Empirical Study on High Quality Development of Enterprises from the Perspective of New Quality Productivity

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Abstract. Based on the financial data of listed companies in 2011 —— 2022, the paper uses the bidirectional fixed effect panel data model to empirically study the impact of new quality productivity on the high-quality development of enterprises. Research found that improving the level of new quality productivity of enterprises can promote the high-quality development of enterprises, and the selection of strategic emerging industries as samples to further verify the new quality productivity level of enterprises to promote the high-quality development of enterprises. The improvement of financing constraint FC index reduces the positive impact of the level of new quality productivity of enterprises on the high-quality development of enterprises.

Keywords: New Quality Productivity; High-Quality Development; Panel Data Model

1   Introduction

Against the backdrop of unprecedented changes in the world today, the emergence of new qualities and new productive forces in the economic field is a natural evolution that conforms to the general trend and logic1. The new round of technological and industrial revolution happening globally today will bring about profound and fundamental changes in human survival, life, and production methods, resulting in a qualitative leap. In China, the transition from the "new normal of the economy" and "new development concept" to "high-quality development" and "new productive forces" is a continuous scientific advancement. In the process of China's economic transformation and upgrading, new quality and productivity are constantly emerging. What is productivity? The classical theory holds that productivity is the material force that humans use and transform nature. It is the ability of people with labor ability to conquer and transform nature, combined with means of production (production tools and labor objects), reflecting the relationship between humans and nature and the degree of human civilization progress.

2   Literature Review

The concept of new quality productivity is mainly driven by technological innovation, supported by the cultivation and formation of strategic emerging and future industries. The introduction of the concept of new quality productivity inherits the basic views of Marxism, endows the era with new connotations, and is an important theoretical innovation. New quality productivity is based on the new scientific and technological revolution and industrial revolution. It is a new high-level modern productivity and the productivity foundation for promoting Chinese path to modernization. Chinese path to modernization and high-quality development need to form and develop new quality productivity2 . The inherent characteristics of new quality productivity: Firstly, from the perspective of development philosophy, new quality productivity is a new development paradigm that can adapt to international new rules and transform the production pattern. Secondly, from the perspective of development content, new quality productive forces themselves are a form of competitiveness. Thirdly, from the perspective of development mode, innovation is the foundation of new quality productivity, and technology is the tool of new quality productivity3 . The new quality productivity of enterprises also affects their high-quality development. From the perspective of supply, the focus of high-quality development is to improve efficiency (or total factor productivity), drive the economy towards high-quality and efficient development, and continuously release development efficiency; From the perspective of demand, it should better meet the growing needs of the people for a better life 4.A large amount of literature has been accumulated globally on the factors influencing total factor productivity (TFP). Scholars such as Miller and Upadhyay (2000) have found that international trade openness promotes the cross-border dissemination of technology, known as technology spillover effects, which have a positive effect on improving total factor productivity9. Hsieh and Klenow's (2009) study suggests that effective allocation of factor resources is crucial for improving total factor productivity, and inefficient resource allocation can lead to productivity losses10.

3   Research Hypotheses

The endogenous growth theory believes that economic growth is driven by internal factors such as technological innovation and human capital accumulation within the economic system, which is closely related to the emphasis on technology and knowledge in the new quality productivity. High level of new quality productivity means that enterprises can more effectively research and introduce new technologies. Enterprises with higher levels of new quality productivity are usually better at utilizing and allocating resources, including funds, talents, raw materials, etc. The new quality productivity of enterprises also affects their high-quality development. By improving the level of new quality productivity, enterprises can better adapt to market changes, enhance core competitiveness, and achieve sustainable high-quality development. Therefore, Hypothesis Study 1 is proposed.

H1: The level of new quality productivity has a significant promoting effect on the high-quality development of enterprises.

Due to increasingly fierce market competition, capitalists can only increase their investment to obtain more surplus value. Enterprises need to stand invincible in market competition, which means they need to be competitive, able to meet consumer needs, and provide competitive products or services. Based on this, hypothesis 2 is proposed in this article.

H2: Capital accumulation plays a positive regulatory role between the level of new quality productivity and the high-quality development of enterprises.

The endogenous growth theory suggests that economic growth stems from continuously acquiring new knowledge and applying it to production, while requiring support from favorable market conditions, property rights systems, political stability, and macroeconomic stability8. According to Heiskanen's (2017) research, the effective reduction of financing channels and costs will have a positive driving effect on expanding corporate investment, thereby alleviating the financing constraints of enterprises and ultimately benefiting the improvement of total factor productivity of enterprises7. Based on this, this article proposes hypothesis 3.

H3: Financing constraints play a negative regulatory role between the level of new quality productivity and the high-quality development of enterprises.

4 Research Design

4.1 Variable Selection

The dependent variable: Therefore, this article uses total factor productivity (TFP_FE) of enterprises as a measure of high-quality development, and draws on the calculation method of total factor productivity by Lu Xiaodong and Lian Yujun (2012) to calculate the total factor productivity of sample enterprises under the FE method for empirical analysis5.

Core explanatory variable: Drawing on Song Jia, Zhang Jinchang, and Pan Yi (2024) to construct a new quality productivity indicator system (NPro) based on the theory of two factors of productivity as the core variable indicator of this article6.

Adjusting variable: Capital Accumulation Rate (RCA) and Financing constraints (FC).

Control variable: Company age (Age); Asset liability ratio (Lev); Return on Assets (ROA); Enterprise value (Tobin Q); Dual; Asset to current ratio (Liquid); Year , Industry .

4.2 Model Setting

Build model (1) to test the impact of new quality productivity level on the high-quality development of enterprises:

$$\text{TFP\_FE}_{i,t} = \alpha_0 + \alpha_1 \text{NPro}_{i,t} + \alpha_2 \text{Controls}_{i,t} + \alpha_i + \lambda_t + \varepsilon_{i,t} \tag{1}$$

Among them, i represents the individual, t represents the year, represents the individual fixed effect, represents the time fixed effect, is the disturbance term that changes with the individual and time, and Controls is the control variable, the same below.

Build model (2) to test the positive moderating effect of capital accumulation between the level of new quality productivity and the high-quality development of enterprises, and introduce an interaction term between the level of new quality productivity and the rate of capital accumulation in enterprises.

$$\text{TFP\_FE}_{i,t} = \beta_0 + \beta_1 \text{NPro}_{i,t} + \beta_2 \text{NPro}_{i,t} \times \text{RCA}_{i,t} + \beta_3 \text{Controls}_{i,t} + \alpha_i + \lambda_t + \varepsilon_{i,t} \quad (2)$$

Build model (3) to test the negative moderating effect of financing constraints (FC) on the level of new quality productivity and high-quality development of enterprises, and introduce an interaction term between the level of new quality productivity and financing constraints of enterprises.

$$\text{TFP\_FE}_{i,t} = \gamma_0 + \gamma_1 \text{NPro}_{i,t} + \gamma_2 \text{NPro}_{i,t} \times \text{FC}_{i,t} + \gamma_3 \text{Controls}_{i,t} + \alpha_i + \lambda_t + \varepsilon_{i,t} \quad (3)$$

4.3 Data Sources

This article selects data from A-share listed companies from 2011 to 2022, excludes ST, * ST, and PT listed companies, excludes samples from the financial and real estate industries, and excludes samples with missing new productivity indicators. Finally, 16812 sample data are obtained. The data used in this article are all from the Guotai An database.

5 Empirical Analysis

5.1 Descriptive Statistics

Table 1 presents the descriptive statistics of each variable and the results of the variance inflation factor (VIF) test. The mean of the dependent variable TFP_FE is 11.723, the median is 11.594, and the standard deviation is 1.371, indicating that the total factor productivity indicators used in the sample have certain volatility and can be used for regression analysis. The minimum value is 7.074 and the maximum value is 18.069, indicating that there is a certain gap in total factor productivity among the sample enterprises; The mean of the explanatory variable NPro is 5.122, the median is 4.799, and the standard deviation is 2.422, indicating that the level of new quality productivity of the sample enterprises follows a normal distribution, with a minimum value of 0.106 and a maximum value of 32.475. This indicates that there are significant differences in the level of new quality productivity among different enterprises, and the sample coverage selected in this article is relatively wide. However, there are significant differences between the minimum and maximum values of other control variables, which can provide a good control effect on the research in this article. The final test results of the

variance inflation factor (VIF) for each variable show that the VIF values are all between 1 and 2, all below 5, so there will be no multicollinearity issues between the variables.

Table 1. Descriptive statistics and VIF results

Variable name	sample size	mean	median	standard deviation	minimum	maximum	VIF
TFP_FE	16812	11.723	11.594	1.371	7.074	18.069	1.56
NPro	16812	5.122	4.799	2.422	0.106	32.475	1.05
Age	16812	2.504	2.639	0.614	0.288	3.401	1.25
Lev	16812	0.436	0.438	0.196	0.007	1.484	1.96
Board	16812	2.155	2.197	0.198	1.099	2.89	1.07
Liquid	16812	2.236	1.516	2.502	-0.266	29.916	1.71
TobinQ	16812	1.922	1.535	1.232	0.627	15.607	1.14
Dual	16812	0.213	0	0.41	0	1	1.07

5.2   Benchmark Regression Analysis

Regression Analysis Based on Benchmarks of Listed Companies

Table 2 shows the results of the baseline regression. The first column reports the regression results of the relationship between new quality productivity and high-quality development of enterprises without controlling variables and fixed effects. The regression coefficient of new quality productivity (NPro) of enterprises is 0.059, which is significant at the 1% level; The second column represents the fixed effects without the inclusion of control variables, industry, and year. The results show that the coefficient of NPro for enterprises is 0.033, which is significant at the 1% level; The third column represents the fixed effects of controlling variables, industry, and year, and the results show that the coefficient of NPro for enterprises is 0.021, which is significant at the 1% level. From all the results, it can be seen that without the addition of control variables and control variables, as well as without the addition of fixed effects and fixed effects, the coefficient of new quality productivity (NPro) of enterprises is significantly positive at the 1% level, indicating that the level of new quality productivity of enterprises has a significant positive impact on their high-quality development. Therefore, hypothesis H1 is valid. Exploring the reasons, enterprises can improve production efficiency and reduce production costs through the introduction of new technologies and innovations. The application of production models can improve product quality, enhance service levels, and thus enhance the competitiveness of enterprises, promoting high-quality development of enterprises.

Table 2. Benchmark regression results for listed companies

	(1) TFP_FE	(2) TFP_FE	(3) TFP_FE
NPro	0.059***	0.033***	0.021***
	(4.8187)	(4.6332)	(2.9737)

Control Variable	NO	NO	Yes
_cons	11.421***	11.859***	10.292***
	(162.5689)	(545.6265)	(46.9477)
Year fe	No	Yes	Yes
ID fe	No	Yes	Yes
N	16812	16812	16812
Adj. R2	0.011	0.894	0.902

Regression Analysis Based on Benchmarks for Strategic Emerging Industry Companies

Strategic emerging industries refers to the important position in the national economic development and strategic significance, with high growth rate and strong competitiveness, and the economic structure adjustment, industrial upgrading and technological innovation industry, these industries are usually at the forefront of new technology, new industries and new forms, is to promote economic transformation and upgrading, improve the economic quality and efficiency of the key areas. New quality productivity refers to the productivity change driven by the new generation of technologies such as information technology, artificial intelligence and biotechnology. Therefore, the new quality productivity provides the development direction and power for strategic emerging industry enterprises, and at the same time also puts forward higher requirements for these enterprises, requiring them to carry out reform and innovation in scientific and technological innovation, industrial upgrading, allocation of production factors, organization and management and other aspects, so as to adapt to the development needs of the new era. So this paper selected 327 strategic emerging industry enterprises as a sample, further study the influence of new quality productivity on enterprise development of high quality, the results show without control variables and fixed effect and add fixed effect enterprise new quality productivity (NPro) at 1% level, add control variables and fixed effect enterprise new quality productivity (NPro) are significant at 5% level, further verify the hypothesis H1.

Table 3. Strategic emerging industry enterprise benchmark regression results

	(1)	(2)	(3)
	TFP_FE	TFP_FE	TFP_FE
NPro	0.129***	0.053***	0.040**
	(3.7070)	(3.1037)	(2.3913)
Control Variable	No	No	Yes
_cons	11.220***	11.848***	10.428***
	(60.9188)	(116.1499)	(25.3369)
Year fe	No	Yes	Yes
ID fe	No	Yes	Yes
N	3924	3924	3924
Adj. R2	0.032	0.905	0.911

5.3   Robust Analysis

Replacement by the Explanatory Variable

The variables explained in this paper are the high-quality development of enterprises, And, as measured by the total factor productivity of the enterprise, The calculation methods of total factor productivity include OP method, FE method, LP method, OLS method and GMM method, In this paper, the OP method is used instead of the explained variable for the robustness analysis, The results are shown in Table 4 (2), It is known that the coefficient of NPro by OP method is 0.016 and significantly positive at 1% level is consistent with the regression results of FE method in Table 4 (1), It shows that after replacing the high-quality development of the enterprise, The level of new quality productivity has a positive and significant impact on the high-quality development of enterprises, This paper assumes that H1 is preliminarily verified.

Table 4. Robustness test

	(1) TFP_FE	(2) TFP_OP	(3) TFP_FE
NPro	0.021***	0.016***	0.021***
	(2.9737)	(2.6711)	(2.9846)
Control Variable	Yes	Yes	Yes
Growth			0.016**
			(2.3342)
DLCR			-0.037
			(-0.6857)
_cons	10.292***	5.722***	10.293***
	(46.9477)	(34.2685)	(47.4492)
Year fe	Yes	Yes	Yes
ID fe	Yes	Yes	Yes
N	16812	16812	16812
Adj. R2	0.902	0.845	0.903

Missing Variable Issues

On the basis of the benchmark regression, join the operating income growth rate (Growth) and long-term asset-liability ratio (DLCR) as control variables, table 3 (3) new quality productivity NPro coefficient at 1% level is significantly positive, the results show that the new quality productivity level on the development of positive assumption H1 conclusion robustness.

5.4   Research on Regulatory Effects

Table 5 reports whether the capital accumulation rate (RCA) and financing constraints (FC index) enhance or weaken the impact of new quality productivity levels on the high-quality development of enterprises. The result of column (1) shows that the inter-

action coefficient between NPro of new quality productivity and RCA of capital accumulation rate is 0.013, which is significantly positive at the 10% level. Therefore, the improvement of RCA of capital accumulation rate enhances the positive impact of the level of new quality productivity on the high-quality development of enterprises. Assuming H2 is confirmed; The result of column (2) shows that the interaction coefficient between NPro and financing constraint (FC index) is 0.051, which is significantly positive at the 1% level. Therefore, the improvement of financing constraint (FC index) reduces the positive impact of the level of new quality productivity on the high-quality development of enterprises, verifying hypothesis H3.

Table 5. Regulatory effects

	(1) TFP FE	(2) TFP FE
NPro×RCA	0.013* (1.6478)	
NPro×FC		-0.051*** (-2.9253)
NPro	0.021*** (2.8635)	0.038*** (4.0126)
RCA	0.093*** (2.7468)	
FC		-0.519*** (-4.7634)
Control Variable	Yes	Yes
_cons	10.187*** (46.9780)	10.897*** (49.8281)
Year fe	Yes	Yes
ID fe	Yes	Yes
N	16812	16812
Adj. R2	0.904	0.907

6 Conclusions and Policy Recommendations

This article explores the correlation between new quality productivity and high-quality development of enterprises by analyzing the financial data of listed companies from 2011 to 2022. The research results indicate that enhancing the new quality productivity of enterprises can significantly promote their high-quality development. In the sample enterprises of strategic emerging industries, this positive relationship has been further confirmed. In addition, sufficient capital accumulation has a positive promoting effect on the improvement of new quality productivity and the high-quality development of enterprises. However, the increase in financing constraints (FC index) weakens the positive impact of new quality productivity on high-quality development.

The strategic focus of accelerating the development of new productive forces is to accumulate momentum for breakthroughs in digital, intelligent, and green innovative

development. In the era of big data, digitization is one of the historical trends advancing rapidly globally. In order to fully adapt to this new development requirement, we need to consolidate the computing power foundation for developing new quality productivity and expand the application of computing power technology in various industries. For the highly concerned global intelligence, sufficient manpower, computing power, and financial resources need to be invested to promote the practical application of intelligent technology in more scenarios and promote a historic leap in the production and living forms of the whole society. Green development is the foundation of high-quality development, and new productive forces themselves are green productive forces. Therefore, it is necessary to accelerate the green transformation of development methods and help achieve carbon peak and carbon neutrality.

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