

# Research on Mergers and Acquisitions of Listed Companies Based on Dictionary Method and Development of New Quality Productivity

Yihe Wang\*, Jingfang Cui

School of Finance, Central University of Finance and Economics, Beijing 102206, China

\* Corresponding author: Yihe Wang (Email: wangyihe27@163.com)

---

**Abstract:** In the context of high-quality economic development, new productive forces have become a key force driving industrial upgrading and economic growth. The impact of mergers and acquisitions (M&A) on the development of new productive forces in listed companies has attracted significant attention. This paper uses M&A events of A-share listed companies from 2015 to 2023 as a sample, employing the text dictionary method to construct a dictionary of new productive forces, assessing the level of new productive forces in enterprises, and using the multi-period difference-in-differences method to investigate the impact of M&A on their development. The study finds that M&A significantly enhances the level of new productive forces in enterprises, with more pronounced positive effects on larger companies and those that have merged two roles into one, while having a negative effect on older companies with concentrated equity. Further heterogeneity tests show that M&A has a more significant promoting effect on new productive forces in state-owned enterprises, high-tech industry companies, and regions with well-developed factor markets. Mechanism analysis confirms that M&A promotes the development of new productive forces by enhancing human capital levels and R&D intensity. The study provides reference for corporate strategic decision-making and government policy formulation. Based on the above research, this paper recommends precise targeting of M&A to enhance new productive forces; formulating differentiated policies to support M&A upgrades; expanding research dimensions to delve deeper into the mechanisms of M&A impacts, thereby improving the service efficiency of M&A for new productive force enterprises.

**Keywords:** Mergers and Acquisitions of Listed Companies, New Quality Productivity, Text Dictionary Method, Multi-period Double Difference Method.

---

## 1. Introduction

Accelerating the development of new productive forces and steadily advancing high-quality development have become the main themes of economic and social development. When presiding over the 11th group study session of the 20th Central Committee of the Communist Party of China, President Xi Jinping pointed out that developing new productive forces is an inherent requirement and a key focus for promoting high-quality development. We must continue to write this grand article on innovation and accelerate the development of new productive forces.

The issue of "how to cultivate and develop new productive forces" has now attracted widespread attention from scholars. One of the consensus points reached by most scholars after their research is that to develop new productive forces, it is necessary to clarify the strategic positioning of scientific and technological innovation, establish a sound system for the development of new productive forces, and promote the development of strategic emerging industries and the transformation and upgrading of traditional industries through policy coordination at all levels.

At the same time, listed companies, as the backbone driving the development of new productive forces, optimize asset structures, reduce operational risks, and promote technological innovation through mergers and acquisitions, thus injecting momentum into China's sustainable economic development. This paper focuses on corporate mergers and acquisitions, constructing a dictionary of new productive forces using textual dictionary methods. Based on this, it evaluates the level of new productive forces in A-share listed

companies and combines multiple-period difference-in-differences methods, using corporate mergers and acquisitions as quasi-experimental subjects to investigate the effects of mergers and acquisitions on the development of new productive forces in listed companies. The aim is to enrich theories related to the economic consequences of corporate mergers and acquisitions and provide policy recommendations for government departments in formulating industrial policies and for companies in implementing innovation strategies.

The marginal contribution of this paper is mainly reflected in the following aspects: (1) In terms of research perspective, unlike existing literature that primarily uses traditional methods such as entropy value method and entropy weight-TopSIS method to measure new quality productivity, this study innovatively employs the text dictionary method to construct an evaluation system, providing new methodological support for measuring new quality productivity at the enterprise level. (2) In terms of research content, most existing studies focus on qualitative analysis. This paper, through quantitative research methods, systematically examines the mechanism by which corporate mergers and acquisitions affect new quality productivity and constructs a corresponding theoretical framework, filling the gap in empirical research in this field.

## 2. Related Work

New quality productivity is a qualitative concept, thus requiring a quantitative indicator to measure the level of new quality productivity in a country, region, or enterprise. Regarding the question of "how to measure the level of new

quality productivity," various methods have been adopted by scholars. Wang Jue and Wang Rongji (2024) [1], based on the three major components of productivity, used the entropy value method to construct a comprehensive evaluation system for new quality productivity levels, measuring the new quality productivity levels of 30 provinces in China, focusing at the provincial level. Han Wenlong (2024) [2] et al. constructed an indicator system for measuring new quality productivity from two dimensions: substantive factors and permeable factors, and built several sub-indicators under each dimension, using the entropy value method to measure the new quality productivity levels of 30 provinces nationwide. Lu Jiang (2024) [3] et al.'s research also focused on the provincial level, constructing a comprehensive evaluation system for new quality productivity from three primary indicators: technological productivity, green productivity, and digital productivity, and using the improved entropy weight-TopSIS method to measure the new quality productivity levels of 30 upgraded regions. Fu Lianying and Cai Yu (2024) [4], based on their "three highs, three highs, and three characteristics" features derived from literature reviews, similarly used the entropy weight-TopSIS method to construct a measurement system for new quality productivity, but narrowed down the measurement objects to the city level, measuring the development levels of new quality productivity in 270 cities in China. In addition to measuring the level of new quality productivity in regions, Zhao Guoqing and Li Junting (2024)[5], based on the theory of two factors of productivity, constructed an indicator system for new quality productivity levels for enterprises. Furthermore, some scholars have further segmented new quality productivity according to its

areas of application, measuring the levels of new quality productivity in agriculture (2024)[6] and urban industry (2024)[4].

The impact of corporate mergers and acquisitions on new quality productivity is multifaceted and varies in different contexts. Mergers and acquisitions are effective means for companies to enhance their technological innovation capabilities and accelerate production efficiency (Chen Yating et al. [7]; Dong Tian Tian and Chen Yanling [8]). Through M&A, companies can efficiently integrate resources, providing a rational path for optimizing resource allocation, thereby promoting the development of new quality productivity. M&A can also improve the sustainability of corporate innovation, enhancing independent R&D capabilities while absorbing advanced external technologies through technology M&A, thus achieving optimal integration and complementary advantages of internal and external resources (Xiao Yang and Zhang Xiaofei, 2021) [9]. High-quality corporate development not only manifests in improved economic benefits but also requires the synergistic growth of economic and social values (Huang Sujian et al., 2018) [10]. As an important strategic tool, M&A provides a new avenue for high-quality corporate development by integrating external innovative resources.

### 3. Measurement of new quality productivity

#### 3.1. Research framework

The framework of this paper is shown in Figure 1.

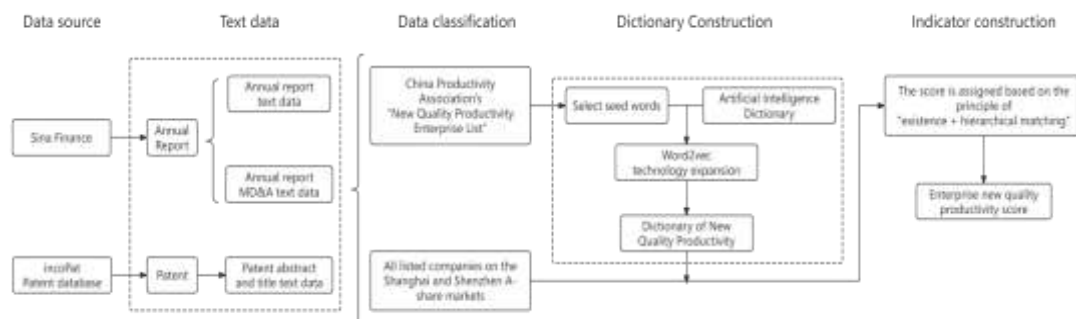


Fig 1: research framework

#### 3.2. Construct a new quality productivity text dictionary

Currently, most related studies rely on word frequency statistics from official databases or construct dictionaries centered around single perspectives such as "technology" and "digitalization," which fail to comprehensively cover the broad definition of new quality productivity, thus limiting the accuracy of measuring new quality productivity. To address this shortcoming, this paper adopts the dictionary construction method proposed by Yao Jiaquan et al. (2024)[11], using an AI dictionary as the base and expanding it with a trained Word2Vec model. This approach aims to build a relatively complete dictionary of new quality productivity, enabling more precise measurement of the development level of new quality productivity in enterprises.

This study takes the list of new quality productive enterprises released by China Productivity Association as the research basis, crawls the annual reports and patent data of the

listed enterprises, and uses jieba library for word segmentation. Then, with the help of stopword table, irrelevant words are removed, and word frequency statistics are conducted to screen out high-frequency words that can effectively represent new quality productivity as seed words.

In the field of natural language processing, converting text into a language that computers can understand is a crucial step. Word2Vec, as a method for creating word embeddings, generates a matrix mapping all words in a vocabulary through training on large-scale text data. There are two main training models for Word2Vec: CBOW and Skip-gram. The CBOW model infers the middle word based on context words. During training, the embedding vectors of context words are input into the model to calculate the predicted value of the middle word; the Skip-gram model, on the other hand, infers context words based on the current word. During training, the embedding vector of the current word is input into the model to calculate the predicted value of the context words.

We chose the Word2Vec model of CBOW architecture,

which works as shown in the figure 2.

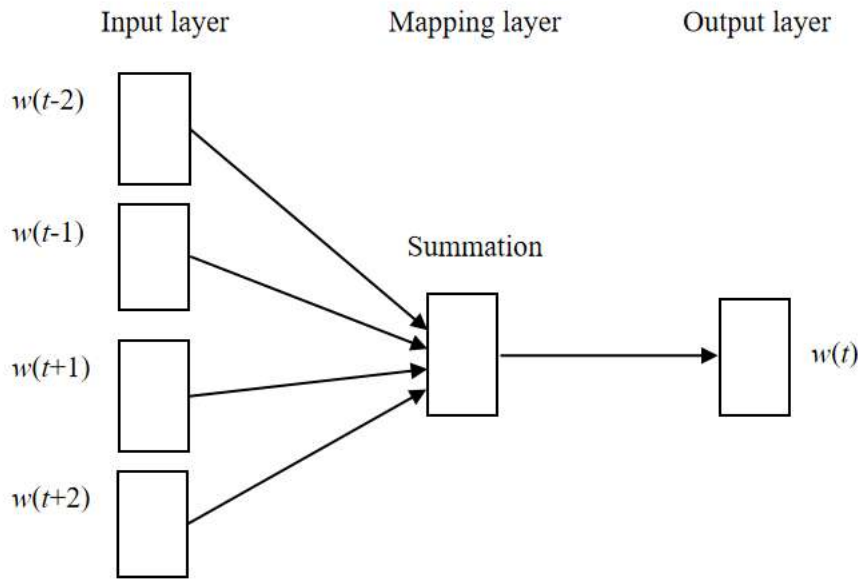


Fig 2: How the Word2Vec model of CBOV architecture works

During the process of dictionary expansion, we used the annual report texts of all A-share companies as corpus for word segmentation and training on a per-sentence basis. After training, by traversing the vocabulary index of the word vector model, we constructed a mapping dictionary from words to vectors and extracted a list of words along with their corresponding vector arrays. On this basis, we removed duplicates from the word list and calculated the average word vector as the document vector, then computed the word vectors of seed words and expanded them. To screen out the words that best reflect the level of new productive forces, we used the Word2Vec model to calculate the cosine similarity between each seed word vector and the expanded word vectors. For each seed word, we selected the top 200 expanded words with the highest cosine similarity as candidates for dictionary expansion.

Ultimately, the New Quality Productivity Text Dictionary consists of three parts: the Basic Dictionary, Seed Words, and Extended Words, totaling 783 entries. The Basic Dictionary directly inherits from the AI dictionary constructed by Yao Jiaquan et al. (2024) [22]; the Seed Words are selected from representative terms in the annual reports and patent data of companies listed on the New Quality Productivity List; the Extended Words are expanded through the aforementioned Word2Vec model and then manually screened. In subsequent calculations of corporate new quality productivity levels, the weight of the Basic Dictionary and Seed Words is set to 1, while the weight of the Extended Words is determined based on their cosine similarity with the Seed Words.

According to the "Implementation Plan for the New Industry Standardization Pilot Project (2023-2035)," enterprises with new quality productivity can be categorized into 8 strategic emerging industries and 9 future industries. To more accurately measure the development levels of enterprises in different areas of new quality productivity, this paper has also classified the text dictionary according to the above standards, resulting in the final dictionary.

### 3.3. New quality productivity scoring for A-share listed enterprises

Through the construction of a new quality productivity text dictionary and its word weight, this paper analyzes the text content of MD&A part of A-share listed enterprises and scores the level of new quality productivity of enterprises.

Initially, we attempted to evaluate a company's new quality productivity using the "word frequency  $\times$  weight" model. However, during testing on some samples, we found that due to different companies describing their business in varying ways, identical terms related to new quality productivity (such as big data, cloud computing, etc.) might appear repeatedly, increasing the word frequency. This clearly failed to accurately reflect the improvement in new quality productivity levels. Therefore, this paper adopts a "presence + graded matching" scoring principle, which involves stratifying companies based on the types of new quality productivity-related terms that appear in their MD&A sections. The specific scoring principles are as follows.

According to the weight of each word in the dictionary, it is divided into two levels: core words (weight  $>$  0.9) and ordinary words (weight  $<$  0.9):

$$\text{Core word score} = 1 \text{ point} \quad (1)$$

$$\text{Common word score} = \text{preset weight} \quad (2)$$

$$\text{Total score} = \text{core word score} + \text{common word score} \quad (3)$$

This matching method not only highlights the key features (core words), but also supplements the identification dimensions (common words), and effectively avoids the impact of differences in expression on the final score.

The final score results show a clear stratification, that is, the enterprises that are widely involved in the business related to new quality productivity are clearly distinguished from those that are basically not involved in the business related to new quality productivity, which reflects the effectiveness of matching scores.

## 4. Empirical Analysis

The results of the analysis using a difference-in-differences

model on the impact of mergers and acquisitions (M&A) on new quality productivity in listed companies are reported. Column (1) shows that the regression coefficient of M&A on new quality productivity is 1.463, which is significant at the 1% level. Column (2) indicates that after adding various control variables at the firm level, the regression coefficient of technology and financial policies remains significantly positive, with a net effect of 1.003 for M&A events. Economically, this means that, controlling for other factors, M&A increases the new quality productivity level of listed companies by approximately 1.003, which has significant

economic implications. These results suggest that M&A can effectively enhance the new quality productivity level of enterprises, particularly for larger firms and those with combined roles, where the positive impact on new quality productivity is more pronounced. Notably, companies that have been established longer and have more concentrated equity experience a more significant negative impact from M&A on their new quality productivity levels, possibly due to organizational inertia, path dependence, and decision-making rigidity caused by equity concentration. The results are shown in Table 1.

**Table 1:** Baseline regression

VARIABLES	(1)	(2)	(3)
	NPQF	DID	PSM-DID
MA	1.463*** (10.68)	1.003*** (7.46)	1.139*** (6.25)
size		1.854*** (32.35)	1.890*** (24.44)
age		-0.089*** (-6.70)	-0.092*** (-5.07)
lev		-0.389 (-1.59)	-0.102 (-0.36)
growth		-0.001 (-0.24)	0.005 (0.28)
board		-0.289 (-0.82)	-0.301 (-0.62)
dual		1.009*** (6.32)	0.943*** (4.31)
top		-0.045*** (-9.33)	-0.052*** (-7.90)
Constant	-0.121 (-0.21)	-35.645*** (-25.02)	-35.717*** (-18.54)
Observations	21,510	21,510	11,713
R-squared	0.397	0.429	0.432
Ind FE	YES	YES	YES
Year FE	YES	YES	YES

Corporate mergers and acquisitions, besides being largely a subjective choice for management and the board of directors, often incorporate scientific measurements such as valuations. However, they are also influenced by factors like policy or market environment, survivorship bias, and other elements, which can increase the presence of selection bias. Therefore, this paper further employs the PSM-DID method to test for the impact of observable and unobservable complex factors between the treatment group and the control group. Specifically, the control variables from the main regression will serve as matching criteria, using a 1:1 with replacement

nearest neighbor matching method. As shown in Figure 3, the standardized deviation percentage between the treatment group and the control group after matching has significantly decreased, reducing the difference between the two groups.

The regression results of PSM-DID are shown in column (3) of Table 1. The regression coefficient of M&A and new quality productivity level is still significantly positive, and the net effect is 1.139, reflecting the robustness of the previous conclusion, that is, M&A of listed companies can effectively promote the improvement of new quality productivity level of enterprises. The results are shown in Figure 3.

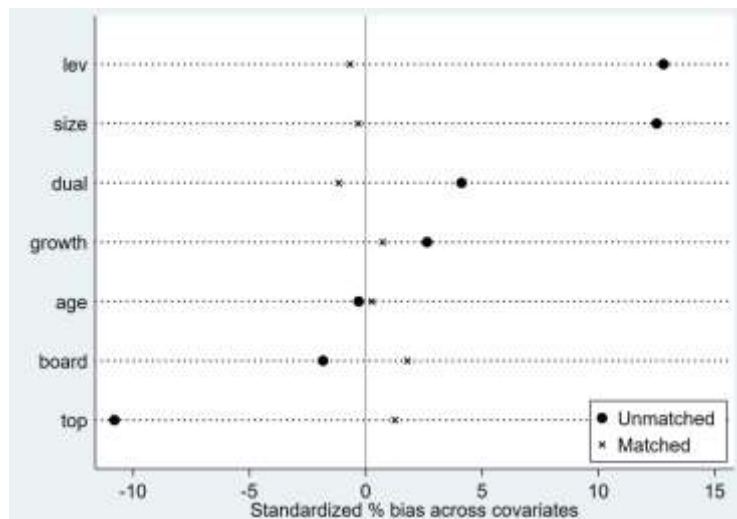


Fig 3: Tie-breaking score matching

To further rule out the impact of non-policy factors on the research results and verify the robustness of the conclusions, this paper adopted a placebo test method, as shown in Figure 4. The results indicate that the estimated coefficients of the dummy variable for pseudo mergers and acquisitions follow a normal distribution with a mean close to 0. Meanwhile, the estimated coefficient of corporate mergers and acquisitions in

the benchmark regression, 1.003, significantly deviates from this distribution range. Therefore, it can be demonstrated that the promotion effect of corporate mergers and acquisitions on new quality productivity levels is not due to random factors, thus further confirming the robustness of the conclusions in the benchmark regression. The results are shown in Figure 4.

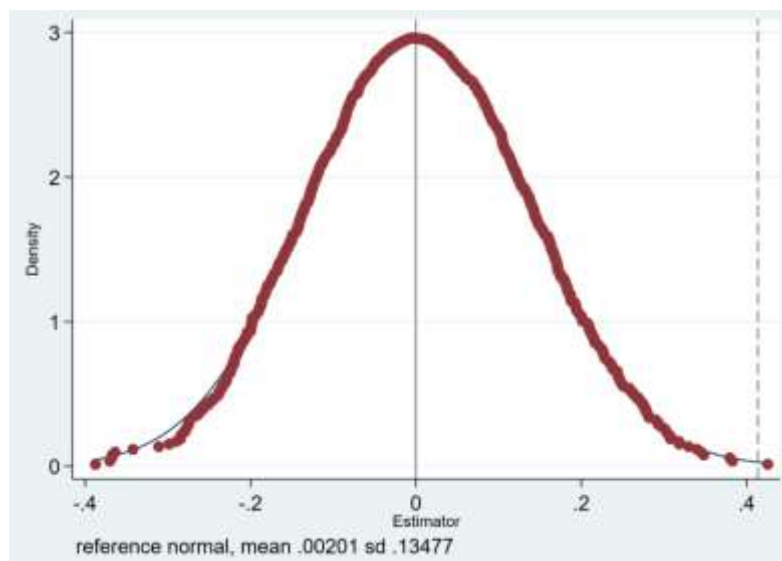


Fig 4: The placebo test

## 5. Conclusions

The economy of our country is transitioning from being driven by traditional factors and investment to innovation-driven growth, with new quality productivity becoming the core of high-quality development. This study focuses on the impact of mergers and acquisitions (M&A) on new quality productivity in listed companies. By analyzing annual reports of A-share companies using the text dictionary method, it reveals differences in new quality productivity levels among firms and provides a new evaluation approach. The study finds that M&A significantly enhances new quality productivity levels, a conclusion that remains robust after various tests. M&A has a greater impact on state-owned enterprises, high-tech companies, and firms in regions with higher market development, primarily through increased human capital and R&D intensity. To promote the positive

effects of M&A on new quality productivity, it is recommended that companies accurately position their M&A activities to enhance new quality productivity; governments formulate differentiated policies to support corporate M&A upgrades; and academia expands research dimensions to conduct in-depth analyses of M&A impact mechanisms.

## References

- [1] Wang Jue, Wang Rongji. New Quality Productivity: Indicator Construction and Temporal-Spatial Evolution [J]. Journal of Xi'an University of Finance and Economics, 2024,37(01):31-47.
- [2] Han Wenlong, Zhang Ruisheng, Zhao Feng. Measurement of New Quality Productivity Levels and New Drivers of China's Economic Growth [J]. Quantitative & Technical Economics Research, 2024,41(06):5-25.

- [3] Lu Jiang, Guo Ziang, Wang Yuping. The Development Level of New Quality Productivity, Regional Differences, and Enhancement Pathways [J]. Journal of Chongqing University (Social Sciences Edition), 2024,30(03):1-17.
- [4] Fu Lianying, CAI Yu. New Quality Productivity in Chinese Cities: Temporal Evolution, Cluster Characteristics and Development Strategies [J]. Industrial Economic Review, 2024, (04):5-22.
- [5] Zhao Guoqing, Li Juntin. Whether Digital Transformation Empowers the Development of New Quality Productivity in Enterprises—Based on Micro-Evidence from Listed Chinese Enterprises [J]. Industrial Economics Review, 2024, (04):23-34.
- [6] Li Shengzhu, Xue Feng, Jiang Jingu. The Impact of Agricultural Digitalization on China's New Quality Productivity in Grain Production [J]. Journal of Agricultural and Forestry Economics Management, 2024,23(04):435-445.
- [7] Chen Yeting, Liu Jintao, Huang Zengyuan. How can technology mergers and acquisitions empower enterprises to develop new productive forces [J]. Finance and Economy, 2025, (01): 27-39.
- [8] Dong Tiantian, Chen Yanling. Research on the influence of supply chain construction on the new quality productivity of enterprises [J]. Contemporary Financial Research, 2024,7 (12): 71-85.
- [9] Xiao Yang, Zhang Xiaofei. The impact of technology mergers and acquisitions on innovation sustainability of manufacturing enterprises: the intermediary role based on absorptive capacity and utilization capacity [J]. Technical Economy, 2021,40(11):1-12.
- [10] Huang Sujian, Xiao Hongjun, Xin Wang. On the high-quality development of state-owned enterprises [J]. China Industrial Economy, 2018, (10):19-41.
- [11] Yao Weighted, Zhang Kunpeng, Guo Lipeng, et al. How does artificial intelligence improve the production efficiency of enterprises? -Based on the perspective of the adjustment of labor skill structure [J]. Management World, 2024,40 (02): 101-116+133+117-122.