

New Quality Productivity Enabling High Quality Economic Development

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Abstract—New quality productivity is a new type of productivity in line with China’s new development concept, it breaks away from traditional low-efficiency, high-consumption production processes, characterized by high efficiency and high quality, driving economic development. This study analyses the impact of new quality productivity on high-quality economic development from the theoretical level, and empirically analyses the impact of new quality productivity on high-quality economic development based on panel data from 31 provinces in China from 2010 to 2022. The study finds that new quality productivity significantly promotes high-quality economic development, which is validated by robustness tests. New quality productivity empowers high-quality economic development through enhancing labor productivity. Heterogeneity analysis indicates that the promotion effect of new quality productivity is more pronounced in the western regions. This suggests that local governments should strengthen measures to promote the development of new quality productivity in the western regions, thereby achieving high-quality economic development.

Keywords—new quality productivity, high-quality development, labor productivity

I. INTRODUCTION

High-quality economic development is a distinctive feature of the new era of socialism with Chinese characteristics and a significant strategic pillar supporting China’s modernization efforts. After China has entered a new stage of development, the core challenge facing its economic development is how to rapidly improve productivity levels and achieve high-quality economic development (Xu and Guo, 2024). In September 2023, during his inspection tour of Heilongjiang, General Secretary Xi Jinping introduced the concept of “new productive forces.” He emphasized the need to “integrate scientific and technological innovation resources, lead the development of strategic emerging industries and future industries, and accelerate the formation of new productive forces.” The introduction and refinement of this concept are crucial components of the primary task of firmly grasping high-quality development and the strategic task of constructing a new development pattern in the new era and on the new journey.

Scholars have primarily focused their research on new quality productivity in terms of its conceptualization, formation conditions, and future development directions (Zhang and Tang, 2024; Sheng, 2024). In studies linking new quality productivity to high-quality economic development, researchers argue that high-quality development represents the advancement of productivity. The inherent logic of new quality productivity empowering high-quality development lies in leveraging new technologies to accelerate changes in production methods, enhancing economic growth rates through new driving forces, and elevating economic development quality through new standards (Shen *et al.*,

2024). The development of new quality productivity necessitates vigorous efforts from multiple perspectives, including scientific and technological innovation, talent cultivation mechanisms, industrial development environments, and the establishment of international innovation platforms, aimed at achieving high-quality economic development (Han and Ma, 2024).

In the broader context where new quality productivity is emerging as a core element of China’s future development, studying its potential to promote high-quality economic development is of significant importance. Compared to existing literature, this paper may contribute in two main aspects: First, while existing literature predominantly examines the impact of new quality productivity on high-quality economic development from a theoretical perspective, this study takes an empirical approach. It designs a framework of indicators for new quality productivity and high-quality economic development, empirically investigates the effects of new quality productivity on high-quality economic development, thus supplementing existing literature. Secondly, this paper explores for the first time the impact mechanism of high-speed rail opening on shared prosperity from the perspective of labor productivity, and integrates regional heterogeneity to empirically investigate how new quality productivity influences high-quality economic development.

II. THEORETICAL ANALYSIS AND RESEARCH HYPOTHESES

A. Direct Impact of New Quality Productivity on High-Quality Development

New quality productivity is crucial for promoting high-quality economic development. Specifically, it primarily enhances innovation capability, promotes sustainable green economic development, and improves societal well-being.

Firstly, new quality productivity represents the productivity resulting from critical and disruptive technological breakthroughs. With the advent of a new era of technological revolution, the application and innovation of next-generation digital technologies such as artificial intelligence, blockchain, and Internet of Things have not only enhanced production efficiency but also driven the emergence of new production sectors and economic models. This transformation has facilitated the shift from old to new growth drivers, catalyzing industrial reform and fostering the formation and development of emerging industries and formats. It has helped enterprises explore new markets, enhance product value-added, and secure more favorable positions in global competition, thereby promoting high-quality macroeconomic growth (Chao and Wang, 2024).

Secondly, new quality productivity not only drives

economic growth but also emphasizes environmental protection and resource conservation, promoting sustainable economic development. It advocates for clean production technologies and renewable energy, aiming to reduce pollutant emissions and resource consumption. Through recycling and reusing waste materials, it minimizes dependence on natural resources and lowers environmental impact. New quality productivity underscores green and sustainable development by reducing resource consumption, optimizing energy utilization, and mitigating environmental burdens. This approach fosters the sustainable development of enterprises and entire industrial chains. It not only addresses environmental challenges but also meets the growing consumer demand for environmental consciousness, enhancing corporate social responsibility and image, and promoting sustainable economic growth (Xu *et al.*, 2023).

Thirdly, new quality productivity effectively breaks through traditional consumption bottlenecks to meet consumers' personalized, diversified, and high-quality consumption demands. It drives supply-side reforms to adapt to the increasing aspiration for a better quality of life among consumers. New quality productivity promotes the innovation of daily lifestyles through the practical application of information technology, facilitating convenience in daily necessities. It also enriches people's daily lives with a broader range of cultural products at the spiritual level. Simultaneously, it enhances the supply of regional public services and social security levels. Leveraging advanced technologies such as digitization, it facilitates convenient sharing of high-quality public services over larger geographical areas. These advancements collectively propel high-quality economic development (Jia *et al.*, 2024).

Based on the preceding discussion, this paper posits Hypothesis 1: New quality productivity promotes high-quality economic development.

B. The Indirect Impact of New Quality Productivity on High-Quality Development

On one hand, new quality productivity emphasizes technological innovation and knowledge accumulation. By continuously advancing the innovation and application of technology, it can sustainably enhance productivity levels and steadily increase labor productivity over the long term. The introduction of advanced production technologies and automation systems significantly improves efficiency during production. Applications such as automated production lines, robotics, and smart manufacturing systems reduce the need for manual operations, thereby increasing production speed and precision, laying a foundation for long-term productivity growth (Hu and Liu, 2023). New quality productivity not only focuses on technological adoption but also includes optimizing management practices such as lean production and agile manufacturing. These management methods effectively streamline labor processes and resource allocation, reduce unnecessary waste, enhance work efficiency, and consequently boost labor productivity. Introducing new quality productivity requires employees to possess higher technical and operational capabilities. Companies typically enhance employee skills through training and education to meet the demands of new technologies and processes. This skill enhancement not only helps in improving labor

efficiency but also raises overall levels of labor productivity (Hao, 2024).

On the other hand, high labor productivity means that a unit of labor input can generate more output. At the macroeconomic level, high labor productivity can drive optimization and upgrading of economic structures, enabling more efficient resource allocation and enhancing overall economic efficiency. High labor productivity directly promotes economic growth by increasing the quantity of goods and services produced per unit of time, thereby boosting total output of the national economy. Economic growth isn't just about quantity; it crucially involves improving quality. High labor productivity supports the economy's progression towards innovation-driven and high-quality development directions (Liu *et al.*, 2024). High labor productivity typically accompanies increases in workers' wages. Efficiency and output contribute to creating more economic value for businesses. This added value can be returned to workers through wages, benefits, or other forms, thereby improving their quality of life and enhancing social stability and sustainable development. Achieving high labor productivity necessitates continuous technological innovation and management optimization by businesses to enhance production efficiency. This pressure drives enterprises to continually progress in technology and management, promoting the upgrading and transformation of industrial structures. By introducing advanced technologies and production methods, high labor productivity facilitates economic development towards industries with high value-added and high technological content, thereby enhancing overall economic competitiveness and innovation capabilities (Zhang *et al.*, 2023).

Based on the preceding discussion, this paper posits Hypothesis 2: New quality productivity promotes high-quality economic development through increased labor productivity.

III. STUDY DESIGN

A. Model Settings

1) The baseline regression

To investigate the impact of new quality productivity on high-quality economic development, this paper constructs the following baseline regression model.

$$Hig_{i,t} = \beta_0 + \beta_1 Nqp_{i,t} + \beta_n Controls_{i,t} + \sigma_i + \gamma_t + \varepsilon_{i,t} \quad (1)$$

$Nqp_{i,t}$ represents the level of new quality productivity development in province (i) during period (t), $Hig_{i,t}$ denotes the level of high-quality economic development in province (i) during period (t), and $Controls_{i,t}$ is a set of control variables. The model also incorporates time fixed effects, province fixed effects, and random disturbances. then β_1 should be significantly positive; conversely, if β_1 is significantly negative, it indicates that new quality productivity suppresses high-quality economic development.

2) The mechanism regression models

This paper introduces an interaction term between the mechanism variable (M) and the new quality productivity variable to examine whether (M) serves as a mechanism variable for new quality productivity and shared prosperity.

The specific model is as follows:

$$Hig_{i,t} = \beta_{01} + \beta_{11}Nqp_{i,t} + \beta_{21}M_{i,t} + \beta_{31}M_{i,t} \times Nqp_{i,t} + \beta_{n1}Controls_{i,t} + \sigma_i + \gamma_t + \epsilon_{i,t} \quad (2)$$

$M_{i,t}$ represents the mechanism variable, and $M_{i,t} \times Digit_{i,t}$ denotes the interaction term between the mechanism variable and the new quality productivity variable. This paper observes the coefficients β_{31} and β_{11} . If β_{31} is positive and statistically significant along with β_{11} , it indicates that the effect of new quality productivity on high-quality economic development strengthens with increasing values of the mechanism variable. If β_{31} is statistically significant in empirical analysis, it signifies the presence of a significant moderating effect observed.

B. Indicator Construction

1) New quality productivity

In the context of modern economics, new quality productivity refers to enhanced productivity across labor, labor resources, labor subjects, and related industries. This concept is derived from studies by Han *et al.* (2024) and Lu *et al.* (2024). This paper selects 20 secondary indicators across four dimensions—new labor force, new labor resources, new labor subjects, and output from emerging industries—to measure the development level of new quality productivity at the provincial level in China. The specific indicators are detailed in Table 1. The study utilizes the entropy weight method to compute these selected indicators, resulting in a comprehensive index system for new quality productivity denoted as Nqp.

Table 1. New quality productivity index system

Primary indicators	Secondary indicators
New labor force	Number of employees in emerging industries
	Number of R&D personnel in high-tech enterprises
New Labor Data	Industrial robot installation density
	Mobile base station density
	Number of data exchanges
	Length of long-distance optical cables
	Integrated circuit production output
New Labor Targets	Number of internet broadband access ports
	Proportion of new energy generation
	Number of ultra-high voltage transmission lines
	Efficiency of new energy utilization
	Output value of new materials enterprises
Output of Emerging Industries	Number of new materials enterprises
	Number of artificial intelligence enterprises
	Revenue from high-tech industries
	Number of patents applied by high-tech enterprises
	Income from enterprise information technology services
Output of Emerging Industries	Revenue from software services
	Number of research and development projects in industrial enterprises
	E-commerce sales of enterprises

2) High-quality economic development

Promoting high-quality economic development is central to building a modern economic system in China and objectively measuring the level of such development contributes to sustainable economic growth. This study, referencing Sun *et al.* (2020), adopts 15 secondary indicators across five dimensions—innovative development,

coordinated development, green development, open development, and inclusive development—to assess the level of high-quality economic development at the provincial level in China. These specific indicators are detailed in Table 2. Consistent with the preceding discussion, the entropy weighting method is utilized to fit these secondary indicators, calculating the composite variable for high-quality economic development, denoted as Hig.

Table 2. High-quality economic development index system

Primary indicators	Secondary indicators
Innovative Development	Total transaction volume of technology transfers
	Intensity of enterprise R&D investment
	Investment efficiency
Coordinated Development	Total retail sales of consumer goods
	Urbanization rate
	Total government debt
Green Development	Energy consumption elasticity coefficient
	Wastewater emissions per unit of output
	Air pollutants emissions per unit of output
Open Development	Total import and export volume
	Total foreign investment
	Regional marketization index
Inclusive Development	Elasticity of household income growth
	Urban-rural income gap
	Proportion of fiscal expenditure on people's livelihoods

3) Mechanism variables

The rapid development of new productive forces has led to a sharp increase in labor productivity, driving high-quality economic development in China. This study references the research of Yu and Qi (2024), using the ratio of regional GDP to the total number of employed persons in the study area to measure provincial-level labor productivity in China, denoted as Lab.

4) Control variables

To comprehensively analyze the impact of new quality productivity on high-quality economic development, this study selects the following control variables. (1) Economic Development Level (LnGDP): Gross Domestic Product with a natural logarithm transformation. (2) Population Density (POP): Ratio of permanent residents to regional administrative area. (3) Transportation Infrastructure Level (Tran): Total freight volume with a logarithm transformation. (4) Government Scale (Gov): Ratio of general budgetary expenditure of local finances to GDP. (5) Industrialization Level (Indu): Ratio of industrial value added to GDP. (6) Industrial Structure (Fra): Ratio of value added of the tertiary industry to the secondary industry. (7) Education Level (Edu): Average years of education.

C. Data Sources

This article utilizes data from 31 Chinese provinces spanning from 2010 to 2022 as research samples, aiming to construct an index system for new quality productivity and high-quality economic development. It empirically examines the impact of new quality productivity on high-quality economic development. Data for the relevant variables primarily come from sources such as the “China Provincial Statistical Yearbook,” “China Energy Statistical Yearbook,” “China Financial Yearbook,” “China Rural Statistical Yearbook,” the China National Research Database (CNRND), the Guotai An (CSMAR) database, the National Bureau of Statistics, and provincial statistical bureaus.

IV. EMPIRICAL ANALYSIS

A. Baseline Results

This study employs a dual fixed-effects model for parameter estimation. After incorporating control variables, provincial fixed effects, and time fixed effects, empirical analysis using Eq. (1) examines the relationship between high-speed rail development and shared prosperity. Table 3 reports the baseline regression results in the first column, presenting estimated coefficients. The regression results indicate that the estimated coefficient of the core explanatory variable is positive and statistically significant at the 1% level. This suggests that the development of new quality productivity promotes high-quality economic development. The estimated coefficient of 0.117 implies that a one-unit increase in new quality productivity is associated with a 0.117 unit increase in high-quality economic development. The baseline regression coefficient estimates confirm hypothesis one of the study, indicating that new quality productivity facilitates high-quality economic development.

Table 3. Regression results

	(1)	(2)	(3)	(4)
Hig	0.117*** (0.033)	0.150*** (0.039)	0.165*** (0.061)	0.189*** (0.051)
LnGDP	0.027* (0.015)	0.040*** (0.013)	0.027*** (0.009)	0.055*** (0.016)
Pop	-0.000*** (0.000)	-0.000*** (0.000)	-0.000 (0.000)	-0.000*** (0.000)
Tran	-0.017** (0.007)	-0.011* (0.007)	-0.009 (0.007)	-0.020*** (0.007)
Gov	-0.007 (0.035)	0.065* (0.034)	0.085 (0.053)	0.035 (0.032)
Indu	0.018*** (0.006)	0.009 (0.039)	0.005 (0.045)	0.032 (0.041)
Fra	0.000 (0.002)	0.020*** (0.007)	0.005 (0.010)	0.030*** (0.008)
Edu	0.248 (0.203)	-0.002 (0.002)	-0.006* (0.003)	-0.008* (0.004)
cons	0.198 (0.140)	0.024 (0.127)	0.109 (0.108)	0.014 (0.141)
N	403	403	403	351
individual fixed	Y	Y	Y	Y
Fixed time	Y	Y	Y	Y
r2	0.982	0.982	0.978	0.951

Note: ***, **, * denote significance levels at 1%, 5%, and 10%, respectively. Standard errors robust to the provincial level are shown in parentheses.

B. Robustness Check

1) Impact of outliers

Considering the possibility of extreme values in certain variables, this study performed truncation at the 1% and 5% levels for both the dependent variable, explanatory variables, and the control variable set to mitigate the potential impact of outliers on the baseline regression results. The regression analysis using Eq. (1) was then re-conducted, with the results presented in columns (2) and (3) of Table 3. The regression results indicate that after removing the influence of outliers, the coefficient estimate for Hig exhibits minimal change and remains statistically significant at the 1% level. This finding is consistent with the baseline regression, confirming the robustness of our initial findings.

2) Exclude samples from municipalities directly under central government administration

Compared to other provinces, municipalities directly under central government administration (direct-controlled municipalities) possess more privileges and resources. To mitigate their potential influence on regression results, this study excluded samples from four direct-controlled municipalities for parameter estimation. The regression results, shown in column (4) of Table 3, indicate that the parameter estimates remain statistically significant after excluding direct-controlled municipality samples, validating the robustness of the baseline regression results.

C. Mechanism Analysis

Building upon the mechanism variable testing process described earlier, this study employs Model (2) to examine whether labor productivity acts as a moderator in facilitating high-quality economic development through the boost of new-quality productivity. The regression results, presented in Table 4 (1), indicate that the core explanatory variable is positive, and the coefficient of the moderating variable is also positive and statistically significant at the 1% level, suggesting that new-quality productivity promotes high-quality economic development by influencing labor productivity. This underscores the need for local governments to strongly support the diffusion of new-quality productivity to enhance labor productivity and drive high-quality economic development. Thus, it validates Hypothesis 2: new-quality productivity promotes high-quality economic development by enhancing labor productivity.

Table 4. Regression results

	(1)	(2)	(3)	(4)
Hig	0.217*** (0.043)	0.061 (0.035)	0.010 (0.175)	0.700*** (0.136)
Nqp×Lab	0.013*** (0.004)			
Lab	0.001*** (0.000)			
cons	0.186 (0.133)	0.723*** (0.269)	-0.415 (0.301)	-0.153 (0.294)
N	403	143	104	156
Controls	Y	Y	Y	Y
individual fixed	Y	Y	Y	Y
Fixed time	Y	Y	Y	Y
r2	0.983	0.992	0.855	0.904

D. Heterogeneity Analysis

This study further divides provinces nationwide into eastern, central, and western regions, examining the impact of new-quality productivity development on high-quality economic development in each region. The results are shown in columns (2) to (4) of Table 4. It is observed that the promotion effect of new-quality productivity on economic growth is more significant in the western region, while it is not significant in the eastern and central regions. This conclusion aligns with the findings of Han *et al.* (2024), suggesting that the differentiated impact of new-quality productivity across regions is mainly due to the relatively developed economy and strong traditional industrial base in the eastern and central regions. Emerging industries also tend to develop first in these regions, resulting in lower marginal

effects of new-quality productivity development on high-quality economic growth. In contrast, in the western region, the development of new-quality productivity has displaced and replaced traditional productivity, potentially turning the development disadvantages of economically lagging areas into new economic growth points and opportunities for leapfrogging. Some shortcomings of traditional productivity could also become strengths of new-quality productivity. For instance, in the new energy industry, regions such as deserts and wastelands, which were previously economically unfeasible, are now becoming major hubs for large-scale wind and solar energy projects in China. Additionally, the western and northeastern regions have greater potential and room for growth in new-quality productivity development. Once effectively leveraging various social innovation resources, these regions could experience explosive growth.

V. CONCLUSION

A. Summary

The study utilizes panel data from 31 provinces in China spanning from 2010 to 2022 to empirically assess the impact of new-quality productivity on high-quality economic development. The research reveals several findings: Firstly, new-quality productivity empowers high-quality economic development, with the estimated coefficients of core explanatory variables remaining significant following robustness tests. Secondly, labor productivity serves as a mediating variable between new-quality productivity and high-quality economic development, underscoring its practical importance in enhancing economic development through new-quality productivity. Thirdly, the impact of High-Speed Rail (HSR) openings on shared prosperity among all citizens exhibits regional heterogeneity, with the western regions showing a more pronounced promotion effect. Accordingly, governments should tailor policies promoting new-quality productivity development based on urban development statuses to foster balanced regional development.

B. Recommendations

Based on the above conclusions, this article derives the following insights: Firstly, governments can increase funding support for basic research and frontier technology fields to nurture emerging industries and high-tech enterprises. They can establish national and local innovation platforms such as technology parks, incubators, and industry alliances to promote collaboration between academia, industry, and research, facilitating technology transfer and establishing mechanisms for converting scientific achievements into productivity efficiently. Secondly, adjusting the education system is crucial, focusing on fostering innovation and practical skills. Particularly in higher education and vocational training, integrating more science and engineering courses is essential. Establishing and promoting a lifelong learning system, along with convenient online education and vocational training platforms, enables workers to continuously enhance their skills and adapt to rapidly changing technological environments. Thirdly, for high-tech industries, developing industrial policies to support their growth is vital. This includes measures such as tax incentives

and financing support to foster the growth of technology-oriented Small and Medium-sized Enterprises (SMEs). It also involves promoting technological transformation and intelligent upgrades in traditional industries, facilitating the transition of manufacturing towards smart and green manufacturing. This enhances the added value and competitiveness of traditional industries and accelerates the development of productive service industries, such as financial services, R&D services, and information services, providing support for the transformation and upgrading of manufacturing.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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