degree of rural revitalization, and the results are significant at 1% confidence level, consistent with the previous discussion. Model (7) represents the impact of technological innovation on new quality productivity, and its result is significantly positive at 1% confidence level; Model (8) represents the impact of new quality productivity and scientific and technological innovation on the degree of rural revitalization, and its result is significantly positive at the 1% confidence level. Therefore, the total utility, direct effect and indirect effect of this intermediary effect model are significant, indicating that the intermediary effect is significant, and H2 is assumed to be valid.

6. Research conclusions and policy recommendations

6.1 Research Conclusions

The main conclusions of this paper are as follows:

(1) The new quality productivity has a significant driving effect on the quality of rural revitalization, and it is still significant after the robustness test. New quality productive forces can promote each other and form a positive interaction with rural revitalization^[10]. Developing new quality productive forces is the proper meaning of promoting rural revitalization and agricultural and rural modernization.

(2) As an important intermediary variable, scientific and technological innovation is an important path for new quality productivity to drive rural revitalization. New quality productivity can promote scientific and technological innovation, while scientific and technological innovation can enhance agricultural production efficiency, improve the quality of agricultural products, and promote agricultural production methods. Therefore, new quality productivity is transmitted to the rural industrial system through the traction force of scientific and technological innovation to promote rural revitalization.

(3) There are regional differences in the effect of rural revitalization enabled by new quality productivity. Compared with the eastern and western regions, the new quality productivity in the central region has a greater impact on rural revitalization, so it is necessary to develop new quality productivity according to local conditions to promote rural revitalization according to different locational positioning, development mode and stage.

6.2 Policy Recommendations

First, accelerate the development of new quality productive forces, take the development of new quality productive forces as the starting point, promote the upgrading of rural industries, layout of strategic emerging agricultural industries, promote the coordinated development of agriculture and other industries, promote the modernization and upgrading of agricultural industries from point to point, and promote the revitalization of rural areas.

Second, take measures to encourage agricultural operators to digitize and upgrade traditional agricultural labor data, take digital technology as the starting point, rely on automated process system and 5G technology, deepen the agricultural industrial chain, cultivate agricultural new quality productivity, and form a digital agricultural industry. The government can set up special funds to support agricultural operators to purchase digital equipment and build information infrastructure. Promote the digital upgrading of agriculture and promote the high-quality development of agriculture.

Third, improve the conversion rate of scientific and technological innovation achievements. Scientific and technological innovation can lead industrial innovation by optimizing the industrial structure, give birth to new industries, new models and new drivers, promote the high-end, intelligent and green development of traditional industries, and provide a strong driving force for the formation of new quality productivity^[11]. We should increase investment in scientific and technological research and development, and support the research of key core technologies. Promote the transformation and application of scientific and technological innovation achievements, form a government-guided and market-led scientific and technological innovation system, and better leverage the role of scientific and technological innovation in promoting the development of new quality productive forces and rural revitalization.

Fourth, pay attention to coordinated development among regions. In light of the resource endowment, industrial base and development potential of different regions, we should promote the replacement of old and new growth drivers, promote the development of new quality productive forces, guide the transfer of new quality productive forces to different regions. At the same time, we should promote the transformation and upgrading of traditional industries, generate radiation effects and synergies, and narrow the development gap between regions and between urban and rural areas. So as to improve the quality of rural revitalization.

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