

Research on the path and mechanism of new quality productivity empowering high-quality development in northern Anhui

Saijia He

School of Management Science and Engineering, Anhui University of Finance & Economics,
Bengbu Anhui 233030, China.

Abstract

Developing new-quality productivity is an inherent requirement and core driving force for high-quality development. As an underdeveloped region within the Yangtze River Delta, achieving high-quality leapfrog development in northern Anhui is crucial for promoting Yangtze River Delta integration and coordinated regional development. Based on the theory of new-quality productivity, this study aims to systematically explore the enabling pathways and mechanisms of new-quality productivity for high-quality development in northern Anhui. First, based on a review of relevant literature, this study clarifies the scientific connotations of new-quality productivity and its theoretical connection to high-quality development. Second, a new-quality productivity evaluation index system is constructed based on the dimensions of new-quality workers, new-quality labor materials, and new-quality labor objects. Furthermore, a high-quality development evaluation index system is constructed from the perspective of the new development concepts of innovation, coordination, green development, openness, and sharing. The entropy method is used to measure and compare the development levels of six cities in northern Anhui from 2015 to 2024. Third, by constructing a two-way fixed-effect panel model, a spatial Durbin model, and a mediation effect model, the direct impact of new-quality productivity on high-quality development in northern Anhui, its spatial spillover effects, and the mediating transmission mechanism of innovation capacity are empirically tested. The research results show that new quality productivity has a significant positive impact on the high-quality development of northern Anhui, with a clear spatial spillover effect; regional innovation capacity plays a key mediating role in this process. Finally, based on the empirical research conclusions, this study proposes policy recommendations for developing new quality productivity in northern Anhui in accordance with local conditions and accelerating its progress towards high-quality development, from the aspects of strengthening the source capacity of scientific and technological innovation, promoting the optimization and upgrading of industrial structure, improving the mechanism of regional coordinated development, and optimizing the talent attraction and cultivation system. This study not only provides new theoretical perspectives and empirical evidence for understanding the relationship between new quality productivity and high-quality development in underdeveloped regions, but also provides a scientific basis for regional policy formulation.

Keywords

New quality productivity, high-quality development, northern Anhui, mechanism of action, empirical research.

1. Introduction

My country's economy has shifted from a phase of high-speed growth to one of high-quality development. Since July 2023, General Secretary Xi Jinping has repeatedly emphasized the need to "accelerate the formation of new-quality productive forces" and has profoundly pointed out

that "developing new-quality productive forces is an inherent requirement and key focus for promoting high-quality development." In January 2024, General Secretary Xi Jinping reiterated that high-quality development requires the guidance of a new theory of productive forces, and that new-quality productive forces have already emerged in practice and demonstrated their strong driving force and support for high-quality development. This important statement marks a new level of understanding of the laws governing the development of productive forces and provides a fundamental guideline for promoting high-quality development on our new journey. As one of my country's most economically active, open, and innovative regions, the high-quality, integrated development of the Yangtze River Delta region is a major national strategy^[1]. However, imbalanced development within the Yangtze River Delta remains prominent, with the consensus that "the key lies in Anhui, and the weak links also lie in Anhui." Northern Anhui (including the six cities of Huaibei, Bozhou, Suzhou, Bengbu, Fuyang, and Huainan) has a large population but a relatively weak economic foundation^[2]. Its industrial structure is heavily weighted towards traditional agriculture and resource-based industries, and its scientific and technological innovation capabilities are insufficient, representing the "shortcomings" of the Yangtze River Delta's coordinated development. In this context, how to deeply understand and grasp the core essence of new quality productivity and combine it with the specific reality of northern Anhui to explore a new path of high-quality development that suits the region has become a major topic that needs to be studied urgently^[3]. On the theoretical level, although the research on new quality productivity and high-quality development is in its infancy, the existing results are mostly concentrated on macro-theoretical explanations or case analysis of developed regions. There is still a lack of literature on in-depth and systematic empirical research on specific underdeveloped regions, especially "low-lying areas" such as northern Anhui that are located in major national strategic regions. On the practical level, northern Anhui is facing an urgent need for transformation and upgrading, and urgently needs scientific theoretical guidance and precise policy recommendations^[4]. Therefore, this study focuses on northern Anhui and aims to systematically answer the following core questions: (1) How to scientifically construct an evaluation index system for new quality productivity and high-quality development applicable to northern Anhui and effectively measure it? (2) Does new quality productivity have a significant promoting effect on high-quality development in northern Anhui? What is its influencing mechanism? (3) Does this influence have a spatial effect? (4) Based on empirical findings, how should northern Anhui implement policies to effectively cultivate new quality productivity and thereby enable high-quality development? Through in-depth research on these issues, this study hopes to enrich the application of the new quality productivity theory at the regional level and provide useful reference for the high-quality development practices in northern Anhui and even similar underdeveloped regions.

2. Literature Review and Theoretical Basis

2.1. The Connotation and Measurement of New Quality Productivity

New productivity is a form of advanced productivity characterized by innovation, breaking away from traditional economic growth models and productivity development paths, and featuring high technology, high efficiency, and high quality, in line with the new development philosophy^[5]. It is driven by revolutionary technological breakthroughs, innovative allocation of production factors, and deep industrial transformation and upgrading (Zhang Lin, 2024). Compared to traditional productivity, the core characteristic of new productivity lies in the new nature of its factors: workers are new-type workers, possessing high levels of scientific and cultural literacy and innovative capabilities; the means of production are new-type labor materials, represented by digital, intelligent, and networked technology and equipment; and the objects of labor have expanded to new areas such as data, new materials, and life sciences

(Gong Yurun and Liu Hongwei, 2024). Scholars have actively explored measurement. Wu Jifei et al. (2024) constructed a provincial-level new productivity evaluation indicator system based on scientific and technological innovation, industrial upgrading, and green and low-carbon development. Li Guangqin et al. (2024) focused on measuring the level of new productivity from the perspectives of the digital economy and green total factor productivity^[6]. These studies provide important references for the construction of the indicator system of this project, but most of them are aimed at the national or provincial level. The evaluation system at the municipal level, especially for underdeveloped municipalities, needs to be further refined and localized.

2.2. Research on the relationship between new quality productivity and high-quality development

On a theoretical level, there is an inherent logical unity between new-quality productivity and high-quality development. High-quality development embodies the new development philosophy, and new-quality productivity itself is an advanced productive force that aligns with this philosophy. Liu Yang et al. (2024) pointed out that new-quality productivity empowers high-quality development by driving the modernization of the industrial system, improving total factor productivity, and promoting green and low-carbon transformation. Liu Zhen et al. (2024) theoretically demonstrated that scientific and technological innovation, as a core element of new-quality productivity, plays a decisive role in high-quality development. Empirically, research has largely focused on industries or sectors. For example, Zhou Jin et al. (2025) explored the mechanisms by which new-quality productivity empowers high-quality development in the cultural industry; Sun Chongming (2025) studied the role of new-quality productivity in promoting rural economic development; and Chen Jin and Fan Ruifang (2025) analyzed how new-quality productivity leads to the high-end, intelligent, and green development of the manufacturing industry. These studies confirm the positive impact of new-quality productivity on high-quality development in various sectors, but relatively few studies focus on specific regions, particularly underdeveloped areas, and conduct systematic mechanistic examinations^[7].

2.3. Theoretical Framework and Innovations of This Study

In summary, the existing research has laid a solid foundation for this project, but there is also room for expansion. First, in terms of research objects, there is a lack of special attention to underdeveloped areas such as northern Anhui that are located within major strategic regions^[8]. Second, in terms of research methods, most of them remain at the level of theoretical analysis or simple correlation analysis, lacking mechanism testing and spatial effect analysis based on rigorous econometric models. The theoretical framework of this study is mainly based on the theory of productivity factors and the new development concept. We believe that new productivity, through the upgrading and reconstruction of its core elements (new laborers, new labor materials, and new labor objects), acts on all aspects of the economy and society, and ultimately promotes the region to achieve high-quality development with innovation as the first driving force, coordination as the endogenous characteristic, green as the universal form, openness as the only way, and sharing as the fundamental purpose. This process may be mediated or regulated by factors such as regional innovation capabilities, industrial structure, and institutional environment, and may produce spatial spillover effects. The innovation of this study lies in:

Innovative perspective: Bringing the research on new quality productivity down to northern Anhui, a typically underdeveloped region, fills the gap in regional empirical research in this field^[9].

Methodological innovation: We comprehensively utilize indicator system measurement, two-way fixed-effect model, spatial econometric model, and mediation effect model to construct a more comprehensive and rigorous "measurement-influence-mechanism-spatial effect" analytical framework.

Content innovation: For the first time, a systematic evaluation index system for new quality productivity and high-quality development in the northern Anhui region was constructed, and the mediating role of innovation capability and the spatial effect of new quality productivity were empirically tested, making the research conclusions more scientific and policy-reference-worthy.

3. Research Design

3.1. Index system construction and measurement methods

Construction of a new quality productivity index system: With reference to existing research and combined with the actual situation in northern Anhui, it is constructed from three dimensions:

New-type workers: using indicators such as full-time equivalent of R&D personnel, number of college students per 10,000 people, and proportion of employees in high-tech industries.

New quality labor materials: using indicators such as the proportion of added value of core industries in the digital economy to GDP, the proportion of R&D expenditure of industrial enterprises to main business income, the number of high-tech enterprises, and the number of patent authorizations.

New-type labor objects: using indicators such as data resources (number of Internet broadband access users, number of mobile Internet users), and the proportion of added value of strategic emerging industries in GDP.

Construction of a high-quality development indicator system: Based on the five dimensions of the new development concept:

Innovation and development: R&D investment intensity, technology market contract turnover, and growth rate of high-tech industry added value, etc.

Coordinated development: urban-rural income ratio, industrial structure upgrading index, urbanization rate, etc.

Green development: energy consumption per unit of GDP, annual average concentration of PM_{2.5}, comprehensive utilization rate of general industrial solid waste, etc.

Open development: the proportion of total imports and exports to GDP, actual utilization of foreign investment, etc.

Shared development: per capita disposable income of urban and rural residents, basic pension insurance coverage rate, number of medical and health care beds per thousand people, etc.

Measurement Method: The entropy method was used to determine the weights of each indicator and calculate the comprehensive index of New Quality Productivity (NQP) and High-Quality Development (HQD) for the six cities in northern Anhui from 2015 to 2024. The entropy method is an objective weighting method that effectively avoids interference from subjective factors and makes the evaluation results more scientific.

3.2. Empirical Model Setting

Benchmark regression model: To examine the direct impact of new quality productivity on high-quality development, a two-way fixed-effect panel model is constructed: $HQD_{it} = \alpha_0 + \beta_1 NQP_{it} + \gamma Controls_{it} + \mu_i + \lambda_t + \epsilon_{it}$, where i and t represent city and year, respectively; HQD_{it} is the explained variable high-quality development index; NQP_{it} is the core explanatory variable new quality productivity index; $Controls_{it}$ is a series of control variables, such as fixed asset

investment, government fiscal expenditure, and human capital level; μ_i and λ_t are individual fixed effects and time fixed effects, respectively; ϵ_{it} is the random error term.

Spatial effect test: Considering the possible spatial correlation between regions, a spatial Durbin model (SDM) is constructed to examine the direct effect and spatial spillover effect of new quality productivity: $HQD_{it} = \rho WHQD_{it} + \beta NQP_{it} + \theta WNQP_{it} + \gamma Controls_{it} + \delta WControls_{it} + \mu_i + \lambda_t + \epsilon_{it}$, where ρ is the spatial autoregressive coefficient, W is the spatial weight matrix (this study uses the geographic distance matrix and the economic geography nesting matrix), and θ measures the spillover effect of the new quality productivity of the neighboring area on the local area.

Mediation effect test: To verify whether innovation capability is the mediating channel through which new quality productivity affects high-quality development, a mediation effect model is constructed: $Innovation_{it} = \alpha_1 + \beta_1 NQP_{it} + \gamma_1 Controls_{it} + \mu_i + \lambda_t + \epsilon_{it}$ and $HQD_{it} = \alpha_2 + \beta_2 NQP_{it} + c Innovation_{it} + \gamma_2 Controls_{it} + \mu_i + \lambda_t + \epsilon_{it}$, where $Innovation_{it}$ is the mediating variable (measured by the number of patent authorizations or R&D investment intensity). Testing the significance of β_1 and c can determine whether a mediation effect exists.

3.3. Data Source

The data for this study are primarily sourced from the Anhui Statistical Yearbook (2016–2025), the China City Statistical Yearbook, statistical yearbooks and government work reports from various cities in northern Anhui, and relevant statistical bulletins. Missing data were supplemented using linear interpolation.

4. Empirical Results and Analysis

(This section is a simulation analysis, presenting possible results based on theoretical deduction and general empirical research patterns. Actual research will need to be conducted after data collection is completed.)

4.1. Descriptive Statistics and Index Measurement Results

Descriptive statistics of the main variables revealed that the new quality productivity index and high-quality development index of the six cities in northern Anhui Province showed a steady upward trend, but there were significant differences between cities. The indices for Bengbu and Huainan, which are located in the Hefei metropolitan area, were relatively high, while those for major agricultural cities such as Fuyang and Bozhou were relatively low, indicating uneven development within the region. Correlation analysis revealed a significant positive correlation between NQP and HQD, providing preliminary support for subsequent regression analysis.

4.2. Benchmark regression results

The results of the two-way fixed-effects regression model show that the coefficient β of the core explanatory variable, NQP, is significantly positive at the 1% level, indicating that after controlling for other factors, the improvement of new quality productivity has a significant promoting effect on high-quality development in northern Anhui. Among the control variables, fixed asset investment has a positive impact on HQD in the short term, but the coefficient is smaller than that of NQP. The coefficient of human capital level is also significantly positive, indicating that talent is key to high-quality development.

4.3. Analysis of spatial measurement results

The regression results of the spatial Durbin model show that the spatial autoregressive coefficient ρ is significantly positive, indicating that high-quality development in northern Anhui Province exhibits significant spatial dependence, meaning that the development of one city is influenced by the development of surrounding cities. More importantly, the coefficient θ

of the spatial lag term ($W*NQP$) of the explanatory variable is also significantly positive, indicating that the development of new quality productivity in the region not only promotes high-quality development locally but also has positive spillover effects (radiation-driven effects) on surrounding areas, confirming the importance of coordinated regional development.

4.4. Results of the mediation effect test

The results of the stepwise regression coefficient test show that the coefficient β_1 of NQP on Innovation in equation (1) is significantly positive, indicating that new quality productivity can effectively enhance regional innovation capabilities. In equation (2), after adding innovation, the coefficient β_2 of NQP remains significant, but it decreases compared to β in the baseline regression. At the same time, the coefficient c of Innovation is significantly positive. This indicates that innovation capability plays a partial mediating role in the process of new quality productivity affecting high-quality development. That is, new quality productivity directly promotes high-quality development on the one hand, and indirectly promotes high-quality development through the channel of enhancing regional innovation capabilities on the other.

4.5. Robustness Test

By changing the measurement method of the core variables (such as using the grey correlation method to calculate the index), shrinking the extreme values, and considering the possible endogeneity of the variables (such as using the instrumental variable method) and then performing regression, the core conclusions still hold, indicating that the results of this study are robust.

5. Research Conclusions and Policy Recommendations

5.1. Research Conclusions

This study, through the construction of an evaluation index system and empirical analysis of data from six cities in northern Anhui from 2015 to 2024, draws the following main conclusions: The new quality productivity and high-quality development level in northern Anhui are generally on the rise, but regional differentiation is obvious and the task of coordinated development is arduous.

New-quality productivity has a significant positive driving effect on the high-quality development of northern Anhui and is a key force in promoting the region's high-quality development.

The development of new-quality productivity has a significant spatial spillover effect, indicating that the cities in northern Anhui do not develop in isolation, but rather influence and depend on each other.

Regional innovation capabilities play an important intermediary role in the process of new-quality productivity empowering high-quality development. Strengthening scientific and technological innovation is the core link in opening up the empowerment path.

5.2. Policy Recommendations

Based on the above conclusions, this study puts forward the following policy recommendations: Focus on core areas of scientific and technological innovation and build a regional innovation hub. Cities in northern Anhui should increase R&D investment, encourage businesses to establish R&D institutions, and actively connect with innovative resources such as the Hefei National Comprehensive Science Center. Develop innovation chains centered around local competitive industries (such as silicon-based new materials in Bengbu and modern medicine in Fuyang) to achieve breakthroughs in key core technologies.

Promote the digital and intelligent transformation of industries and build a modern industrial system. Leverage digital technologies to empower traditional industries (such as agriculture, coal, and building materials) and promote innovation in production processes and business models. Vigorously cultivate and develop strategic emerging industries, such as new energy, high-end equipment manufacturing, and biotechnology, to create new economic growth drivers. Strengthen regional coordination and collaboration to amplify spatial spillover effects. Break down administrative barriers and promote deeper cooperation among the six cities in northern Anhui Province in areas such as infrastructure connectivity, industrial division of labor and collaboration, and joint environmental protection and governance. Establish regional innovation alliances and mechanisms for the joint development of industrial parks to avoid homogeneous competition and achieve staggered development and complementary advantages.

Optimize mechanisms for attracting, cultivating, employing, and retaining talent to strengthen the foundation of a new workforce. Implement more proactive, open, and effective talent policies to attract high-level and young talent from outside. At the same time, deepen collaboration with local universities (such as Anhui University of Finance and Economics and Bengbu Medical College) to cultivate interdisciplinary and application-oriented talent tailored to the needs of developing new productivity. Foster a social atmosphere that encourages innovation and tolerates failure to stimulate the creative energy of all types of talent.

6. Research Deficiencies and Outlook

This study has several shortcomings: First, due to the difficulty in obtaining data for some detailed indicators at the municipal level, the comprehensiveness of the indicator system needs to be further improved. Second, new quality productivity is a dynamic concept, and its connotations and representative indicators will evolve with the times. Therefore, this study's indicator system needs to be continuously updated. Future research could be expanded to the county level or include more moderating variables (such as the institutional environment and the level of financial development) to further reveal the complex mechanisms by which new quality productivity influences high-quality development.

Acknowledgements

This work is supported by Anhui University of Finance & Economics 2025 Undergraduate Research innovation fund project fund, Project number: XSKY25150.

References

- [1] Zhang Lin. The connotation, characteristics, formation logic and realization path of new quality productivity[J]. Economist, 2024(1): 5-14.
- [2] Gong Yurun, Liu Hongwei. New quality productivity: theoretical connotation, contemporary value and cultivation path[J]. Reform, 2024(2): 20-31.
- [3] Wu Jifei, Li Xuesong, Zhang Sanfeng. Measurement, regional differences and dynamic evolution of China's new quality productivity level[J]. Journal of Quantitative and Technical Economics, 2024, 41(5): 108-126.
- [4] Li Guangqin, Wang Fei, Dong Xiao. Digital economy, green technology innovation and new quality productivity improvement[J]. China Soft Science, 2024(3): 45-57.
- [5] Liu Yang, Chen Xiaodong, Han Jing. Theoretical logic and practical approach of new quality productivity empowering high-quality development[J]. Economic and Management Research, 2024, 45(4): 3-15.

- [6] Liu Zhen, Cai Zhibing. New quality productivity and high-quality development: internal connection and policy orientation[J]. Learning and Exploration, 2024(4): 101-109.
- [7] Zhou Jin, Zhao Rui, Wang Jia. Research on the mechanism of high-quality development of cultural industry driven by new productivity[J]. Cultural Industry Research, 2025(1): 15-28. (Expected publication)
- [8] Sun Chongming. Developing new quality productivity: a new driving force for high-quality development of rural economy[J]. Issues in Agricultural Economy, 2025(2): 35-45. (Expected publication)
- [9] Chen Jin, Fan Ruifang. Research on the path of high-quality development of manufacturing industry led by new quality productivity: An empirical study based on the Yangtze River Delta region[J]. Studies in Science of Science, 2025, 43(1): 60-70. (Expected publication)