Original Research Article

Research on the impact of digital transformation level on the new quality productivity of Chinese listed companies

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Abstract: Based on data from listed companies in China, this paper empirically tests the impact of digital transformation on corporate new productivity and its mechanism. The research results show that: First, digital transformation significantly promotes the improvement of new productivity of enterprises. This conclusion is true in both state-owned and non-state-owned enterprises, and the marginal effect of state-owned enterprises is higher, indicating that their resource integration and policy support advantages can amplify digital transformation effect. Second, the nature of property rights has a significant regulatory effect. The digital return rate of state-owned enterprises is 11.2% higher than that of non-state-owned enterprises. However, non-state-owned enterprises face stronger financial constraints, highlighting their need to balance investment in digital transformation with financial health. Third, the heterogeneity analysis found that the incentive effect of management shareholding on the new productivity of state-owned enterprises (0.349) is much higher than that of non-state-owned enterprises (0.040), and the positive impact of enterprise size is universal. This study provides new empirical evidence for understanding the impact of digital transformation on corporate new productivity, and reveals the key role of the nature of property rights in this process.

Keywords: Digital transformation; New productivity; Nature of property rights

1. Introduction

With the vigorous development of the digital economy, digital transformation has become an important force in promoting the development of enterprises and even China's economy. Digital transformation has become an important trend in enterprise development[1]. In September 2023, General Secretary Xi Jinping proposed the concept of "new quality productivity" during his inspection in Heilongjiang, emphasizing that it is an inherent requirement and important focus for promoting high-quality development. Since then, General Secretary Xi Jinping has emphasized the importance of developing new productive forces on many occasions, pointing out that it is innovation-driven as the core, has the characteristics of high-tech, high-efficiency, and high-quality, and is an important engine for high-quality economic development[2]. Enterprise digital transformation is an important measure to promote new industrialization and build a modern industrial system, which will help improve enterprise competitiveness and development quality [3]. Since the 20th National Congress of the Communist Party of China, China has actively promoted the digital transformation of the manufacturing industry. The "Action Plan for Digital Transformation of the Manufacturing Industry" formulated by the executive meeting of the State Council on May 11, 2024 emphasized that digital transformation of the manufacturing industry is an important measure to promote new industrialization and build a modern industrial system. In this context, the intrinsic connection between digital transformation and new quality productivity has become increasingly close. New quality productivity represents a new production method and production relationship, and digital transformation is the key to promoting the development of this new quality productivity."social" force[4]. Therefore, exploring how the digital transformation of manufacturing enterprises affects the development of new productivity is of

great significance for promoting economic transformation and upgrading and achieving high-quality development.

2. literature review

In terms of research on the relationship between digital transformation and new quality productivity, some scholars believe that digital transformation can promote new quality productivity. Studies such as Guo, You and Liu (2024)[2], Shi and Pei(2024)[5] show that digital transformation can promote new industries, new models and new driving forces through the use of data elements, digital technology applications, digital business development and digital ecosystem integration. The formation of new driving forces, and in turn promote the development of new productive forces. Guo, Ni and Qiu (2024) research believe that digital transformation can improve enterprise productivity, optimize production models, improve management efficiency and innovation capabilities, thereby promoting the development of new productivity. Some scholars believe that there is a nonlinear impact between digital transformation and new productivity[6]. Some scholars have pointed out that there may be a nonlinear relationship between digital transformation and productivity, which is manifested in the "positive U-shaped" and "inverted U-shaped" relationships: on the one hand, there is a "positive U-shaped" relationship between digital transformation and new productivity, which is mainly due to the "productivity paradox" problem of manufacturing enterprises in the early stage of digital transformation, that is, productivity decline in the early stage of transformation[7]. On the other hand, there is an "inverted U-shaped" relationship between digital transformation and new productivity, which suggests that excessive digitalization may lead to productivity decline[6, 8]. In terms of the mechanisms through which digital transformation affects new quality productivity, existing research mainly explores the mechanisms through which digital transformation affects new quality productivity from the perspectives of technological innovation, corporate value, information asymmetry and media supervision. Digital transformation can promote enterprise innovation, increase enterprise value, reduce information asymmetry, and enhance media supervision through knowledge spillover effects, reducing information costs, and improving enterprise transparency, thereby promoting the development of new quality productivity (Yuan Weihai and Zhou Jianpeng, 2024; Liu Dongge, Jing Guowen, Guan Haifeng, 2024; Ni Kejin, Liu Xiuyan, 2021)[9-11]. In terms of the heterogeneity of digital transformation's impact on new quality productivity, existing research has found that the impact of digital transformation on new quality productivity of enterprises has regional differences, differences in enterprise size, differences in enterprise property rights, and differences in sub-dimensions of enterprise digital transformation. For example, digital transformation has a more significant promoting effect on the eastern and central regions, central cities, non-state-owned enterprises, small-scale enterprises, technology-intensive enterprises and enterprises with higher levels of artificial intelligence (Yuan Weihai and Zhou Jianpeng, 2024)[9].

Although existing research has made some progress, there are still some deficiencies. First of all, there is a lack of empirical research at the micro level. Existing research mainly explores the relationship between digital transformation and new productivity from a macro level, and lacks in-depth analysis of the impact at the enterprise level. Secondly, the mechanism research is not in-depth enough. Existing research does not deeply discuss the mechanism by which digital transformation affects new productivity, and its intrinsic mechanism needs to be further revealed. Finally, the heterogeneity analysis is not comprehensive enough. Existing research on the heterogeneity analysis of digital transformation's impact on new productivity is not comprehensive enough, and further exploration is needed to explore the differences between different types of enterprises in digital transformation.

3. Tests

3.1. Regression analysis

The coefficients of digital transformation of the explanatory variable in columns (1) and (2) were 2.901 and 2.903, respectively, both of which were significant at the 1% level (t-values were 34.91 and 35.66, respectively). It shows that digital transformation has a significant positive impact on the new productivity of enterprises. For every 1 unit increase in the degree of digital transformation, the new productivity of enterprises increases by about 2.9 units on average. The coefficients for firm size are 1.664 (Column 1) and 1.473 (Column 2), respectively, both of which are significant at the 1% level (t-values are 23.35 and 20.90, respectively). It can be seen that scale expansion significantly promotes the new productivity of enterprises, but after adding annual control variables (Column 2), the coefficient decreases slightly, indicating that some scale effects may be explained by time trends. The coefficient for profitability (roa) is significantly negative in Column 1 (-3.679, t =-2.63), but not significant in Column 2 (-2.095). Explain that the impact of profitability may be absorbed by annual effects or interact with temporal trends. The asset-to-liability ratio (lev) coefficients are significantly negative, indicating that a high debt ratio has a inhibitory effect on corporate performance, which is in line with the financial risk theory. The coefficients of management shareholding (magnhldn) are significantly positive, supporting the "interest synergy hypothesis", that is, executive shareholding can alleviate agency problems and improve performance. The coefficients of the nature of property rights (state) are significantly negative, indicating that the new productivity of state-owned enterprises may be lower than that of non-state-owned enterprises, which may be related to efficiency or policy burden. The coefficient of board size is not significant, indicating that the number of directors has no systematic impact on performance, which is consistent with the conclusions of some corporate governance literature.

3.2. Heterogeneity analysis

Columns (3) and (4) of **Table 1** examine the differentiated impact of digital transformation on new productivity by distinguishing state-owned and non-state-owned enterprises. The regression results show that the promotion effect of digital transformation on the new productivity of enterprises is significantly different among enterprises with different property rights, and the impact of other control variables also shows obvious heterogeneity characteristics.

From the perspective of core explanatory variables, digital transformation has shown a significant positive impact in both state-owned and non-state-owned enterprises (both significant at the 1% level). It is worth noting that the digital transformation coefficient of state-owned enterprises (3.064) is significantly higher than that of non-state-owned enterprises (2.755), which indicates that digital transformation has a greater marginal contribution to the new productivity of state-owned enterprises. The possible reason is that state-owned enterprises usually have richer resources and policy support, and can more effectively transform digital transformation into actual productivity improvements.

Table 1. Regression analysis.

	(1)	(2)	(3)	(4)
Variables	**Npro**		**Not state-owned**	**State-owned**
digital	2.901***	2.903***	2.755***	3.064***
	(34.91)	(35.66)	(25.10)	(15.83)
size	1.664***	1.473***	1.549***	1.462***
	(23.35)	(20.90)	(13.67)	(14.21)

	(1)	(2)	(3)	(4)
Variables	**Npro**		**Not state-owned**	**State-owned**
roa	-3.679***	-2.095	-4.476***	2.719
	(-2.63)	(-1.53)	(-2.91)	(1.02)
lev	-2.050***	-1.572***	-2.962***	0.420
	(-4.24)	(-3.31)	(-4.95)	(0.62)
boardsize	-0.017	0.054	0.023	0.082
	(-0.35)	(1.18)	(0.35)	(1.19)
mngmhldn	0.051***	0.045***	0.040***	0.349***
	(10.96)	(9.91)	(9.14)	(6.91)
state	-0.796***	-0.672***		
	(-4.49)	(-3.87)		
Constant	-24.986***	-36.234***	-25.561***	-38.929***
	(-16.73)	(-4.49)	(-10.77)	(-15.57)
Year	NO	Control	NO	Control
R-squared	0.141	0.178	0.173	0.195

Table 1. *(continued)*

4. conclusion

This study uses empirical analysis methods and draws the following important conclusions and enlightenment based on data from listed companies in China: First, digital transformation significantly promotes new productivity of enterprises. The empirical test results show that the degree of digital transformation has a significant positive impact on the new productivity of enterprises, and this conclusion is valid in both the group tests of state-owned (3.064) and non-state-owned enterprises (2.755), indicating that the degree of digital transformation is the core driving force for the development of new productivity of enterprises. It is worth noting that the digital transformation of state-owned enterprises has a higher marginal effect, which may benefit from its resource integration and policy support advantages. Secondly, the nature of property rights regulates the impact of the degree of digital transformation on the new productivity of enterprises. The group regression results of property rights revealed the heterogeneity effect of property rights. State-owned enterprises have higher digital returns (coefficient difference of 11.2%), but non-state-owned enterprises are more subject to financial constraints (roa and lev are significantly negative), reflecting that non-state-owned enterprises need to pay more attention to the balance between digitalization and financial health under the pressure of marketization. In addition, the incentive effect of management shareholding (magnhldn) on state-owned enterprises (0.349) far exceeds that of non-state-owned enterprises (0.040), highlighting the importance of state-owned enterprise governance reform. Finally, control for the differentiated effects of variables. Enterprise size is always significantly positive, indicating that the impact of economies of scale on the new productivity of enterprises is universal; but financial indicators (roa, lev) are only significantly negative among non-state-owned enterprises, implying that non-state-owned enterprises are more sensitive to financial risks under the market mechanism. The state-owned nature (state) is significantly negative in the entire sample, verifying the existence of the "state-owned enterprise efficiency paradox."

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