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# The Impact of Private Equity Investment on the New Quality Productivity of the Enterprises in Strategic Emerging Industry

Li Wang<sup>1,2,\*</sup> and Mu Zhang<sup>1,2</sup>

<sup>1</sup> School of Applied Economics, Guizhou University of Finance and Economics, Guiyang (550025), Guizhou, China

<sup>2</sup> Guizhou Institution for Technology Innovation & Entrepreneurship Investment, Guizhou University of Finance and Economics, Guiyang (550025), Guizhou, China

\* Correspondence: 2591762623@qq.com

Received: April 25, 2025; Received in revised form: June 24, 2025; Accepted: June 29, 2025; Available online: June 30, 2025

**Abstract:** Private equity investment brings incremental funds to enterprises, but can it enhance the new quality productivity of enterprises and facilitate their high-quality development? From the perspective of technological innovation, this paper uses the relevant data of 378 listed companies in China's strategic emerging industries from 2019 to 2023 to study the impact of private equity investment on the new quality productivity of strategic emerging industry enterprises, further examines the mediating role of technological innovation capability and the moderating role of regional science and technology finance levels, and investigates the heterogeneity of enterprise property rights nature, as well as industrial nature. The research results show that: First, private equity investment has a significant positive impact on the new quality productivity of enterprises in strategic emerging industries; Second, private equity investment can promote the development of new quality productivity of enterprises in strategic emerging industries by enhancing their technological innovation capability. Third, the level of regional science and technology finance positively moderate the promoting effect of private equity investment on the new quality productivity of enterprises in strategic emerging industries. Fourth, the new quality productivity of non-state-owned enterprises is more sensitive to private equity investment. The new quality productivity of enterprises in the new generation of information technology industry, new energy vehicle industry, new energy industry, energy conservation and environmental protection industry and digital creative industry is more sensitive to private equity investment. The research conclusion provides relevant inspirations for further utilizing private equity investment to enhance the new quality productivity of enterprises in strategic emerging industries.

**Keywords:** Private Equity Investment; Strategic Emerging Industries; New Quality Productivity; Technological Innovation Capability; Regional Level of Science and Technology Finance

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## 1. Introduction

Against the backdrop of intensifying global technological competition and China's pursuit of high-quality development, strategic emerging industries have become a pivotal force in driving national economic transformation and high-quality development. As a new paradigm of productivity development in the new era, the New Quality Productivity emphasize technological innovation,

optimized resource allocation, and enhanced market competitiveness, serving as the core driver for the sustainable development of strategic emerging industry enterprises [1]. Private equity investments effectively foster enterprise growth and innovation by providing capital, management expertise, and strategic resources [2]. However, the specific impact of private equity investments on the New Quality Productivity of strategic emerging industry enterprises and their underlying mechanisms remains unclear. This research gap not only constrains the decision-making efficiency of investment institutions but also hinders the innovative development of enterprises.

Strategic emerging industries are industrial fields that are based on major technological breakthroughs and development needs, and have strong radiation and driving effects on social and economic development. They have global and directional characteristics [3]. New quality productivity, as a new concept proposed by General Secretary Xi Jinping in September 2023, is an advanced productivity state dominated by innovation, characterized by high technology, high efficiency, and high quality. It is formed through technological revolutionary breakthroughs, innovative allocation of production factors, and deep industrial transformation and upgrading [4]. The academic community has preliminarily explored the connotation of new quality productivity: Wang and Cheng [5] emphasized the qualitative change of laborers, labor materials, and labor objects in the digital economy era; Zhang [6] highlights its green productivity attribute; Meng and Han [7] focused on new division of labor and collaboration models; Zhang and Tang [8] focused on innovative allocation of production factors. These studies have laid the foundation for the theoretical construction of new quality productivity.

Existing research indicates that private equity investment has a significant promoting effect on corporate technological innovation. Lai [9] confirmed that it can promote corporate innovation; Lu and Jiang [10] pointed out its unique role in deepening financial reform; Mu [11] emphasizes its function of alleviating information asymmetry; Jiang [12] focused on the support of its organizational structure for innovation; Wang et al. [13] found that alumni relationship networks can enhance innovation motivation; Liu et al. validated its innovation effect from a patent perspective. However, these studies have not yet systematically examined the impact of private equity investment on the productivity of strategic emerging industries, and empirical analysis is relatively scarce.

At present, the research on the new quality productivity of strategic emerging industry enterprises in China has not fully considered the impact of private equity investment, and mostly remains at the theoretical level, lacking empirical analysis. This paper selected the data of 378 listed companies in China's strategic emerging industries from 2019 to 2023, and through empirical analysis studied the impact of private equity investment on the new quality productivity of enterprises in strategic emerging industry. After benchmark regression, conducting robustness and endogeneity tests, further mediation effect test, moderation effect test, and heterogeneity analysis were conducted.

The structure of this paper is arranged as follows: Section 2 presents theoretical analysis and research hypotheses; Section 3 introduces the research design; Section 4 conducts empirical research; Section 5 is Conclusions and Suggestions.

## **2. Theoretical Analysis and Research Hypotheses**

The cultivation of new quality productivity in enterprises highly relies on technological innovation and R&D investment, but the R&D activities have the characteristics of long cycles, high risks, and high funding requirements, and generally face financing constraints. Private equity

investment promotes the development of new quality productivity through the following mechanisms: Firstly, directly injecting funds to alleviate the cash flow pressure of enterprises, and expanding debt and equity financing channels through credit endorsements; Secondly, by appointing directors to participate in decision-making and optimizing governance structures, agency costs can be reduced; Thirdly, establish incentive and constraint mechanisms to achieve synergy of interests. Based on this, Hypothesis 1 is proposed:

H1: Private equity investment has a significant positive impact on the new quality productivity of enterprises in strategic emerging industries.

Private equity investment provides enterprises with research and development funds, alleviates financing pressure, and promotes technological innovation. Compared with ordinary investors, private equity investment institutions have extensive resource networks and can help enterprises obtain cutting-edge technology information and accelerate the transformation of technological achievements [14]. Meanwhile, private equity investment promotes the transformation and upgrading of enterprises and facilitates the development of new quality productivity by introducing professional management experience and talents, improving the internal management mechanism of enterprises, creating an innovative atmosphere, stimulating the vitality of R&D personnel, and enhancing the technological innovation capability of enterprises [15]. Based on this, this paper proposes Hypothesis 2.

H2: Private equity investment promotes the development of new quality productivity of enterprises in strategic emerging industries by enhancing their technological innovation capability.

The science and technology finance provides a favorable development environment for private equity investment. Through policy support and innovative mechanisms, it improves the financial ecosystem, attracts social capital, and broadens the sources of funds for private equity investment. The government-established science and technology finance guidance fund, by leveraging its effect, attracts private capital to participate and provides sufficient funds. At the institutional level, science and technology finance promotes the optimization of regulatory policies, reduces investment risks, and enhances investor confidence. Meanwhile, science and technology finance improve financial infrastructure and accelerates the innovation of exit mechanisms for private equity investment, such as developing regional equity markets and broadening channels for mergers and acquisitions and reorganizations, providing investors with diversified exit options, attracting more entities to participate, forming a virtuous cycle, and promoting the prosperity of private equity investment. Based on this, this paper proposes Hypothesis 3.

H3: The development level of regional science and technology finance has a positive moderating effect on the impact of private equity investment on the new quality productivity of strategic emerging industry enterprises.

### **3. Research Design**

#### *3.1. Sample Screening*

This paper selected 378 listed companies from the sample enterprises of the China Strategic Emerging Industries Comprehensive Index (000891) from 2019 to 2023 as the initial samples. Strategic emerging industries are classified into nine categories according to the "Classification of Strategic Emerging Industries (2018)" released by the National Bureau of Statistics of China. There are 152

companies in the new generation of information technology industry, 33 companies in the high-end equipment manufacturing industry, 26 in the new materials industry, 32 in the biotechnology industry, 28 in the new energy vehicle industry, 23 in the new energy industry, 26 in the energy conservation and environmental protection industry, 29 in the digital creative industry and 29 in the high-tech service industry.

### 3.2. Construction of the Variables

#### 3.2.1. Explained Variable

Following the approach of Song et al. [16], the evaluation index system of new quality productivity was constructed based on the two-factor theory of productivity (Table 1). The weight of each index was calculated using the entropy method employed by Xu and Wei [17] (Table 1). The entropy method was used to evaluate the new quality productivity of enterprises. The data were from the CSMAR database.

**Table 1.** Evaluation index system of new quality productivity.

Factors	Indicates	Calculation method	Weights
Workforce	Proportion of highly educated personnel	Graduate degree or above/Total number of employees	22.78%
	Proportion of R&D personnel	Number of R&D personnel/Total number of employees	9.39%
	Proportion of R&D personnel's salary	(R&D expenses - wages and salaries)/Operating income	9.65%
Tools	Proportion of fixed assets	Fixed assets/Total assets	11.62%
	Percentage of manufacturing expenses	(Operating cash outflow + Depreciation of fixed assets + Amortization of intangible assets + Impairment provisions - Cash paid for goods and services - Wages paid to employees)/(Operating cash outflow + Depreciation of fixed assets + Amortization of intangible assets + Impairment provisions)	8.49%
	Proportion of R&D depreciation and amortization	(R&D expenses - depreciation and amortization)/Operating income	7.12%
	Proportion of R&D leases	(R&D expenses - lease fees)/Operating income	6.69%
	Proportion of direct investment in R&D	(R&D expenses - direct inputs)/Operating income	6.50%
	Proportion of intangible assets	Total intangible assets/Total assets	5.89%
	Total asset turnover	Operating income/Average total assets	5.89%
	The inverse of the equity multiplier	Owner's equity/Total assets	6.00%

#### 3.2.2. Explanatory Variable

The listed companies with private equity investment backgrounds were defined in accordance with the approach of Zhao [18]. We used the private equity fund proportion among top ten shareholders to measure the private equity investment. The relevant data on private equity investment were collected manually through the eastmoney website.

### 3.2.3. Mediating Variable

Referring to the approach of Wang and Chen [19] on mediating variables, this paper reflected the technological innovation capability from two aspects: innovation output and innovation input. We selected the total number of patent applications up to the end of the period to measure the innovation output, and selected the R&D expenditure/Enterprise operating income to measure the innovation input. The data were sourced from the CSMAR database.

### 3.2.4. Moderating Variable

Following the approach of Zhang et al. [20], the development level of regional science and technology finance was introduced as the moderating variable. It was measured by the development level of science and technology finance in prefecture level cities. The data were sourced from the CSMAR database.

### 3.2.5. Control Variables

Referring to the research contents of Sun [21], Peng [22], and Wang et al. [13], seven control variables that may affect the new quality productivity of enterprises were added. The specific variable descriptions in this paper were shown in Table 2.

**Table 2.** Variable definition.

Variables	Name	Symbol	Variables measurement
Explained variable	New quality productivity	npro	Entropy method calculation
Explanatory variable	Private equity investment	pe	Private equity fund proportion among top ten shareholders
Mediating variables	Innovation output	patents	The total number of patent applications up to the end of the period
	Innovation input	RDSpendSum	R&D expenditure/Enterprise operating income
Moderating variable	The development level of regional science and technology finance	rstf	The development level of science and technology finance in prefecture-level cities
Control variables	Firm size	size	Logarithm of total assets
	Debt-to-asset ratio	lev	Total liabilities/Total assets
	Accounts receivable ratio	rec	Net accounts receivable/Total assets
	Board size	board	The number of directors on the board of directors of a listed company
	Intangible assets ratio	intangible	Net intangible assets/Total assets
	Fixed assets ratio	fixed	Net fixed assets/Total assets
	Revenue growth rate	growth	Current period revenue - previous period revenue/Previous period revenue

### 3.3. Model Construction

To verify the impact of private equity investment on the new quality productivity of strategic emerging industry enterprises, this paper conducted an empirical analysis using a panel data model. The benchmark regression model was constructed as follows:

$$NPRO_{it} = \beta_0 + \beta_1 PE_{it} + \beta_2 Control_{it} + \beta_3 YEAR_t + \beta_4 IND_i + \varepsilon_{it} \tag{1}$$

where  $NPRO_{it}$  represents the new quality productivity,  $PE_{it}$  represents the private equity investment,  $Control_{it}$  represent the control variables,  $YEAR_t$  represents the time fixed effect,  $IND_i$  represents the individual fixed effect,  $\varepsilon_{it}$  represents the random error term.

To verify Hypothesis 2, the two-step testing method used by Jiang [23] was referenced, the mediating effect test was conducted by taking innovation output and innovation input as mediating variables. The mediating effect test model was constructed as follows:

$$MV_{it} = \beta_0 + \beta_1 PE_{it} + \beta_2 Control_{it} + \beta_3 YEAR_t + \beta_4 IND_i + \varepsilon_{it} \tag{2}$$

where  $MV_{it}$  represent the mediating variables (innovation output, innovation input).

To test Hypothesis 3, this paper constructed a moderating effect test model to verify the positive moderating effect of regional science and technology finance level on the relationship between private equity investment and new quality productivity of enterprises. The moderating effect test model was set as follows:

$$NPRO_{it} = \beta_0 + \beta_1 PE_{it} + \beta_2 RSTF_{it} + \beta_3 PE_{it} * RSTF_{it} + \beta_4 Control_{it} + \beta_5 YEAR_t + \beta_6 IND_i + \varepsilon_{it} \tag{3}$$

where  $RSTF_{it}$  represents the moderating variable (regional science and technology finance level),  $PE_{it} * RSTF_{it}$  represents the interaction term.

## 4. Empirical Results and Analysis

### 4.1. Descriptive Statistics

**Table 3.** Descriptive statistics results.

Variables	N	Mean	Sd	Min	Max
ind	1,890	356,230	342,813	2,006	688,819
year	1,890	2,021	1.415	2,019	2,023
npro	1,890	0.285	0.183	0	0.672
pe	1,890	2.810	3.469	0	31.77
size	1,890	22.14	0.0639	22.07	22.25
lev	1,890	0.341	0.0107	0.328	0.358
rec	1,890	0.141	0.00701	0.135	0.154
fixed	1,890	0.164	0.0107	0.153	0.181
intangible	1,890	0.0386	0.00259	0.0357	0.0423
board	1,890	2.095	0.00678	2.083	2.102
growth	1,890	0.704	9.775	-1.920	423.0

In this paper, STATA 18 software was used to perform descriptive statistics on variables. The results show that the average value of new quality productivity is 0.285, the maximum value is 0.672, and the minimum value is 0, indicating that the new quality production of different companies is more discrete and the overall level is low, and the maximum value of private equity investment, the core explanatory variable, is 31.77, and the minimum value is 0, there are significant differences, and there may be extreme values. The statistical results of other control variables are basically consistent with the conclusions of mainstream literature, and will not be explained here. The specific data are shown in Table 3.

#### 4.2. Benchmark Regression Analysis

According to Equation (1), this paper used STATA 18 software to study the impact of private equity investment on the new quality productivity of enterprises in strategic emerging industries. Table 4 presents the basic regression results, in which columns (1) and (2) represent the regression results without control variables and with control variables, respectively, and the empirical results show that private equity investment has a significant positive impact on the new quality productivity of enterprises in strategic emerging industries, which verifies the Hypothesis 1 of this paper.

**Table 4.** Benchmark regression results.

Variables	npro	npro
pe	0.016*** (7.59)	0.015*** (7.37)
size		-0.469 (-0.24)
lev		-7.067 (-0.33)
rec		6.796 (0.23)
fixed		5.299 (1.61)
intangible		0.000 (0.00)
board		0.000 (0.00)
growth		0.000 (0.61)
_cons	0.240*** (36.94)	11.201 (0.28)
N	1890	1890
R <sup>2</sup>	0.633	0.635
adj. R <sup>2</sup>	0.539	0.541

Note: ①“\*\*\*” indicates P < 0.01, “\*\*” indicates P < 0.05, “\*” indicates P < 0.1; ②The value in parenthesis ( ) is z.

#### 4.3. Robustness Test

##### 4.3.1. Replace the Explained Variable

To explore more comprehensively the impact of private equity investment on the new quality productivity of enterprises, this paper adopted the data of new quality productivity in Song et al. [16] paper for basic regression verification. The regression results are shown in columns (1) and (2) of Table 5. At the 1% confidence level, the impact of private equity investment on new quality

productivity is significantly positive. It further verified the promoting effect of private equity investment on the new quality productivity of enterprises and supported the robustness of the benchmark regression results.

#### 4.3.2. Replace the Explanatory Variable

In the benchmark regression, following the method used by Pan et al. [24] to handle venture capital, we use the proportion of private equity funds among the top ten shareholders as the data for private equity investment. Considering the close connection between private equity funds and venture capital in terms of investment strategies, targets, and risk characteristics, this paper used venture capital as a proxy for private equity investment. The regression results are shown in columns (3) and (4) of Table 5. The impact of venture capital on new quality productivity is significantly positive, further demonstrating that private equity investment plays a promoting role in the new quality productivity of strategic emerging industry firms.

**Table 5.** Robustness test results.

Variables	Replace the explained variable	Variables	Replace the explanatory variable
pe	0.0806*** (7.9545)	vcshare	0.0083* (1.6569)
Control	Yes	Control	Yes
_cons	11.1301 (0.2792)	_cons	63.4883** (1.9919)
N	1890	N	1890
r2_a	0.5434	r2_a	0.5244
ind	Yes	ind	Yes
year	Yes	year	Yes

Note: ①“\*\*\*” indicates  $P < 0.01$ , “\*\*” indicates  $P < 0.05$ , “\*” indicates  $P < 0.1$ ; ②The value in parenthesis ( ) is z.

#### 4.4. Endogeneity Test

The relationship between private equity investment and the new quality productivity of enterprises may have endogenous problems. On the one hand, enterprises with higher productivity may be more likely to attract private equity investment. On the other hand, the unobservable management capabilities of enterprises may also affect the investment decisions of private equity and the improvement of productivity. To alleviate endogeneity, this paper adopted the management shareholding ratio (Mshare) as the instrumental variable method for estimation. The usage results are shown in Table 6.

**Table 6.** Endogeneity test results.

Variables	npro
Mshare	0.0728*** (4.0643)
N	1890
r2_a	0.1520
Control	Yes
ind	Yes
year	Yes

Note: ①“\*\*\*” indicates  $P < 0.01$ , “\*\*” indicates  $P < 0.05$ , “\*” indicates  $P < 0.1$ ; ②The value in parenthesis ( ) is z.

4.5. Mediating Effect Test

According to Equation (2), technological innovation capability was represented through innovation output and innovation input, while also testing the mediating effect of innovation output and innovation input. The test results are shown in Table 7, which are significantly positive at the 1% confidence level, indicating that private equity investment promotes the development of new quality productivity of enterprises in strategic emerging industries by enhancing their technological innovation capability. In conclusion, Hypothesis 2 is validated, and the hypothesis holds.

Table 7. Mediating effect test results.

Variables	npro	patents	RDSpendSum
pe	0.0154*** (7.3702)	0.0000*** (7.9563)	0.0000*** (3.2635)
patents		0.0016*** (8.7677)	
RDSpendSum			0.0000*** (8.7677)
N	1890	1890	1890
Control	YES	YES	YES
r2_a	0.5407	1.0000	1.0000
ind	YES	YES	YES
year	YES	YES	YES

Note: ①“\*\*\*” indicates P < 0.01, “\*\*” indicates P < 0.05, “\*” indicates P < 0.1; ②The value in parenthesis ( ) is z.

4.6. Moderating Effect Test

According to Equation (3), we tested the moderating effect of the development level of science and technology finance. The test results are shown in Table 8. As shown in Table 8, the interaction is significantly positive at a confidence level of 1%, indicating that the level of regional science and technology finance plays a positive moderating role in the impact of private equity investment on the new quality productivity of strategic emerging industry enterprises. In summary, Hypothesis 3 has been validated and the hypothesis is valid.

Table 8. Moderating effect test results.

Variables	(1)	(2)	(3)
pe	0.0154*** (7.3702)	0.0164*** (4.1951)	0.0082*** (4.0325)
rstf		0.5822*** (8.7677)	0.5000*** (7.7506)
interaction			0.0163*** (2.8045)
Control	YES	YES	YES
_cons	11.2009 (0.2802)	-13.0959** (-2.0589)	-9.4568*** (-2.7940)
N	1890	1890	1889
r2_a	0.5407	0.3218	0.1756
ind	YES	YES	YES
year	YES	YES	YES

Note: ①“\*\*\*” indicates P < 0.01, “\*\*” indicates P < 0.05, “\*” indicates P < 0.1; ②The value in parenthesis ( ) is z.

4.7. Heterogeneity Analysis

Table 9. Heterogeneity analysis results (property rights nature).

Variables	State-owned enterprises	Non-state-owned enterprises
pe	npro -0.0007 (-0.2662)	npro 0.0041*** (3.4421)
Control	YES	YES
_cons	-23.4266 (-1.4871)	2.6251 (0.4311)
N	205	1685
r2_a	0.1358	0.1883
ind	YES	YES
year	YES	YES

Note: ①“\*\*\*\*” indicates P < 0.01, “\*\*\*” indicates P < 0.05, “\*\*” indicates P < 0.1; ②The value in parenthesis ( ) is z.

Table 10. Heterogeneity analysis results (industrial nature).

Variables	New generation of information technology industry	High end equipment manufacturing industry	New materials industry	Biological industry	New energy vehicle industry
pe	0.0226*** (4.2225)	0.0004 (1.2127)	0.0023 (0.2358)	0.0160 (1.6371)	0.0321*** (4.9159)
Control	YES	YES	YES	YES	YES
_cons	58.2385*** (4.8361)	0.9175 (0.3215)	-17.3739 (-0.5192)	56.6812* (1.9443)	15.8086 (0.5293)
N	760	165	130	160	140
r2_a	0.2996	0.0120	0.2649	0.2595	0.4291
ind	Yes	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes	Yes

Continued Table 10.

Variables	New energy industry	Energy conservation and environmental protection industry	Digital creative industry	Related service industry
pe	0.0482*** (5.2115)	0.0235* (1.9552)	0.0204*** (3.0235)	-0.0016 (-0.1899)
Control	YES	YES	YES	YES
_cons	28.7858 (1.0910)	-9.5682 (-0.2753)	43.3975 (1.4685)	32.2775 (0.8776)
N	115	130	145	145
r2_a	0.3161	0.3137	0.4803	0.5057
ind	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes

Note: ①“\*\*\*\*” indicates P < 0.01, “\*\*\*” indicates P < 0.05, “\*\*” indicates P < 0.1; ②The value in parenthesis ( ) is z.

This paper classified the sample enterprises based on the property rights nature and conducted heterogeneity analysis. The results of heterogeneity analysis based on the property rights nature are shown in Table 9. As shown in Table 9, the non-state-owned enterprises’ new quality productivity is more sensitive to private equity investment.

This paper classified the sample enterprises based on the industrial nature and conducted heterogeneity analysis. The results of heterogeneity analysis based on the industrial nature are shown in Table 10. As shown in Table 10, the new quality productivity of enterprises in the new generation of information technology industry, new energy vehicle industry, new energy industry, energy conservation and environmental protection industry and digital creative industry is more sensitive to private equity investment.

## 5. Conclusions and Suggestions

### 5.1. Research Conclusion

This paper takes 378 listed companies in China from 2019 to 2023 as samples; we deeply analyze the impact of the entry of private equity investment on the development of new quality productivity of enterprises in strategic emerging industry. The potential marginal contribution of this paper lies in: 1) Studies show that the entry of private equity investment has significantly promoted the development of new quality productivity of enterprises in strategic emerging industry. 2) Mediating effect test reveals that private equity investment can promote the development of new quality productivity of enterprises in strategic emerging industry by enhancing their technological innovation capability. 3) Moderating effect test indicates that the level of regional science and technology finance plays a positive moderating role in the impact of private equity investment on the new quality productivity of strategic emerging industry enterprises. 4) Heterogeneity tests indicate that the non-state-owned enterprises' new quality productivity is more sensitive to private equity investment, and the new quality productivity of enterprises in the new generation of information technology industry, new energy vehicle industry, new energy industry, energy conservation and environmental protection industry and digital creative industry is more sensitive to private equity investment.

### 5.2. Policy Recommendations

First, enterprises should rationally introduce private equity investment, give full play to its positive role, improve the connection mechanism with technological innovation, actively carry out research and development innovation, enhance internal management level, draw on the advanced concepts of private equity investment, innovate management methods, and provide support for the development of new quality productivity of enterprises [25]. Second, the government promotes the construction of the private equity investment system, provides policy support, attracts capital inflows, stimulates market vitality, and guides it to assist enterprises in innovation and reform as well as industrial transformation and upgrading. Regulatory authorities should improve laws and regulations, strengthen supervision, standardize the operation of private equity investment institutions, and build a standardized and professional development pattern. Third, the government should increase its support for scientific and technological research and development, encourage enterprises to innovate, promote technological breakthroughs and industrial upgrading, and facilitate the development of new quality productivity [26]. Meanwhile, in response to the issue of unbalanced regional development, the government should make overall coordination, offer policy preferences to the central and western regions, optimize resource allocation, strengthen talent

cultivation and introduction, and promote the development of new quality productivity in the central and western regions.

**Funding:** This research was funded by the Regional Project of National Natural Science Foundation of China, grant number 71861003.

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

- [1] Yao, B. G. (2024). A study on the path of industrial fund empowerment in the development of new productive forces. *China Business Review*, 33(22), 160-163. <https://doi.org/10.19699/j.cnki.issn2096-0298.2024.22.160>
- [2] Li, C. Z. (2017). A study on the impact of private equity investment on GEM enterprises. *Modern Business*, (18), 62-63. <https://doi.org/10.14097/j.cnki.5392/2017.18.028>
- [3] Liu, H. C. (2024). Challenges and countermeasures for high-quality development of strategic emerging industries from the perspective of new productive forces. *Journal of Economic Research*, (24), 17-20.
- [4] Zhou, S. L., & Qiao, G. H. (2024). The overall logic of General Secretary Xi Jinping's important discourse on new productive forces. *Economic Issues*, (07), 11-19. <https://doi.org/10.16011/j.cnki.jjwjt.2024.07.009>
- [5] Wang, G. C., & Cheng, Z. F. (2024). New productive forces and the transformation of basic economic modes. *Contemporary Economic Science*, 46(03), 71-79.
- [6] Zhang, T. (2024). New productive forces are inherently green productive forces. *Ideological and Theoretical Education*, (11), 35-42. <https://doi.org/10.16075/j.cnki.cn31-1220/g4.2024.11.003>
- [7] Meng, J., & Han, W. L. (2024). On new productive forces: A historical materialist interpretation. *Economic Research Journal*, 59(03), 29-33.
- [8] Zhang, H., & Tang, Q. (2024). A study on the important principles of developing new productive forces in accordance with local conditions. *Teaching and Research*, (09), 16-30.
- [9] Lai, J. H. (2012). A study on private equity investment, corporate innovation, and their macroeconomic effects. *Journal of Central University of Finance and Economics*, (09), 42-47.
- [10] Lu, Y. B., & Jiang, X. W. (2018). Private equity investment promotes the transformation and upgrading of China's economy. *Tsinghua Financial Review*, (07), 87-90. <https://doi.org/10.19409/j.cnki.thf-review.2018.07.030>
- [11] Mu, Z. Q. (2020). Can private equity investment promote corporate innovation? [Master's thesis, Southwestern University of Finance and Economics]. CNKI. <https://doi.org/10.27412/d.cnki.gxncu.2020.002071>
- [12] Jiang, C. (2023). A discussion on the impact of private equity investment on corporate innovation. *National Economic Review*, (13), 81-84. <https://doi.org/10.16834/j.cnki.issn1009-5292.2023.13.036>
- [13] Wang, H. J., Yu, M. X., Zhang, L., et al. (2020). Alumni relationships and corporate innovation: A perspective based on the relationship between PE managers and senior executives. *Accounting Research*, (03), 78-94.
- [14] Xu, J. (2019). The impact of private equity investment funds on the growth of small and medium-sized enterprises: Evidence from enterprises on the New Third Board from 2011 to 2016. *Journal of Beijing Technology and Business University (Social Sciences Edition)*, 34(03), 74-83.
- [15] Zhang, Y. (2025). Empowering the development of new productive forces by cultivating and strengthening patient capital. *Red Flag Manuscript*, (04), 30-32.
- [16] Song, J., Zhang, J. C., & Pan, Y. (2024). The impact of ESG development on corporate new productive forces: Empirical evidence from A-share listed companies in China. *Contemporary Economic Management*, 46(06), 1-11. <https://doi.org/10.13253/j.cnki.ddjjgl.2024.06.001>
- [17] Xu, Y. C., & Wei, Y. Q. (2025). The impact of new productive forces on the resilience of the food supply chain: Evidence from panel data of 30 provinces and regions in China. *Journal of Yunnan Agricultural University (Social Sciences)*, 19(02), 34-42.

- [18] Zhao, Q. (2023). The impact of private equity investment on the value of small and medium-sized enterprises from an ESG perspective. *Economic Issues*, (11), 40-47. <https://doi.org/10.16011/j.cnki.jjwt.2023.11.001>
- [19] Wang, J. F., & Chen, S. J. (2025). The impact of private equity investment on corporate new productive forces. *Journal of Shandong University of Finance and Economics*, 37(02), 19-32.
- [20] Zhang, H., Pang, K., Liu, K., et al. (2025). Efficiency-driven and policy coordination: The mechanism of science and technology finance in promoting new productive forces. *Southwest Finance*, (05), 17-32.
- [21] Sun, R. (2023). The impact of private equity investment on technological innovation of GEM-listed enterprises. [Master's thesis, Lanzhou University of Finance and Economics]. CNKI. <https://doi.org/10.27732/d.cnki.gnzsx.2023.000259>
- [22] Peng, H. C. (2012). A study on the exit mechanisms of private equity funds in China. [Doctoral dissertation, Huazhong University of Science and Technology]. CNKI.
- [23] Jiang, T. (2022). Mediating and moderating effects in empirical causal inference studies. *China Industrial Economics*, (05), 100-120. <https://doi.org/10.19581/j.cnki.ciejournal.2022.05.005>
- [24] Pan, D. D., Fan, C. L., & Wang, Z. M. (2025). Venture capital ownership and key digital technology innovation. *Modern Financial Research*, 30(03), 32-43. <https://doi.org/10.16529/j.cnki.11-4613/f.2025.03.002>
- [25] Liu, G. C., Li, Y. Z., & Li, M. (2022). Private equity investment, executive incentives, and corporate innovation performance: An examination from the perspective of patent heterogeneity. *Economic Management*, 44(08), 116-134. <https://doi.org/10.19616/j.cnki.bmj.2022.08.007>
- [26] Niu, B., Xin, X. N., & Wang, J. X. (2024). The impact of financial technology on corporate new productive forces. *Financial Theory and Practice*, (12), 17-28.



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(Executive Editor: Si-hao Kou)