Study on the influence of rural labor force mobility on new quality productivity

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Abstract

This paper selects 30 provinces in China from 2010 to 2022 as samples to build the evaluation index system of new quality productivity from three dimensions of innovation productivity, green productivity and digital productivity, so as to explore the impact of rural labor flow on new quality productivity. The research shows that the development of new productivity is uneven; the rural labor flow has a significant positive effect on the new productivity in the east and the central region.

Keywords

Rural labor force, new quality productivity, influence effect.

1. Foreword

At the 11th collective study session of the Political Bureau of the CPC Central Committee, General Secretary Xi Jinping stressed that "developing new quality productive forces is an inherent requirement and an important focus for promoting high-quality development. We must continue to do a good job in innovation and accelerate the development of new quality productive forces."As the key factor to promote economic transformation and upgrading and achieve high-quality development, the cultivation and development of new quality productive forces has become the core content of China's economic strategy. In the face of the profound changes in the global economic structure and industrial competition pattern, accelerating the development of new quality productive forces is not only an urgent need to enhance national competitiveness, but also the only way to achieve sustainable economic and social development. However, the development of new quality productivity still faces many challenges in China, including the lack of technological innovation ability, the single industrial structure, and the imperfect talent supply system. The existence of these problems has restricted the rapid growth of new quality productivity and affected the innovation power and competitiveness of the economy.

In this context, as the rural labor market mobility is an important embodiment of the flexibility and mobility, its impact on the new quality productivity has gradually been widely concerned by all sectors of society. With the acceleration of agricultural modernization and new urbanization construction, a large number of rural labor force is transferred to cities and non-agricultural industries. This phenomenon has not only changed the structure of rural labor force, but also injected new vitality into the urban economy. However, the specific influence mechanism and effect of rural labor flow on new quality productivity have not been fully studied and recognized. In this context, it is of great theoretical and practical significance to explore the influence of rural labor flow on new quality productivity, optimize the allocation of labor resources, promote the optimization and upgrading of industrial structure, and promote the balanced development of regional economy.

2. Theoretical analysis and research hypothesis

As the key link of urban and rural economic interaction, rural labor mobility has a significant role in promoting the improvement of new quality productivity. With the transfer of labor from agriculture to the non-agricultural sector, the marginal output of labor in agricultural production is increased, thus driving the growth of agricultural technical efficiency. In this process, labor flow has a positive impact on agricultural production through the return of capital, the adjustment of agricultural production structure and the technological progress mechanism. Especially in terms of technological progress, the flow of labor force not only brings the return of capital, but also introduces new agricultural technology and management experience, promotes the innovation and application of agricultural technology, and improves the technical level and overall efficiency of agricultural production[1]. In addition, labor flow enhances the investment capacity of farmers through the capital return mechanism, promotes the input of production factors such as agricultural machinery and chemical fertilizer, and further enhances agricultural productivity.

From the macro level, the rural labor flow has a far-reaching impact on the development of regional economy. Labor flow promotes the optimal allocation of labor resources between urban and rural areas, helps to narrow the gap between urban and rural development, and promotes the balanced development of regional economy. At the same time, with the accumulation of working experience of the rural labor force in cities, their skill level and knowledge structure have been improved. These experiences and skills are brought back to the countryside when the labor force returns, injecting new vitality into the rural economic development. In addition, labor mobility also drives the change of the consumption pattern of rural residents, promotes the prosperity of the rural market, and provides a new growth point for the rural economic development[2].

Based on this, this paper puts forward the hypothesis H1: rural labor flow can significantly promote the development of new quality productivity.

3. Research design

3.1. Variable selection

3.1.1. New quality productivity level index calculation

Combined with the background of the new era and based on the previous analysis of the connotation of new quality productivity, the evaluation of the level of new quality productivity in this paper starts from the development concept of "number and quality", "green development" and "digital interconnection". Specifically, referring to the practice of Lu Jiang et al., this paper constructs an evaluation system including three primary indicators of innovation productivity, green productivity and digital productivity, and 14 secondary indicators (see Table 1). The entropy weight method is used to empower the index, and finally the regional new quality productivity development level index (Nqp) is obtained.

About innovation productivity, it reflects the strength of a regional innovation activities and results, the regional patent applications directly reflects the number of innovation, regional high technology industry main business income shows the innovation industry direct contribution to the economy, industrial enterprises R&D spending and R&D personnel full-time equivalent, respectively from the perspective of financial investment and human resources to measure the regional investment in innovation.

About green productivity, its emphasized in the process of economic development of environmental protection and rational utilization of resources, the energy intensity and water intensity as a negative index, reflects the utilization efficiency of energy and water resources,

and waste water and waste utilization index is directly related to the environmental protection and industrial pollution control.

The introduction of digital productivity is to capture the contribution of digital transformation to the improvement of productivity. indicators such as electronic information, communication business and network popularization reflect the regional digital infrastructure construction and service level, while digital information and e-commerce show the application and market scale of digital technology in the commercial field.

3.1.2. Rural labor force mobility

In this paper, the number of rural migrant workers (Rmw) is used to measure the flow of rural labor force, and at the same time, the number of perennial rural migrant workers is selected to test the robustness. Data sources are Annual Report of China's Rural Management (2010-2018) and Annual Report of China's Rural Policy and Reform (2019-2022).

3.1.3. Control variable measurement

According to the existing research, the following variables are controlled: industrial structure upgrading (Upins), the ratio of industrial output value; financial development level (Fin), the proportion of financial added value to GDP; economic development level (Rgdp), the per capita GDP; population level (Peo) and the number of regional resident population.

Table 1: New quality productivity evaluation index system

Level 1 indicators	metric	explanation	unit	Indicator attributes
Innovation productivity	innovative product	Number of regional patent applications	individual	forward direction
	Innovation industry	Regional high-tech industry main business income	One thousand yuan	forward direction
	Innovation investment	R & D expenditure of industrial enterprises above designated size	Wan Yuan	forward direction
	Innovative research and development	Full-time equivalent of R & D personnel in industrial enterprises above designated size	thousands of people	forward direction
Green productivity	energy intensity	Energy consumption / GDP	%	negative direction
	Water intensity	Industrial water consumption / GDP	%	negative direction
	salvage	Comprehensive utilization / production amount of industrial solid waste	%	forward direction
	Waste water discharge	Industrial wastewater discharge / GDP	%	negative direction
	exhaust emission	Industrial sulfur dioxide emissions / GDP	%	negative direction
Digital productivity	electronic information	Integrated circuit production	a hundred million	forward direction
	Communication business	Revenue from telecom business	100 million	forward direction

Network popularization	Internet broadband access volume	One million	forward direction
numerical information	Optical cable length / area area	/	forward direction
Electronic Commerce	E-commerce sales volume	100 million	forward direction

3.2. Data description and processing

According to the above index calculation method, the relevant data of 31 provinces in 2010-2022 were selected for analysis. Due to the serious lack of some indicators in Tibet Autonomous Region, only the remaining 30 provinces were selected as the main research objects. The relevant data mainly come from China Statistical Yearbook[3], China Energy Statistical Yearbook, China Rural Statistical Yearbook and The Statistical Annual Report of China's Rural Policy and Reform. The establishment process of the new quality productivity index system fully considers the data availability, and the interpolation method is used to supplement a small amount of missing data values.

3.3. Model specification

A two-fold fixed effects model combined with data characteristics was used to study the impact of rural labor mobility on new quality productivity. The model setting is as shown in equation (1), in which i represents the province and city, t represents the year, Nqp_{it} represents the new quality productivity level, Rmw_{it} represents the rural labor mobility, β represents the influence coefficient, and Xit represents the set of control variables. In addition, double fixation includes urban fixed effect μ_i and year fixed effect δ_i, as follows.

$$Nqp_{it} = \propto + \beta_1 Rmw_{it} + \mu_i + \delta_i + \varepsilon_{it}$$

Table 2: Descriptive statistics

Indicator attributes	variable	Observations	mean	least value	crest value	median	standard error
explained variable	New quality productivity level Nqp	390	0.199	0.027	0.877	0.145	0.177
explanatory variable	Rural labor force mobility RMW	390	799.308	14.5	2837.6	744.253	626.337
controlled variable	Industrial structure upgrading Upins	390	1.236	0.5	5.297	1.075	0.714
	Financial development level of Fin	390	0.069	0.02	0.199	0.064	0.032
	Economic development level, Rgdp	390	8.205	6.333	9.448	8.278	0.742
	Population size level of Peo	390	10.864	9.482	12.156	10.838	0.478

Table 3: Robustness test results

	(1)	(2)	(3)	(4)
Rmw			1.7558★★★ (0.0000)	1.1328★★★ (0.0000)
CRmw	0.6073★★ (0.0446)	-1.2122★★★ (0.0055)		
Upins		0.1034★★★ (0.0000)	0.1175★★★ (0.0000)	-0.0312★★ (0.0038)
Fin		1.3723★★★ (0.0000)	1.4048★★★ (0.0000)	0.7820★★★ (0.0000)
Rgdp		0.4183★★★ (0.0000)	0.2136★★★ (0.0000)	0.3675★★★ (0.0000)
Peo		0.0234 (0.3035)	0.0344★★ (0.0013)	-0.0094 (0.3410)
_cons	0.1349★★★ (0.0000)	-3.6702★★★ (0.0000)	-2.0801★★★ (0.0000)	-2.9342★★★ (0.0000)
N	390	390	390	360
adj.R2	0.0760	0.3232	0.3307	0.6268

 Descriptive statistical analysis

Descriptive statistics results are shown in Table 2. The maximum and minimum values of the new quality productivity are 0.877 and 0.027 respectively, and the mean and standard deviation are 0.199 and 0.177 respectively, which indicates that the development of the new quality productivity level in provinces and cities is not balanced and the gap is large[4]. The mean and standard deviations of rural labor mobility were 799.308 and 626.337, respectively, with large standard deviations indicating that the amount of rural labor mobility varied significantly between different observed values.

4. Empirical results analysis

4.1. Benchmark regression

The effect of the impact of rural labor mobility on new productivity was verified using model (1). As shown in Table 4, the coefficient of rural labor mobility (Rmw) was 0.6953 and was significant at the significance level of 5%, indicating that rural labor mobility has a significant positive impact on the level of new productivity. That is, the increase of rural labor flow promotes the development of new quality productivity. Column (2) indicates that after controlling for other variables, the coefficient of rural labor mobility (Rmw) decreased to 0.6209, still significant at the significance level of 5%. This shows that the positive impact of rural labor mobility on new quality productivity is still significant after considering the influence of other factors. In addition, the control variables were significantly positive, and the influence coefficient of the financial development level was the highest.

Table 4: regression results

(1)	Nqp	(2)
Rmw	0.6953★★(0.0130)	0.6209★★(0.0228)
Upins		
Fin		1.2489★★★(0.0000)
Rgdp		0.4749★★★(0.0000)
Peo		0.0618★★(0.0054)
cons	0.1208★★★(0.0000)	-4.4513★★★(0.0000)
N	390	390
adj.R2	0.0817	0.2491

Note: ★ indicates $p < 0.1$, ★★ $p < 0.05$, ★★★ $p < 0.01$; t value in parentheses.

4.2. Robustness test

4.2.1. RepTablelace core variables

According to the availability of data, the number of rural migrant workers (Rmw) with the number of rural migrant workers (CRmw) is selected. The results are shown in 4, and column (1) shows that the results are still robust after the replacement of explanatory variables. After further introduction of all control variables, the results as shown in column (2) remain robust.

4.2.2. Replacement model method

The fixed effects model (FE) was changed to the random effects model (RE) to further test the robustness of the model setting. The coefficient of rural labor mobility is still significantly positive.

4.2.3. Extend the observation window

Rural labor flow and new quality productivity may exist the relationship between reverse cause, so extend the rural labor flow of new quality productivity observation window, to explain variables do lag phase processing, explanatory variables and interaction term coefficient is still significantly positive, that the rural labor flow to promote new quality productivity has robustness.

4.3. Further analysis

In order to further analyze the regional heterogeneity of the promotion effect of rural labor flow on new quality productivity, the 30 provinces were divided into eastern region, central region, western region and northeast region. The eastern region (including Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan), the central region (including Shanxi, Anhui, Jiangxi, Henan, Hubei, Hunan), the western region (Chongqing, Sichuan, Guizhou, Yunnan, Gansu, Qinghai, Ningxia, Guangxi, Xinjiang, shaanxi, Inner Mongolia), northeast China (including Liaoning, Jilin, Heilongjiang). The results of the regression are shown in Table 5.

It can be seen from the results that in the eastern and central regions, the coefficient of rural labor flow is significantly positive, indicating that in the above regions, rural labor flow can significantly promote the development of new quality productivity. However, in the western and northeast regions, the influence coefficient is not significant, indicating that the rural labor flow in the above regions may not significantly affect the change of new quality productivity.

On the whole, compared with the eastern region and the central region, the regression coefficient of Rmw is smaller, indicating that the rural labor flow in the central city has a stronger effect on promoting the new quality productivity[5]. This may be due to the relatively higher economic development level of development in the eastern cities, the marginal contribution of rural labor mobility is relatively smaller, while the central cities have higher labor demand and are concentrated in labor-intensive industries such as manufacturing, which can absorb labor mobility more effectively. In addition, the per capita of GNP in western region has a significant negative impact on new quality productivity, indicating that the economic growth in western region has not effectively driven the improvement of new quality productivity. This may be because the economic growth in western region is more from traditional industries, and the lack of innovation and industrial upgrading to promote the improvement of new quality productivity.

Table 5: Subregional regression results

	east	middle part	the west area	Northeast China
Rmw	2.237★★★	2.291★★★	-0.149	0.257
	(0.000)	(0.006)	(0.533)	(0.905)
Upins	0.025	0.065	-0.003	0.002
	(0.060)	(0.053)	(0.013)	(0.022)
Fin	1.463★★★	2.863★★★	0.709★★★	1.739★★★
	(0.000)	(0.000)	(0.000)	(0.005)
Rgdp	0.785★★★	1.196	-0.359★★★	0.117
	(0.000)	(0.178)	(0.000)	(0.188)
Peo	0.052	0.647★★★	0.093★★★	0.209★★★
	(0.194)	(0.000)	(0.000)	(0.000)
_cons	-6.967★★★	-17.040★★	1.935★★★	-3.074★★
	(0.000)	(0.015)	(0.000)	(0.014)
N	130	78	143	39
adj.R2	0.607	0.619	0.611	0.710

5. Conclusion and policy implications

5.1. Research conclusion

First, the development of new quality productivity in various provinces is not balanced, and the gap is large. Second, the flow of rural labor force has a significant positive impact on the level of new quality productivity, indicating that the transfer of rural labor force from rural to urban and non-agricultural industries can promote the development of new quality productivity. Third, the rural labor flow in the eastern region and the central region has a more significant effect on promoting the new quality productivity.

5.2. Countermeasures and suggestions

First, we will optimize policies on labor mobility and promote the rational allocation of labor resources. The government should introduce more active and specific policy measures to promote the orderly flow of rural labor force to cities and non-agricultural industries. At the same time, the monitoring mechanism of labor flow should be established and improved to grasp the trend of labor flow in time and provide data support for policy adjustment. In addition, enterprises are encouraged to participate in the skills training of the rural labor force, and to

improve the pertinence and effectiveness of the training through the cooperation between enterprises and the government.

Second, strengthen rural education and skills training to enhance the employment competitiveness of the rural labor force. We will increase investment in rural education, especially vocational education and adult education, and improve the cultural quality and professional skills of the rural labor force. Through the cooperation with urban high-quality education resources, advanced educational concepts and teaching methods are introduced to improve the quality of rural education. At the same time, order-type training and oriented training are carried out to train skilled talents in line with the development needs of modern industry, according to the market demand and the employment needs of enterprises.

Third, we will promote balanced regional economic development and narrow the gap between urban and rural development. By formulating a regional coordinated development strategy, we will increase investment in the central and western regions and the economically underdeveloped regions, and promote industrial transfer and regional economic integration. We will optimize the distribution of industries, guide the transfer of labor-intensive industries and resource-processing industries to the central and western regions, and provide more local employment opportunities for the rural workforce. At the same time, we will strengthen rural infrastructure construction, improve rural production and living conditions, and make them more attractive and competitive. We will encourage enterprises and government subsidies to invest and do business in rural areas to promote rural economic development and employment growth.

Fourth, promote the application of digital technology in agriculture and improve the efficiency of agricultural production. Encourage and support the application of digital technology in agricultural production, management and sales. Use of the Internet of Things, big data, cloud computing and other technologies to achieve intelligent and accurate agricultural production, improve the efficiency of agricultural production and product quality. Through the establishment of agricultural products e-commerce platform, broaden the sales channels of agricultural products, increase farmers' income. At the same time, in addition, digital technology training will be carried out to improve farmers' digital skills and enhance their ability to use digital technology to improve production and life.

Acknowledgements

References

[1] Liu Huaguang, Yu Yalin, Zhao Hanwei. The influence of rural labor force mobility and economic growth on urban-rural dual structure －－ Empirical analysis of dynamic panel and threshold effect model [J]. Economic Forum, 2024 (04): 104-113.

[2] Zhu Pingfang, Fang Shunchao. Targeted poverty alleviation and rural labor mobility: Policy effect and mechanism of action [J]. Academic Monthly, 2024,56(03):70-83.DOI:10.19862 /j.cnki. xsyk.000812.

[3] Zhang Jumei. Research on the influence mechanism and countermeasures of population flow on urban-rural integrated development [J / OL]. Administration and Law: 1-15 [2024-06-04].http : //kns.cnki.net/kcms/detail/22.1235.D.20240311.1353.004.html.

[4] Wang Hui, Chen Dechao. Research on the promotion path of rural labor force mobility under the background of Rural Revitalization [J]. Director of the Village Committee, 2024 (04): 170-172.

[5] Li Jun, Shu Jijun. Study on the influence of digital economy on urban-rural integration from the perspective of factor flow [J]. Science, Technology and the Economy, the 2023,36(06):16-20.DOI:10.14059/j.cnki.cn32-1276n.2023.06.005.