



Economic Consequences of National Organized Drug Centralized Volume Procurement Policy—A Review of Empirical Literature

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Abstract. The implementation of China's National Organized Drug Centralized Volume Procurement (NCDP) policy represents a historic shift in drug pricing in the world's largest pharmaceutical market. This paper reviews research on the policy's mechanisms and economic impacts on pharmaceutical firms and the industry, identifies limitations in existing studies—such as overreliance on listed companies, limited long-term analysis, and insufficient heterogeneity assessment—and proposes future research directions, including longitudinal tracking, refined impact analysis, and comprehensive evaluation of the industrial chain ecosystem. The findings aim to inform scholars and support policy improvement.

Keywords: National Organized Drug Centralized Volume Procurement; Economic Consequences; Pharmaceutical Enterprise; Literature Review; Pharmaceutical Industry

1 Introduction

Drug centralized procurement policies are critical for any country, as they directly affect public spending and citizen welfare. As of 2025, 150 countries have implemented national organized centralized volume procurement, according to WHO data. Global healthcare spending has risen steadily over recent decades, with drug costs being a major contributor, placing significant pressure on health systems. To address this, many countries are using legislation and improved procurement strategies to control costs and enhance drug accessibility.

China attaches great importance to the implementation of the National Centralized Drug Procurement (NCDP) policy. From the launch of the 'National Organized Drug Centralized Procurement Pilot Program' in 2018 to the publication of the 'Notice on Carrying Out the Information Filling Work for the 11th Batch of National Organized Drug Centralized Procurement' in 2025, China's NCDP policy has been continuously optimized, which has had a profound impact on all levels of the pharmaceutical industry.

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Existing research covers a broad range of topics and yields rich results. However, the lack of a systematic review has led to limited overall understanding of the NCDP policy’s economic consequences in both academic and practical circles, hindering further research and impeding policy evaluation and improvement. This paper systematically reviews existing studies, classifies different effect scenarios, and maps current research trends to guide future work.

This paper is structured as follows: Section one reviews the development of NCDP, analyzes its potential impact, identifies research directions, and provides a framework for classifying subsequent literature. Sections two and three examine the policy’s economic effects on pharmaceutical firms and the industry, based on the framework established in section one. Section four summarizes current research and suggests future directions.

2 Theoretical Analysis of Policy Background and Economic Consequences

2.1 Formulation and Implementation of NCDP Policy

Launched in 2018, the NCDP policy is an important part of China's deepening reform of the medical and health system. Its core goal is to squeeze out the inflated prices in the drug distribution process through centralized procurement and volume-for-price negotiation, reduce the burden of medication for patients, and promote the healthy development of the pharmaceutical industry^[1]. Since its implementation in 2018, the NCDP policy has undergone a total of 11 rounds of revisions and improvements by August 2025, as detailed in Table 1.

Table 1. NCDP Modification Batches and Modification Content

Batch	Execution Time	Main Optimizations and Modifications
Batch 1	December 2018	Introduce a volume-based procurement model to address the "disconnection between quantity and price," achieving an average 52% price reduction, and establish pilot city alliances to enable large-scale bargaining.
Batch 2	January 2020	National expansion, optimization of competition rules, and increased transparency; average price reduction of 53%.
Batch 3	August 2020	Expanded variety coverage and strengthened performance and trustworthiness mechanisms; average price reduction of 53%.
Batch 4	February 2021	First inclusion of injections and improved bidding rules; average price reduction of 52%.
Batch 5	June 2021	Scale hits a new historical high, adjusting the competition for injections; average price reduction of 56%.
Batch 6 (Insulin Special)	November 2021	Expanded to the field of bio pharmaceuticals, optimizing quotations and supply; average price reduction of 48%.

Batch	Execution Time	Main Optimizations and Modifications
Batch 7	July 2022	Covers 31 therapeutic areas, strengthening advance payments and distribution; average price reduction of 48%.
Batch 8	2023	Normalize adjustments and optimize the reporting ratio of medical institutions.
Batch 9	2024	Further plug loopholes and improve quality supervision.
Batch 10	Implemented in December 2024 and April 2025	Adjust the number of shortlisted products, target problem-oriented; the average price reduction is expected to be more than 50%.
Batch 11	July-August 2025 (reporting volume starts)	Optimize rules to meet diverse needs, such as independently selecting specifications; further improve clinical supply during execution.

2.2 Analysis of the Impact of Policies on Pharmaceutical Companies

Theoretically speaking, the NCDP policy may have positive and negative impacts on pharmaceutical companies.

On the one hand, NCDP will have a positive impact on specific pharmaceutical companies. First, for pharmaceutical companies that have already won the bid and have high prices, the policy guarantees the stability of these companies' sales through a volume-for-price mechanism, partially offsetting the negative impact of price reductions on profits, thereby improving financial performance. Second, for traditional sales-driven companies, the policy will guide companies to shift to innovation-driven, while inefficient production model companies will be eliminated^[2]. Finally, for pharmaceutical companies that are already in the research and development stage, after the policy is implemented, in order to increase the probability of their own produced drugs being selected into the centralized procurement list, they will usually increase R&D expenditures, and at the same time adjust marketing expenditures according to the stage of R&D. This can improve their R&D and innovation capabilities, thereby producing lower-cost, higher-quality drugs, and thus improve their operating performance^[3]. The positive impact of the policy on pharmaceutical companies is shown in Figure 1.

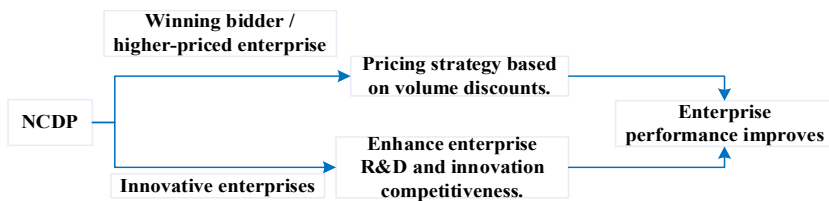


Fig. 1. Positive Impact of NCDP Policy on Pharmaceutical Companies

On the other hand, the NCDP policy may have a negative impact on the operating capabilities and financial performance of selected companies. First, for companies that fail to win the bid, their market share will shrink; for winning companies with low

prices, the profit loss due to excessively low prices cannot be offset by increasing sales, ultimately leading to a decline in performance^[5]. Second, the NCDP policy may weaken the R&D investment and innovate motivation of some companies, thereby reducing performance. Due to the low drug pricing leading to meager profits, while R&D costs are high and the failure rate is high, some companies may actively or passively choose to abandon R&D^[5-7]. Facing the increased degree of competition among pharmaceutical companies brought about by the NCDP policy^[2], insufficient R&D will lead to a decline in corporate performance^[8]. The negative impact of the policy on pharmaceutical companies is shown in Figure 2.



Fig. 2. Negative Impact of NCDP on Pharmaceutical Companies

2.3 Analysis of the Impact of Policies on the Pharmaceutical Industry

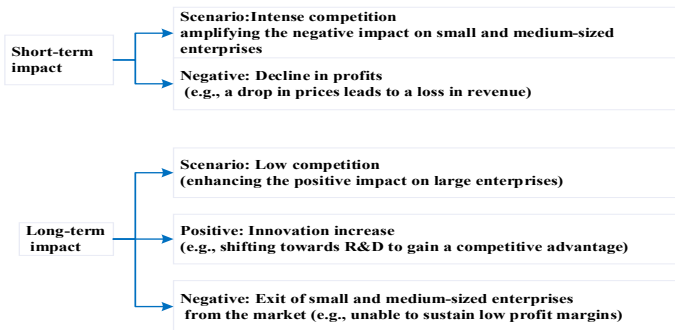


Fig. 3. NCDP generated both short-term and long-term effects—positive and negative in each case.

Theoretically speaking, the impact of the NCDP policy on the pharmaceutical industry will exhibit characteristics of coexistence of positive and negative effects, differences in the short and long term, and dependence on scenarios. Specifically, the policy amplifies competitive pressure in the short term through a volume-for-price mechanism, leading to a shrinking market share for small and medium-sized enterprises. In the short term, the NCDP policy will have a negative effect on the pharmaceutical industry. This is because the policy will increase the degree of market competition, and unsuccessful bidders may face the risk of declining sales and supply chain disruptions^[2]. For unsuccessful bidders with high product costs or unsuccessful bidders with single products,

this negative impact will be more lasting and may inhibit the stability of raw material supply in the upstream of the industrial chain^[2]. In the long term, it will promote the improvement of industrial concentration and the optimization of resource utilization efficiency. In the long term, the NCDP policy may have a positive effect, specifically reflected in the adjustment of the long-term industrial structure. The NCDP policy further consolidates the industry position of large enterprises, reduces production costs through economies of scale, and guides resources to tilt towards innovation. In a high concentration market scenario, this effect is more significant, and winning bidders can obtain market share growth through stable supply, supporting long-term R&D investment. Both short-term and long-term effects—positive and negative in each case NCDP produced are shown in Figure 3.

3 Empirical Research on the Economic Consequences of Policies for Pharmaceutical Companies

Existing literature suggests that the economic consequences of NCDP at the enterprise level mainly revolve around three aspects: enterprise performance, R&D investment, and innovation. Among them, the impact of NCDP on enterprise performance mainly focuses on two parts: enterprise financial performance and market capital value.

3.1 Empirical Research on the Impact of NCDP Policy on Enterprise Financial Performance

Reviewing existing research reveals that the impact of NCDP policy on the financial performance of pharmaceutical companies is not uniform. Table 2 shows the financial performance indicators and conclusions involved in the main literature reviewed in this article.

As shown in Table 2, the existing literature on the impact of policies on corporate financial performance indicators does not reach a unified conclusion. Some studies have shown that NCDP has a positive impact on the financial performance of winning companies. For example, Sun et al. ^[4]used the DID method and financial data of Chinese listed pharmaceutical companies to find that NCDP significantly improved the financial performance of winning companies, mainly through cost reduction and market share expansion; Xu et al. ^[6]also used the multi-period DID method, based on the annual financial data of Chinese pharmaceutical companies from 2016-2022, and concluded that NCDP positively improved corporate performance.

Some empirical studies have also shown that NCDP has a negative impact on the financial performance of unsuccessful bidders, successful bidders, and even all listed pharmaceutical companies. For example, Xu and Wu^[10] used the DID method and financial data of Chinese pharmaceutical companies as a sample to find that unsuccessful bidders managed their earnings downward, resulting in asymmetric negative financial performance; Yang et al. ^[5]used the DID method, based on the financial data of Chinese listed pharmaceutical companies, to prove that NCDP led to a decline in the revenue of successful bidders, and the price decline caused profit losses; Ke et al. ^[11]applied the

PSM-DID method and used the financial data of Chinese listed pharmaceutical companies from 2016-2020 to conclude that NCDP significantly negatively affected business performance, and the increase in sales could not compensate for the profit losses caused by the price decline; Feng and Tang^[9] used the panel data regression analysis method, based on the financial data of Chinese A-share pharmaceutical manufacturing listed companies from 2014-2022, and found that medical insurance negotiations and NCDP had a significant negative effect on the operating and development capabilities of these companies.

Table 2. Financial Performance Indicators and Related Conclusions

Main Indicators	Authors Appeared in Papers	Conclusions from Papers
Tobin's Q	Zongjun Ke	The policy has a significant short-term negative impact on the Tobin's Q of participating in bidding companies.
ROA	Zhixuan Sun et al. Feng Yuli&Tang Shaoliang	The policy has an impact on the ROA of the winning enterprises The policy significantly reduces ROA for winning enterprises but has no effect on unsuccessful ones.
OGS(Overall Growth Score)	Zhixuan Sun et al.	The policy has a positive impact on the OGS of winning enterprises.
ROE	Feng Yuli&Tang Shaoliang(2024) Feng Yuli&Tang Shaoliang	The policy has no significant effect on the ROE of chemical pharmaceutical and SMEs. The policy significantly reduces the net profit margin of winning enterprises but has no effect on non-winning ones.
Net Profit Margin	Hu et al	The policy leads to a decrease in the net profit of some enterprises in the short term.
Net Income	Fenghong Yang et al. Gu and Zhuang ^[12]	The policy has a significant negative impact on the net income of winning enterprises. The policy has a negative effect on the operating profit of enterprises
Operating Profit	Liu Xiaoting&Lv Hao Feng Yuli&Tang Shaoliang	The policy has no impact on the operating profits of companies participating in centralized procurement. The policy significantly reduces operating profits for winning companies but has no effect on non-winning ones.
Sales Expense Ratio	Feng Yuli&Tang Shaoliang	The policy is significantly positively correlated with the sales expense ratio of pharmaceutical companies.
Sales Expense	Xu Xinchen et al. Gu and Zhuang	The policy has not significantly reduced the sales expenses of pharmaceutical companies in China. The policy reduces the sales expenses of companies participating in centralized procurement.
Solvency	Feng Yuli&Tang Shaoliang Zhixuan Sun	The policy has no significant effect on the solvency of pharmaceutical companies. The policy improves solvency for most pharmaceutical companies.
Cost efficiency	Xu Zhikai, Meng Guangxing ^[13]	The policy significantly improves corporate cost efficiency

However, some studies have shown that the impact of NCDP on corporate financial performance varies from period to period. For example, Hu et al. ^[14] found that in the short term, the net profits of some companies may decline, but in the long run, the situation may improve. This suggests that after adapting to the policy, companies may be able to gradually restore or even improve their financial situation through cost control, efficiency improvement, and product structure optimization.

In summary, there are a large number of empirical studies on the impact of NCDP policy on corporate financial performance, and the conclusions are not unified, which is reflected in the fact that the positive and negative impacts of NCDP policy on enterprises are different, and the impact of NCDP policy on enterprises is also inconsistent due to the different implementation periods.

3.2 Empirical Research on the Impact of NCDP Policies on Corporate Capital Market Value

Similar to the section on corporate financial performance, this paper reviews existing research and finds that the impact of NCDP on pharmaceutical companies' financial performance also varies across studies.

The corporate market capital value indicators and conclusions involved in the literature reviewed in this paper are shown in Table 3.

Table 3. Market Capital Value Indicators and Related Conclusions

Indicator Name	Authors Appeared in Papers	Conclusions from Papers
Enterprise Value	Tang Yunshu et al.	The policy promotes corporate innovation and expands market share, thereby enhancing corporate value.
	Zhixuan Sun et al.	Policies increase the market share of winning enterprises
	Sha Xu & Dejun Wu	Policies increase the market share of pharmaceutical enterprises
Market Share	Tang Yunshu et al.	Policies increase the market share of winning enterprises
	Tan Qingli&Wu Minggen	Policies increase the market share of winning enterprises through market incentives,
	Xiujuan Li	Policies promote the market share growth of winning enterprises
Development Ability	Feng Yuli&Tang Shao-liang	Policies have a negative impact on the development ability of pharmaceutical enterprises
	Fangjun Qiu et al. ^[15]	Policies have a significant positive impact on the development ability of high-marketing pharmaceutical manufacturing enterprises
Market Concentration	Zhixuan Sun et al.	Policies improve Pharmaceutical companies market Concentration
	Tang Yunshu et al.	Policies increase Pharmaceutical companies' market Concentration
Bidding Frequency	Zhu Hengpeng et al. ^[16]	Under high bidding frequency, the policy has a smaller price reduction effect on the bidding drugs
	Zhixuan Sun et al.	Policies significantly affect the bidding frequency of pharmaceutical companies through the bidding mechanism

As shown in Table 3, the research conclusions on the impact of policies on the capital market value of enterprises are not uniform. Some believe that NCDP has a positive

effect on enterprise value. For example, Xu and Wu^[10] found through empirical research that the policy increased the market share of winning enterprises, and the winning enterprises improved market value through upward earnings management; Sun et al.^[4] analyzed the financial data of Chinese listed pharmaceutical companies and proved that NCDP improved enterprise value through market share expansion; Sun et al.^[2] applied text mining methods, using the national drug NCDP text from 1999-2022 as a sample, and concluded that the NCDP policy not only incentivized enterprises to reduce drug prices to increase market share, but also fully guaranteed the profit margin of winning enterprises, greatly saving costs in marketing and circulation, thereby reducing the average production cost, and then improving the enterprise value of winning enterprises; Tan and Wu^[17] used the Porter Five Forces model and AHP-SWOT analysis method, using environmental data of small and medium-sized pharmaceutical enterprises, and found that small and medium-sized pharmaceutical enterprises under the NCDP policy positively improved market value through turnaround strategies.

On the one hand, some also believe that NCDP also brings negative effects to enterprise value. Tang et al.^[18] pointed out that the price effect of NCDP on drug pricing is negatively offset by the enterprise price effect, which is not conducive to the improvement of enterprise value; Tan and Wu^[17] found that the NCDP policy exacerbated the financial and talent difficulties of small and medium-sized pharmaceutical enterprises, leading to negative value; He et al.^[7] used the event study method to analyze the impact of NCDP on the stock prices of 205 Chinese pharmaceutical companies, and the results showed that policy changes led to a significant decline in market capital value on the day of the event. In addition, long-term effect analysis showed that this negative impact may last for one year in the stock market. This shows that in the early stage of policy implementation, the market showed concerns about the uncertainty and profit margin compression brought by NCDP, resulting in damage to enterprise valuation.

In summary, there are abundant empirical studies on the impact of NCDP policy on the capital market value of enterprises, and most of the empirical methods used involve the DID method. Most studies emphasize that the NCDP policy has a positive impact on the capital market value of enterprises. However, since some studies have considered confounding factors such as market concentration, the conclusions tend to be that the NCDP policy has a negative impact on the capital market value of enterprises.

3.3 Empirical Research on the Impact of NCDP Policy on Enterprise R&D Investment and Innovation

The impact of the National Centralized Drug Procurement (NCDP) policy on pharmaceutical companies' R&D investment and innovation behavior is a central focus in the literature. Studies primarily examine how the policy shapes innovation strategies through price pressures, market competition, and resource reallocation. Table 4 summarizes key indicators—covering R&D intensity, scale, and efficiency, as well as innovation output and quality—and their main findings, reflecting the multidimensional nature of the policy's effects.

Table 4. Enterprise R&D Investment and Innovation Indicators and Related Conclusions

Indicator Name	Authors Appeared in Papers	Conclusions from Papers
R&D Investment Intensity	Xu Zhikai, Meng Guangxing	The policy significantly increases the innovation investment of pharmaceutical companies
	Jiaming Li et al. [19]	The policy has a positive impact on the R&D investment intensity of non-winning enterprises
	Fangjun Qiu et al.	The policy encourages marketing-oriented enterprises to increase R&D investment intensity
	Gu and Zhuang	The policy has a significant positive impact on the R&D investment intensity of listed pharmaceutical companies
	Feng Yuli&Tang Shaoliang	Policies promote increased R&D investment intensity.
R&D Investment	Yue & Miraldo	Policies strengthen corporate R&D investment intensity.
R&D Investment Spending	Xu Xinchen et al.	Policies have increased the R&D investment level of pharmaceutical companies.
Innovation Input Intensity	Jiaming Li et al.	Policies increase companies' R&D spending, but more significantly for non-winning companies.
	Xu Zhikai, Meng Guangxing	Policies promote winning companies to increase R&D spending.
	Gu and Zhuang	Policies promote enterprises to increase innovation input intensity .
Number of Patents	Xu Zhikai, Meng Guangxing	Policies increase the innovation input intensity of winning companies.
	Fangjun Qiu et al.	Policies increase the intensity of corporate innovation investment
	Wang Shaofei et al. [20]	The lower the product market competition, the stronger the policy's incentive effect on enterprise innovation.
Innovation Quality	Tang Yunshu et al.	Policies increase the number of patents
	Jiaming Li et al.	Policies reduce the number of patents, but improve the quality of patents.
	Gu and Zhuang	Policies have a significant negative impact on the number of patents for enterprise R&D.
R&D Output	Gu and Zhuang	Policies promote enterprises to improve the quality of patents.
	Tang Yunshu et al.	The policy significantly increases the patent output of winning companies.
	Wang Shaofei et al.	The policy promotes enterprises to increase patent output.
R&D Efficiency	Xu Zhikai, Meng Guangxing	The policy reduces costs and adjusts the market, thereby increasing the R&D output of enterprises
	Tang Yunshu et al.	The policy significantly improves the R&D efficiency of listed companies.
	Yang Ying et al.	The policy improves the R&D efficiency of enterprises.
	Song Jia et al.	The policy lacks targeting accuracy and fails to guide enterprises in aligning R&D with market demands, undermining R&D efficiency.

Some research conclusions on the impact of policies on enterprise R&D investment and innovation are shown in Table 4 and are not uniform. Most of the existing studies believe that NCDP promotes R&D investment and innovation. For example, Tang et al.^[18] believe that NCDP guides enterprises to change their sales models, which further affects the innovative development of pharmaceutical companies; Xu et al.^[10] also provided direct evidence in their empirical research, and they found that the centralized drug procurement policy significantly improved the R&D investment level of pharmaceutical companies in China; Liu and Lv^[21] found through empirical research that NCDP reduced drug prices, thereby reducing the operating costs of enterprises, and prompted pharmaceutical companies to shift to innovation-driven, increasing R&D investment; Yang et al.^[22], Xu and Meng^[13] found through empirical research that the NCDP policy enhanced the R&D intensity of enterprises, improved the R&D output of enterprises, and optimized the pharmaceutical industry structure.

However, some studies also argue that the policy hinders companies' R&D investment and innovation, making it difficult for small and medium-sized enterprises to benefit. For example, Tan and Wu^[17] used Porter's Five Forces model and AHP-SWOT analysis to examine the environmental data of small and medium-sized pharmaceutical companies. The results showed that although these companies have a strong willingness to innovate and are flexible in transformation, the lack of funds, talent, and market awareness led to an actual decline in R&D investment, making it impossible to effectively produce high-quality drugs; Song et al.^[23] found that NCDP has low targeting accuracy and is not strongly coupled with the interests of patients and pharmaceutical enterprises, failing to effectively guide enterprises to optimize R&D directions according to market demands, thereby hindering the overall innovation ecosystem.

In summary, existing studies emphasize the dominant role of NCDP in promoting innovation, but the negative effects are significant in specific contexts.

4 Empirical Conclusions on the Economic Consequences of Policies on the Pharmaceutical Industry

NCDP has had a significant impact on the pharmaceutical market structure and competitive landscape, mainly reflected in the increase in market concentration and the optimization of the industrial structure.

In terms of increasing market concentration, Ke et al^[11], Li et al^[19] and others used panel data of Chinese A-share listed pharmaceutical companies (data of 1,521 manufacturing companies and 102 chemical pharmaceutical companies from 2015 to 2022) as samples, and adopted the DID analysis method to find that the national centralized drug procurement policy significantly increased the R&D investment intensity of pharmaceutical companies, and there is an oligopoly risk, concluding that NCDP helps to optimize the industrial structure and shift to innovation-oriented, but needs to improve bidding rules and support small enterprises to balance market concentration and avoid monopoly. Xin Li et al.^[24] analyzed the development law of NCDP and its impact on pharmaceutical manufacturers by analyzing the bidding results of national NCDP drugs and the scale of winning enterprises; the increase in market concentration is conducive

to forming economies of scale, reducing production costs, and improving the overall efficiency of the industry, but it may also bring market monopoly risks, which need to be continuously monitored and balanced by regulatory authorities.

In terms of optimizing the industrial structure, NCDP also promoted the survival of the fittest in the pharmaceutical industry, encouraging enterprises to shift from homogeneous competition to differentiated competition, and from generic drug production to high-quality generic and innovative drug research and development. For example, Li and Xu^[25] analyzed from the perspective of policy impact on pharmaceutical innovation, using data from 164 listed pharmaceutical companies from 2015 to 2022, and adopted the DID method to find that the NCDP policy significantly increased innovation investment, especially for generic drugs and non-winning companies, by reducing profits and other means to exert survival pressure, and concluded that the policy promotes industry optimization, should expand the policy to further reduce drug prices and strengthen quality supervision, and at the same time cautiously apply it to innovative drugs to maintain R&D incentives.

5 Conclusions

This review systematically summarizes the economic consequences of the NCDP policy on pharmaceutical companies through a review of existing literature. The study found that:

(1) NCDP affects the financial performance and market value of firms, but the direction—positive or negative—remains unclear; (2) the policy boosts R&D and innovation in listed pharmaceutical companies, yet harms SMEs and low-winning-rate firms through capital constraints and reduced innovation incentives; (3) NCDP increases industry concentration, driving consolidation and high-quality development.

While these findings reveal key mechanisms and economic effects, research gaps remain. Key areas for future study include:

(1) The conclusions of existing studies are not consistent, and future research can be carried out on the economic consequences of the policy on pharmaceutical companies and the economic consequences on the pharmaceutical industry. For example, if the research objects selected are the same, but the conclusions drawn are different, then future research should change the research methods, or adjust the research models and variables, and then continue the research; in addition, scenario analysis can also be strengthened to clarify under what scenarios NCDP has positive and negative impacts.

(2) The depth of research on the long-term impact of existing studies on the policy is sufficient, and future research can deepen the study on the impact of the long-term effects of the policy. Although some studies in existing research touched upon the long-term impact, the depth of research is not enough, and the conclusions drawn conflict. Therefore, future research needs to further improve the analysis in terms of the long-term impact.

(3) Existing research lacks heterogeneous analysis of the impact of NCDP policies, and future research should further strengthen the refined analysis of heterogeneous im-

pacts. The NCDP has significant differences in its impact on different types of enterprises (such as state-owned enterprises, private enterprises, and foreign-funded enterprises), different product lines (such as generic drugs, innovative drugs, and biological products), and different regional markets, but existing research has not conducted a detailed analysis of this. Therefore, future research can further refine the heterogeneity and reveal deeper mechanisms of action.

(4) Existing research pays less attention to the upstream and downstream of the pharmaceutical industry supply chain, and future research should focus on the comprehensive impact of NCDP policies on the pharmaceutical industry innovation ecosystem. The NCDP will have a long-term impact on the upstream (such as raw materials, R&D services) and downstream (such as circulation, retail) of the pharmaceutical industry chain, as well as on the entire pharmaceutical innovation ecosystem (such as research institutions, investment institutions), but existing research is still insufficient in this regard. Therefore, more research is needed in the future to fully study the comprehensive impact of NCDP on the innovation ecosystem.

In summary, as a dynamic reform, China's NCDP needs to be continuously explored for its multi-dimensional effects to clarify the deep-seated mechanisms and long-term benefits of the policy, and to provide scientific support for the healthy development of the pharmaceutical industry and the public welfare.

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