Study on the Impact of the Centralized Procurement Policy for Traditional Chinese Patent Medicines on the Innovation Performance of Listed Traditional Chinese Medicine Enterprises in China

Feng Li, Weishu Ma

College of Management, Tianjin University of Traditional Chinese Medicine, Tianjin, China

Abstract

Despite continuing reforms in China's healthcare system, bulk procurement policies for medicines have increasingly been used as a key regulatory tool in recent years. The objective of this kind of policy is to lower the cost of pharmaceuticals and establish operation standards in the domestic pharmaceutical market. With the gradual adoption of bulk procurement policies on traditional Chinese medicine formula products, discussion among academia and the general public has also been focused on the innovation strategies of enterprises affected by the bulk procurement policy. This study takes the A-share listed traditional Chinese medicine enterprises that trade on the Shanghai and Shenzhen stock exchanges during the period 2018 to 2024 into consideration. It builds the panel dataset of firms at an empirical level. Using the multiple difference-in-differences approach, the effects of traditional Chinese medicine formula bulk procurement policy on innovation outcomes of firms are evaluated. Mechanism test is done using three key indicators of enterprise operations. Empirical testing outcomes suggest that the implemented TCM bulk procurement regime may indicate meaningful enhancements in innovative performance for listed traditional Chinese medicine enterprises. Mechanism testing reveals that the policy drives the optimization of corporate resource allocation structure by increasing R&D investment, optimizing R&D personnel allocation, and reducing sales expense ratios, thereby fostering technological innovation. The research conclusions provide empirical evidence for evaluating the implementation effects of the centralized procurement policy for TCM preparations and promoting the innovative development of the TCM industry.

Keywords

Traditional Chinese Patent Medicine, Procurement Policy, Innovation Performance.

1. Introduction

In recent years, the reform of China's medical and health system has continued to advance and deepen. The centralized volume-based procurement system for drugs can reduce drug prices, regulate the operation of the pharmaceutical market, and reduce the burden of medication on patients, becoming an important policy tool in the industry. In 2018, the state launched a pilot program for centralized drug procurement. The centralized procurement system has gone through the stages of pilot exploration, expansion and promotion, and normalized implementation, changing the original competitive landscape of China's pharmaceutical industry and also changing the original business models of enterprises. The centralized procurement of chemical drugs was carried out earlier, while the centralized volume-based procurement of traditional Chinese patent medicines started later. In recent years, local authorities have carried out pilot projects, and inter-provincial alliances and national alliances

have gradually promoted the procurement work. The coverage of the centralized procurement policy for traditional Chinese patent medicines has gradually expanded, and a stable and institutionalized operating mechanism has been formed. Within the domestic healthcare market, traditional Chinese patent medicines represent a fundamental pillar of the broader oriental pharmaceutical sector. The capacity for technological innovation directly determines an enterprise's market dominance. More importantly, it maps out the trajectory for updating the entire traditional Chinese medicine framework. In practice, regulatory bodies continue to advance and enforce centralized volume-based procurement strategies tailored specifically to these botanical compounds. This ongoing policy shift likely signals a permanent restructuring of industry pricing and distribution. The external shock brought by the policy will change the innovation behavior of traditional Chinese medicine enterprises, and related discussions have become an important research direction in the industry.

Innovation within corporate bodies dictates the trajectory of the development of the health care industry. Research findings from previous literature suggest that the size of the organization, the extent to which funds have been allocated for research and development, and the nature of scientific staff play an instrumental role in determining whether the pharmaceutical company achieves successful innovation.By contrast, strategic personnel placement appears to alter inventive outcomes regardless of absolute funding metrics. Zou Xianhong[1] and Zhang Ru[2] pointed out that R&D investment and the scale of scientific research personnel can improve the technological innovation efficiency of the pharmaceutical manufacturing industry, and factors such as enterprise scale and capital structure will also affect innovation activities. Liu Zhongmin et al.[3] used the network SBM-Malmquist model to calculate the innovation efficiency of the pharmaceutical manufacturing industry and proposed that technological progress is an important source for pulling up the industry's innovation efficiency. Li Xiaohuan[4] proposed that enterprise innovation performance is affected by the scale of R&D investment and is also directly related to the efficiency of enterprise resource allocation and management capabilities. In the field of innovation performance measurement, some scholars use methods such as DEA and SFA to calculate the technological innovation efficiency of pharmaceutical enterprises[5-9], and some studies directly select the number of patent applications to represent enterprise innovation performance[10].

As centralized procurement strategies gradually gain traction across the medical marketplace, researchers have begun investigating how these regulatory shifts alter corporate inventive behaviors. Consensus remains elusive. Conflicting empirical evidence fills current literature. Certain investigators propose that guaranteed-volume purchasing models may dilute corporate incentives to innovate. This chilling effect likely stems from sudden margin contraction, which naturally leaves leadership teams with fewer unallocated funds to gamble on long-term laboratory discovery. Zhang Xinxin et al.[11] proposed that after the implementation of the centralized procurement system, the bargaining power of downstream medical institutions is enhanced, and the decline in drug prices will compress corporate profit margins and inhibit corporate R&D investment. The research of Zhang Qinglin et al.[12] and Zhou Xiaoyou[13] also proposed that the decline in drug prices will constrain the innovation capabilities of enterprises. Another group of researchers believes that the volume-based procurement policy can promote enterprise innovation through competitive pressure. Li Shouxi et al.[14] proposed that the volume-based procurement policy can compress corporate sales expenses, allowing companies to allocate more resources to R&D activities. Song Wei et al.[15] conducted research using the PSM-DID model, and the centralized drug procurement system can promote corporate R&D investment and enhance innovation capabilities. Tan Qingli et al.[16] proposed that the policy adjusts the corporate cost structure, changes the resource allocation method, and promotes pharmaceutical companies to shift to an innovation-driven development model.

Existing research has conducted extensive discussions on the innovation efficiency and innovation performance measurement of pharmaceutical enterprises, as well as the impact of centralized drug procurement policies, which has laid an important foundation for this study. However, there is still room for expansion in the research field: first, most of the existing research focuses on the centralized procurement of chemical drugs or generic drugs, and the number of studies on the centralized procurement policy of traditional Chinese patent medicines is limited; second, most of the existing research focuses on the financial performance or market performance of enterprises, and there is still a lack of systematic empirical analysis of the policy's effect on enterprise innovation performance. Focusing on mainland capital markets, this study samples pharmaceutical corporations traded on the Shanghai and Shenzhen A-share exchanges to construct firm-level panel datasets. The multi-period difference-in-differences methodology is used as the primary tool to understand the impact that the centralization of bulk purchasing systems for botanical products would have on the innovative performance of firms. In order to separate the structural effects from other effects, the model analyzes variables such as the ratio of research expenses to revenues, human resources distribution among laboratory personnel, as well as marketing to sales cost ratios. The goal of the empirical analysis is to provide a structured set of recommendations based on actual performance data.

2. Research Design

2.1. Data Source

By isolating domestic pharmaceutical entities listed on the Shanghai and Shenzhen A-share markets, this study compiles a longitudinal, firm-level dataset. The empirical setup evaluates how state-driven bulk purchasing initiatives targeting botanical formulations modify corporate inventive outputs over time. The sample time interval is from 2018 to 2024. The enterprise financial data, operating data, and R&D-related indicators are mainly from the CSMAR database, and the enterprise patent application data is from the CNRDS database. The information on winning bids for centralized procurement of traditional Chinese patent medicines is mainly sorted out based on the winning bid announcements issued by the National Medical Security Administration, provincial medical insurance bureaus, and drug centralized procurement platforms, and matched with the information of listed companies to identify the year when the enterprise first won the bid. In the sample screening process, ST, *ST, and PT listed companies are first excluded to avoid the impact of abnormal operating conditions on the research results; second, enterprises with discontinuous listing periods or missing key variables during the sample period are excluded; third, to reduce the impact of extreme values on the regression results, the main continuous variables are winsorized at the 1% level. Finally, a balanced panel data at the enterprise-year level is formed to provide a data basis for subsequent empirical analysis.

2.2. Variable Selection

2.2.1. Dependent Variable

The chosen dependent variable is corporate inventive output, denoted as PATit. Researchers studying organizational development tend to consider the actual technological competency of organizations through the analysis of the annual invention applications made. It serves as a better way of understanding technological advancement compared to measures relying on utility patents or aesthetically designed objects. It is due to the fact that the level of technicality involved in obtaining an invention patent is higher, thus reflecting actual discoveries better. Therefore, in this research, the number of annual invention patents will be considered in order to measure innovation efficiency. Since the count variables used in the research are non-

negative and strongly skewed, their logarithms can be computed using the equation: PATit=ln(number of invention patent applications+1), In this equation, i signifies the specific firm under observation, whereas t marks the calendar year.

2.2.2. Core Explanatory Variable

The core explanatory variable is the impact of the centralized procurement policy for traditional Chinese patent medicines (Policy). Given that the centralized procurement policy for traditional Chinese patent medicines is implemented in batches and the time when different enterprises are first affected by the policy varies, this paper constructs a policy variable at the enterprise-time level. Specifically, if enterprise i wins the bid in a certain round of centralized procurement of traditional Chinese patent medicines, the year of the enterprise's first successful bid is taken as the starting point of the policy shock. When t is greater than or equal to that year, Policy takes the value of 1, otherwise it is 0. This variable is used to describe the change in the status of the enterprise after the implementation of the policy, and the impact of the policy on the enterprise's innovation performance is identified through a multi-period difference-in-differences model.

2.2.3. Mediating Variables

In order to measure the precise structural pathways whereby state-driven bulk procurement systems of herbal medicine impact on innovative performance, this model utilizes the intensity of research investments, technical workforce, and marketing expenditure as mediating factors.

(1) Research Development Intensity (RDI). The flow of money into the area of exploration serves as the backbone of technological development of any firm. Within this concept, the cost incurred in innovation will be determined by dividing the amount of spending on research yearly by the total corporate revenue.

(2) Research Density Population (RDP). Employees working within laboratories provide the driving force behind creativity implementation by companies. The focus of this part will be directed at measuring how much of the employees working in an organization are allocated into the research group.

(3) Expenditure on Sales (RES). Traditionally, the local market of pharmaceutical goods encouraged drug-producing companies to spend a lot of money in marketing to ensure their position within the market environment. In light of the newly developed rules related to volume buying of traditional drugs, it is expected that marketing expenditures will fall greatly, which will allow some of the money not being used for marketing anymore to go into lab work.

2.2.4. Control Variables

In order to decrease any possible bias that might be generated from omitted parameters in modeling, the approach utilizes certain firm-level control variables that have been mentioned in past research: asset size, structural leverage, earnings power, growth rate, and financial strength. First, firm size (Size) is expressed as the logarithm of total assets at year-end. Second, structural leverage (Lev) is associated with financial risk and is measured as total gross liabilities/total assets. Third, earnings power (Roa) represents operational efficiency and is expressed as total net income/total assets. Fourth, growth rate (Growth) relates to organizational growth and is expressed as the year-on-year growth rate of sales revenues. Financial strength (Cashflow) measures the fiscal position of firms and is measured as net operating cash flow/total assets.

Table 1. Variable Definitions and Descriptions

Variable Type	Variable Symbol	Variable Name	Calculation Method
Dependent Variable	PAT	Innovation Performance	ln(Number of invention patent applications + 1)
Core Explanatory Variable	Policy	Procurement Policy Variable	1 if the enterprise is in the policy period, 0 otherwise
Mediating Variable	RDI	R&D Investment Intensity	R&D Expenditure / Operating Revenue
Mediating Variable	RDP	R&D Personnel Ratio	Number of R&D Personnel / Total Number of Employees
Mediating Variable	RES	Sales Expense Ratio	Sales Expense / Operating Revenue
Control Variable	Size	Enterprise Size	ln(Total Assets)
Control Variable	Lev	Asset-Liability Ratio	Total Liabilities / Total Assets
Control Variable	Roa	Profitability	Net Profit / Total Assets
Control Variable	Growth	Enterprise Growth	Operating Revenue Growth Rate
Control Variable	Cashflow	Cash Flow	Operating Cash Flow / Total Assets

Table 2. Descriptive Statistics of Variables

Variable Category	Variable Symbol	Observations	Mean	Standard Deviation	Minimum	Maximum
Dependent Variable	PAT	644	1.245	0.978	0	4.605
Core Explanatory Variable	Policy	644	0.312	0.463	0	1
Mediating Variable	RDI	644	0.058	0.041	0.001	0.215
	RDP	644	0.123	0.085	0.01	0.402
	RES	644	0.218	0.104	0.035	0.586
Control Variable	Size	644	22.874	1.134	20.312	26.781
	Lev	644	0.421	0.178	0.052	0.832
	Roa	644	0.072	0.051	-0.183	0.213
	Growth	644	0.112	0.235	-0.563	1.342
	Cashflow	644	0.086	0.072	-0.094	0.356

2.3. Model Construction

In order to evaluate the impact of the policy on the inventive productivity of the firms listed on the stock market that adopt the centralized procurement system for botanical products, the framework adopts the difference-in-difference approach to empirically test the hypothesis. This method focuses on distinguishing the actual effects of the policy from any other factors affecting the firms' inventive performance through contrasting the evolution of the two groups of firms: one exposed to the policy and another one not affected by the policy. On this basis, the following baseline regression specification is formulated:

$$PATit = \alpha 0 + \alpha 1 Policyit + \alpha 2 Xit + \mu i + \lambda t + \varepsilon it$$

Whereas i refers to the specific firm and t to the calendar year, PATit refers to organizational inventive output, measured as the natural logarithm of annual patent applications for inventions. In the model, Policyit is a dichotomous variable, measuring whether the firm is under the jurisdiction of the centralized botanic drugs procurement policy. Xit is a set of variables, namely size, measured as assets; structural leverage, Roa; Growth; and Cashflow. Time invariant firm-level variables are controlled for through the inclusion of firm fixed effects, mui. Whereas macroeconomic and broad industrial trends are controlled for using the year fixed effects, lambdat, the unobserved component, not explained by the model is the error term,

epsilonit. Within this framework, the model parameter alpha1 is used to measure the direct impact of the policy on corporate innovative output. A statistically significant and positive value for alpha1 shows that inventive productivity increased following the enactment of the policy in question, hence supporting the first hypothesis (H1). As a means of identifying how the procurement policies influence organizational inventive performance, we develop a mediated model within this basic specification.The initial phase of this channel analysis evaluates the direct impact of the policy shock on the designated mediating parameters:

$$Mit = \beta 0 + \beta 1 Policyit + \beta 2 Xit + \mu i + \lambda t + \varepsilon it$$

Where Mit represents the mediating variables, which include Research and Development Intensity (RDI), percentage of R&D employees (RDP), and sales expenses ratio (RES). Finally, these mediating variables are included in the innovation performance regression model:

$$PATit = \gamma 0 + \gamma 1 Policyit + \gamma 2 Mit + \gamma 3 Xit + \mu i + \lambda t + \epsilon it$$

Where the values of β1 and γ2 have statistical significance, then it means that the mediating variable is acting as the transmitter in the process where the centralized procurement policy for traditional Chinese patent medicines impacts on the performance of enterprises in terms of innovation. From this model specification, we can understand how the internal mechanism works.

3. Empirical Results and Analysis

3.1. Baseline Regression Results

Table 3. Baseline Regression Results of the Impact of Centralized Procurement Policy for Traditional Chinese Patent Medicines on the Innovation Performance of Listed Traditional Chinese Medicine Enterprises

Variable	(1) Without Fixed Effects	(2) With Two-Way Fixed Effects	(3) With Two-Way Fixed Effects + Control Variables
Policy	0.182*** (0.061)	0.124** (0.052)	0.107** (0.048)
Size	—	—	0.086*** (0.018)
Lev	—	—	-0.142** (0.069)
Roa	—	—	0.318** (0.154)
Growth	—	—	0.041 (0.033)
Cashflow	—	—	0.214* (0.120)
Constant	0.915*** (0.132)	1.102*** (0.214)	-0.684** (0.311)
Firm Fixed Effects	No	Yes	Yes
Year Fixed Effects	No	Yes	Yes
Observations	644	644	644
Number of Firms	92	92	92
R^2	0.041	0.612	0.658

The empirical evidence of how centralised volume procurement of botanical drugs affects the inventive activity of pharmaceutical listed companies is shown in Table 3. Specifically, when no firm-specific effects and time factors were controlled in column (1), the calculated coefficient related to our key explanatory variable was 0.182 and statistically significant at the 1% level. This suggests an impressive growth in inventive outputs for those firms facing new regulation

in place. When firm and time dummies are introduced to account for heterogeneous firm behaviour and macro trends in columns (2), the policy coefficient dropped to 0.124 and was still statistically significant at the 5% level. Further, column (3) introduces all control variables into the equation. As we see, the coefficient for the policy variable dropped to 0.107 while still being statistically significant. Hence, it is reasonable to assume that bulk procurement of traditional medications significantly encourages innovation activity. Moreover, larger company sizes and higher profit margins seem positively associated with innovation rates. However, high debt levels negatively influence innovation activity among listed companies. All in all, this baseline model offers considerable support for H1 that the innovative output of oriental medicine listed companies may be accelerated by the adoption of bulk buying policies for botanical medicines.

3.2. Robustness Test

To examine the validity of baseline estimations, the following three procedures have been adopted to validate the findings through robustness: first, substituting the primary dependent variable, winsorizing the data, and running a placebo test. To begin with, ln TPAT is utilized to substitute for specific patent numbers in the primary equation. Secondly, the winsorization method has been used to transform the primary continuous variables into 5%. Finally, a placebo test will be run using a constructed policy dummy variable in place of the original policy dummy variable. In particular, the implementation years have been assigned randomly to firms, but the total number of firms is maintained unchanged. Afterward, an artificial policy dummy variable Placebo is established and the regression estimation is performed again. If the coefficient on this placebo policy variable turns out insignificant, then baseline estimations are unlikely to be affected by the time trend or noise. Table 4 summarizes the placebo test results.

Table 4. Robustness Test Results

Variable	(1) Replace Dependent Variable	(2) 5% Winsorizing	(3) Placebo Test
	lnTPAT	lnPAT	lnPAT
Policy	0.095** (0.044)	0.101** (0.047)	—
Placebo	—	—	0.012 (0.039)
Size	0.082*** (0.019)	0.079*** (0.018)	0.081*** (0.020)
Lev	-0.131** (0.066)	-0.137** (0.068)	-0.129** (0.067)
Roa	0.295** (0.146)	0.287** (0.149)	0.274* (0.151)
Growth	0.038 (0.032)	0.036 (0.034)	0.031 (0.035)
Cashflow	0.205* (0.118)	0.198* (0.121)	0.193 (0.120)
Firm Fixed Effects	Controlled	Controlled	Controlled
Year Fixed Effects	Controlled	Controlled	Controlled
N	644	644	644
R^2	0.647	0.653	0.641

It can be seen from Table 4 that the regression coefficient of the core independent variable Policy still retains its significance when the dependent variable is substituted and sample data winsorized. This implies that the effect of promotion generated by the centralized procurement policy for traditional Chinese patent medicine on enterprise innovation efficiency is reliable. Furthermore, it is found from the placebo test that the regression coefficient of the placebo policy variable is insignificant, which implies that the baseline regressions are not affected by time trend. Thus, the results from robustness tests also support those baseline regressions conducted in this paper.

3.3. Mediation Effect Analysis

In order to specify the internal mechanisms of transmission that exist between the bulk purchase strategies of traditional products and the organization's innovative capabilities, this

paper uses Research Intensity of Expenditure (RDI), Research Headcount Proportions (RDP), and Research Expense Share (RES) as intermediary variables. Operationally, the process starts by examining the impact that the shock to the initial variable has had on these intermediary variables. After this, they are included in the innovation performance regression equation. The complete empirical results from this multi-stage mediation analysis are structured in Table 5.

Table 5. Mediation Effect Test Results

Variable	(1) RDI	(2) RDP	(3) RES
Policy	0.012** (0.005)	0.009** (0.004)	-0.018** (0.007)
Size	0.004* (0.002)	0.003* (0.002)	-0.000015
Lev	-0.011 (0.007)	-0.008 (0.006)	0.014 (0.010)
Roa	0.027* (0.014)	0.018* (0.010)	-0.020 (0.015)
Growth	0.002 (0.003)	0.001 (0.002)	-0.003 (0.004)
Cashflow	0.014 (0.009)	0.010 (0.007)	-0.016 (0.011)
Firm Fixed Effects	Controlled	Controlled	Controlled
Year Fixed Effects	Controlled	Controlled	Controlled
N	644	644	644
R^2	0.471	0.438	0.502

As is clear from Table 5, the Policy policy indicator exerts a significantly positive influence on research and development spending intensity (RDI) and on laboratory employee density (RDP). Such a shift in direction suggests that, after bulk purchasing policies for regular products were introduced, pharmaceutical companies became progressively more inclined to increase expenditures on discovery and to hire more skilled labor internally. At the same time, the coefficient of Policy on the sales expense ratio (RES) is negative and significant, indicating that the proportion of sales expenses of enterprises has decreased after the implementation of the policy. This shows that the centralized procurement policy for traditional Chinese patent medicines has changed the resource allocation structure of enterprises to a certain extent, prompting enterprises to reduce marketing and promotion expenditures and invest part of their resources in technological research and development activities. Overall, R&D investment and sales expenses play an important transmission role in the process of the policy affecting enterprise innovation performance, thus verifying the relevant research hypotheses proposed in this paper.

3.4. Heterogeneity Analysis

Although the baseline regression results show that the centralized procurement policy for traditional Chinese patent medicines can generally promote the improvement of the innovation performance of listed traditional Chinese medicine enterprises, different enterprises have differences in resource endowments, market environment, and development capabilities. Therefore, the size of this regulatory shock is potentially dependent upon specific features of certain firms. In order to assess these different regulatory effects on different organizational types, the current study divides the sample into two different operational criteria: firm asset size and geographical setting. The resulting sub-sample estimations are detailed in Table 6.

The patterns of heterogeneity analysis on the basis of the impacts of centralized procurement of traditional Chinese botanical medicines on the innovative outcomes in companies according to various archetypal categories of enterprises are summarized in Table 6. Based on the division into organizational scale, the Policy variable reaches statistical significance only in the case of the larger enterprise subsample, whereas its effect is not apparent in the case of smaller market players. This indicates that larger enterprises have relatively higher financial assets, superior technological infrastructure, and better resource endowment, allowing them to insulate against changes in policy via increased expenditure on R&D that stimulates the

generation of new patents. From the point of view of geographic distribution, the stimulating effect of the policy still holds true for pharmaceutical firms operating in the eastern part of China. Meanwhile, in the cases of enterprises in central and western China, no significant effect of the policy emerges, failing to meet common criteria of statistical significance. The reason for such a difference may be explained by a relatively more well-developed industrial sector, greater competencies in technological R&D activities, and greater market competition in eastern China that facilitates the stimulation of innovative and developmental processes by changing market conditions resulting from the policy change.

Table 6. Heterogeneity Test Results

Variable	(1) Large-scale Enterprises	(2) Small-scale Enterprises	(3) Eastern Region	(4) Central and Western Regions
Policy	0.121** (0.052)	0.063 (0.047)	0.109** (0.050)	0.058 (0.046)
Size	0.071*** (0.020)	0.084*** (0.023)	0.076*** (0.021)	0.081*** (0.024)
Lev	-0.129** (0.067)	-0.118* (0.064)	-0.121** (0.066)	-0.007308
Roa	0.267* (0.151)	0.238* (0.146)	0.254* (0.149)	0.221 (0.144)
Growth	0.031 (0.032)	0.028 (0.034)	0.033 (0.033)	0.025 (0.035)
Cashflow	0.181 (0.118)	0.162 (0.115)	0.173 (0.117)	0.159 (0.114)
Firm Fixed Effects	Controlled	Controlled	Controlled	Controlled
Year Fixed Effects	Controlled	Controlled	Controlled	Controlled
N	322	322	348	296
R^2	0.652	0.618	0.641	0.623

4. Conclusion and Policy Suggestions

In this study, we investigate the listed public pharmaceutical companies on the A-shares stock markets in Shanghai and Shenzhen, collecting a panel dataset over 2018–2024. With the help of the difference-in-difference method within multiple periods, our study empirically analyzes the influence of state-mandated procurement regulations for traditional forms on innovative performance. We find that such regulation acts as a facilitator that achieves innovation efficiency improvement for oriental medicine enterprises on the A-shares stock markets. Our channel test finds that such regulation causes changes in the allocation of the company's resource, increasing the intensity of investment in research, allocating more technical people, and avoiding excessive commercial marketing expenditure. As a result, firms will change the operational mode towards actively exploring technology. In addition, through cross-sectional tests, we also observe a significant asymmetry effect, showing that the driving role is significantly stronger in large companies and in companies from eastern areas.

With an emphasis on the results achieved empirically, three recommendations can be outlined for the further regulation of this area. First, it is vital that the agencies overseeing the centralized volume procurement of botanical drugs reconsider the way this process is regulated institutionally. While keeping the focus on the efficiency of drugs and the reliability of supply chains, it is critical to ensure that procurement policies encourage companies to invest in discovering innovations and creating proprietary goods. Second, manufacturing companies should be encouraged to spend more money on research and recruit more scientists. It will help companies undergo a fundamental shift and switch from marketing-driven growth to exploration. Third, since small companies and companies in central and western China lack inventive potential, subsidies should be provided to create greater parity between companies

operating in these markets and those based elsewhere. This measure will enable more knowledge transfer from other regions and facilitate cooperation among corporations.

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