

Retraction

Retracted: The Comparison of Financing Efficiency of Small and Medium Enterprises in Economically Underdeveloped Regions in China: A Perspective Study

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] J. Xu, D. Yang, and Q. Zhang, "The Comparison of Financing Efficiency of Small and Medium Enterprises in Economically Underdeveloped Regions in China: A Perspective Study," *Journal of Advanced Transportation*, vol. 2022, Article ID 9435625, 12 pages, 2022.

Research Article

The Comparison of Financing Efficiency of Small and Medium Enterprises in Economically Underdeveloped Regions in China: A Perspective Study

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Small- and medium-sized enterprises (SMEs) are important foundations to implement mass entrepreneurship and innovation and play an irreplaceable role in increasing employment, promoting economic growth, as well as scientific and technological innovations, and providing particularly social harmony and stability and imminently are strategic entities to the national economy and social development in underdeveloped regions. However, the low-efficiency financing of SMEs has gradually become a major factor that restricts the high-quality development of SMEs in the current conditions. In this paper, interest expenditure, gearing ratio, and the net debt ratio as input indicators and current asset turnover ratio, cost margin, and main business income as output indicators are used to conduct the DEA-BCC model. By utilizing the GEM-listed private enterprises between 2017 and 2020 in China, the nationwide financing efficiency of SMEs is firstly measured, and then the financing efficiencies of SMEs in economically developed regions and lagging regions are calculated separately. The comparison reveals that the financing efficiency of SMEs in economically underdeveloped regions is not only lower than the national average figure but also much lower than the financing efficiency level in economically developed regions, which is the result of the combined effect of internal and external factors that enterprises face. Further, this paper finds that unexpected public events, core technical personnel, and enterprise size have an impact on the financing efficiency of SMEs when running group testing. This paper puts forward rationalized suggestions to the institutions to improve the financing efficiency of SMEs in underdeveloped regions concerning the conducted research, which are called government, financial institutions, and enterprises.

1. Introduction

With the continuous development of the market economy, SMEs have become a significant new force in the development of national economies and critical driving forces for the rapid development of a country's economy. The development of SMEs stimulates economic vitality, improves market efficiency, and is a fundamental force for relieving unemployment pressure and thus maintaining social stability. SMEs have actively innovated and explored new products and services, becoming an important driving force

for technological innovation, and many SMEs have become an important source of new technology development when high-quality development is the main objective in the context of the transition of national economies. It is not difficult to find that not only are SMEs an important part that drives the economy but also they constitute the micro foundation of the market-based economic system [1–3].

However, the differences in economic development levels between regions are often substantial for a large country such as China and the uneven development of SMEs between different regions greatly restricts the sustainable

development of a country's economy [4]. Although the financial service system is mature, SME financing is more efficient, and enterprises develop rapidly and are more risk-resistant in economically developed regions in China, the same cannot be applied to the underdeveloped regions [5–7].

Nevertheless, SMEs in underdeveloped regions gradually are aware of the problems related to financing and low financing efficiency when the process of rapid development occurs, especially the low financing efficiency directly affecting the survival quality of SMEs in underdeveloped regions [8, 9]. On the other hand, inefficient financing has a great negative impact on SMEs in underdeveloped regions with the increasing cost of the enterprise, the cost of intermediate links, and the decrease of cash inflow. Besides, the utilization rate of enterprise capital is relatively poor, resulting in capital loss to a greater extent, and the operation of enterprise capital is lower than expected, which restricts the development of enterprises. Hence, the industrial chain and supply chain were hit and halted by an abrupt event such as the new crown epidemic in 2020. SMEs had difficulties in resuming work and production. Thus, the survival of SMEs in underdeveloped regions would become harder and the survival of SMEs would be threatened, which harmed the financing situation [10–16]. Therefore, the importance of the survival and development of SMEs to economic development and livelihood protection highlights their significance. How to solve the problem of inefficient financing has become vital to tackling the problem of SMEs' development in underdeveloped areas.

The rest of the manuscript is organized as follows. Section 2 presents both input-output indicators and the implemented model that investigates the relationship between these two sets. Section 3 is allocated to discuss the results of the constructed model such as input-output, relation, and internal and external factors. Section 4 presents the results. Discussion is provided in detail in Section 5. Section 6 concludes the research.

2. Description of Indexes and Introduction of the Model

2.1. The Evaluation of Financing Efficiency Based on DEA-BCC Model. The evaluation methods of financing efficiency mainly include modeling efforts such as the data envelopment analysis method and fuzzy comprehensive evaluation method. It is found that data envelopment analysis (DEA) is based on the concept of relative efficiency, which does not need to set a specific functional relationship, and the financing efficiency can be derived through linear programming. The basic idea of the DEA method is to determine the indicators of inputs and outputs, which has three characteristics: (1) It can flexibly calculate financing efficiency by controlling key variables such as the number of inputs, the number of outputs, the number of years, the number of provinces, and the number of enterprises. (2) It is not necessary to confirm the explicit expressions between all input and output variables. (3) It can be used to compare the effectiveness among different subjects both horizontally and vertically for the same subject at different times.

The DEA method has become the most implemented method for the evaluation of industrial efficiency in various fields. Generally speaking, the DEA method can be divided into two models, which are called the CCR model (constant scale payoff model) and the BBC model (variable scale payoff model).

The validity conditions for the application of the CCR model are defined by

$$\min \theta \sum_{i=1}^n X_i \lambda_i - S^+ = Y_0, \lambda_i \geq 0, \quad i = 1, 2, \dots, n, S^+ \geq 0, S^- \geq 0. \quad (1)$$

After obtaining the validity conditions of the CCR model, the CCR model utilized Archimedean infinitesimal ε that is established by

$$\begin{aligned} \min \theta - \varepsilon \left(\sum_{i=1}^m S_i^- + \sum_{r=1}^s S_r^+ \right), \\ \text{s.t. } \sum_{j=1}^n \lambda_j x_{ij} + s_i^- = \theta x_{io}, \quad \forall i, \\ \sum_{j=1}^n \lambda_j y_{rj} - s_r^+ = y_{ro}, \quad \forall r, \\ \lambda_j, s_i^-, s_r^+ \geq 0, \quad \forall j, i, r. \end{aligned} \quad (2)$$

However, the CCR model assumes constant payoffs to scale and, therefore, has its limitations, which may lead to a situation where the technology for a given decision unit is valid but the result of the DEA is not necessarily valid. To avoid this situation, we relax the assumption of constant returns to scale and consider the case of variable returns to scale, that is, the BCC model.

The BCC model was proposed by [17] after relaxing the assumption of constant returns to scale. Reference [17] initially proposed the corresponding BCC model under the assumption of variable returns to scale, which is defined by

$$\begin{aligned} \max \frac{\sum_{r=1}^s u_r y_{ro} - u}{\sum_{i=1}^m v_i x_{io}}, \\ \text{s.t. } \frac{\sum_{r=1}^s u_r y_{ry} - u}{\sum_{i=1}^m v_i x_{ij}} \leq 1, \quad \forall j, \\ u_r, v_i \geq \varepsilon, \quad \forall r, i. \end{aligned} \quad (3)$$

A linear model equivalent to the above model can be expressed by

$$\begin{aligned} \max \sum_{r=1}^s \mu_r y_{ro} - \mu, \\ \text{s.t. } \sum_{i=1}^m v_i x_{ij} - \sum_{r=1}^s \mu_r y_{rj} + \mu \geq 0, \quad \forall j, \\ \sum_{i=1}^m v_i x_{io} = 1, \\ \mu_r, v_i \geq \varepsilon, \quad \forall r, i. \end{aligned} \quad (4)$$

We can determine the scale benefit corresponding to this decision unit concerning μ in the objective function. When $\mu \leq 0$, the scale benefit of the decision unit is increasing; if $\mu = 0$, the scale benefit of this decision unit is constant; if $\mu \geq 0$, the scale benefit of this decision unit is decreasing. According to the assumption of variable returns to scale, it is only necessary to add the constraint $\sum_{j=1}^n \lambda_j = 1$ to the CCR model to obtain the equivalent pairwise form of the above equation, which is defined by

$$\begin{aligned} \min \theta - \varepsilon \left(\sum_{i=1}^m S_i^- + \sum_{r=1}^s S_r^+ \right), \\ \text{s.t. } \sum_{j=1}^n \lambda_j x_{ij} + s_i^- = \theta x_{i0}, \quad \forall i, \end{aligned}$$

$$\begin{aligned} \sum_{j=1}^n \lambda_j y_{rj} - s_r^+ = y_{r0}, \quad \forall r, \\ \sum_{j=1}^n \lambda_j = 1, \\ \lambda_j, s_i^-, s_i^+ \geq 0, \quad \forall j, i, r. \end{aligned} \quad (5)$$

The set of production possibilities for the BCC model can be expressed by

$$T_{BCC} = \left\{ (X, Y): X_i \geq \sum_{j=1}^n \lambda_j x_{ij}, i = 1, \dots, m; Y_r \leq \sum_{j=1}^n \lambda_j y_{rj}, r = 1, \dots, s; \sum_{j=1}^n \lambda_j = 1, \lambda_j \geq 0 \right\}. \quad (6)$$

We call the decision unit BCC valid when and only when $\theta = 1$ and $(s^{+\infty} = 0, s^{-\infty} = 0)$.

2.2. Efficiency Decomposition of DEA-BCC Model. The calculation of the financial efficiency in the BCC model was further decomposed into integrated technical efficiency, pure technical efficiency, and scale efficiency. Therefore, the relative efficiency calculated by the DEA method includes integrated efficiency, scale efficiency, and technical efficiency. The integrated efficiency is the product of technical efficiency and scale efficiency, so the values of both can be decomposed and analyzed to study the shortcomings of the industry in the development and timely improvement. The comprehensive technical efficiency index can reflect the comprehensive level of resource allocation ability, the efficiency of resource use, and other aspects of the decision-making unit. Pure technical efficiency data reflects the efficiency brought by the system and the management level. In contrast, scale technical efficiency data reflect the gap between the actual scale and the optimal production scale and are also used to portray the degree of the input of the resource factor to the demand of the developing resource. The composite technical efficiency EC (CRS) is the most important factor to examine the efficiency of corporate financing among them [18–20]. Hence, the decomposition formula is defined by

$$\begin{aligned} \text{EC (CRS)} &= \text{PTEC (VRS)} * \text{SEC (CRS, VRS)}, \\ \text{SEC (CRS; VRS)} &= \frac{D_v^t(x^t, y^t)}{D_c^t(x^t, y^t)} * \frac{D_c^{t+1}(x^{t+1}, y^{t+1})}{D_v^{t+1}(x^{t+1}, y^{t+1})}, \end{aligned}$$

$$\text{PTEC (VRS)} = \frac{D_v^t(x^{t+1}, y^{t+1})}{D_v^{t+1}(x^t, y^t)}, \quad (7)$$

where PTEC (VRS) is called the index of pure technical efficiency change with variable payoffs to scale, SEC (CRS, VRS) is called the index of scale efficiency change based on CRS and VRS, and EC (CRS) denotes the combined technical efficiency.

D_c, D_v denote the distance functions under CRS and VRS, respectively, $D^t(x^t, y^t)$ denotes the distance function of (x^t, y^t) in period t , $D^{t+1}(x^t, y^t)$ denotes the distance function in period $t+1$, $D^t(x^{t+1}, y^{t+1})$ denotes the distance function of (x^{t+1}, y^{t+1}) in period t , and $D^{t+1}(x^{t+1}, y^{t+1})$ denotes the distance function in period $t+1$.

2.3. Description of Indicators. The following indicator system is used to calculate the efficiency of SME financing.

2.3.1. Input Indicators

Interest expense (X_1): Interest calculated based on the principal and interest rate is included in the accounting account and reflected as an expense.

Gearing ratio (X_2): The gearing ratio is the percentage of total liabilities divided by total assets at the end of the period, which is the proportional relationship between total liabilities and total assets. It is an indicator of an enterprise's ability to use funds provided by creditors to carry out business activities and reflects the degree of safety of creditors in granting loans. It is a

comprehensive indicator to evaluate the level of indebtedness of a company.

Net debt ratio (X_3): It is the ratio of interest-bearing liabilities of an enterprise minus monetary funds to the owner's equity. Net debt ratio is an indicator reflecting the financial structure of an enterprise.

2.3.2. Output Indicators

Current asset turnover ratio (Y_1): It is the ratio of net income from the main business to average total current assets in a certain period and is an important indicator to evaluate the utilization rate of assets of an enterprise.

Cost margin (Y_2): It shows how much profit can be obtained for every dollar of cost, which reflects the operating results brought by operating expenses.

Revenue from main business (Y_3): It refers to the business revenue obtained by the enterprise that engaged in the production and operation activities of the industry and is the main manifestation of the enterprise's profitability.

The DEA examined the relationships between input and output indicators. However, both types of indicators are derived quantities from economic attributes such as interest rate, interest income, interest expenditure, and liabilities. How to derive those indicators are mathematically expressed in Table 1.

2.4. Data Processing. This paper utilizes the data disseminated by China to study the differences in the financing efficiency of SMEs in different regions with various economic development levels within a country. Jilin Province, a relatively underdeveloped economy, is chosen, while Zhejiang Province and Guangdong Province are selected to represent economically developed regions. The data of GEM-listed enterprises in China are used to reflect the financing and operating conditions of SMEs. By retrieving the data of GEM-listed enterprises, we found out that GEM-listed enterprises include both private and state-run enterprises, which consist of private, local state-run, and central state-run enterprises. Therefore, this paper only screens the data of private enterprises in the GEM to examine the financing characteristics of SMEs as the research objective. Private enterprises in Jilin began to be listed in 2017. Therefore, this paper screens the private enterprises in the GEM between 2017 and 2020 to calculate the financing efficiency of SMEs. All data are obtained from the wind database. The data were preprocessed before running a statistical analysis dealing with the issues as follows:

- (1) Eliminating data in missing cells for key indicators (interest expense, financial debt ratio, net debt ratio, current asset turnover ratio, cost margin, and main operating income).
- (2) Eliminating observations that do not comply with accounting standards.

- (3) Dimensionless processing of the data. The data envelopment analysis (DEA) requires that the values of input and output indicators be nonnegative and nonzero. However, such negative and zero values exist in the actual data set. Therefore, the original sample data are mapped to an interval of positive values according to a particular monotonic functional relationship using a method commonly used to conduct transformations defined by

$$y_i = 0.1 + 0.9 * \frac{x_i - x_{\min}}{x_{\max} - x_{\min}}, \quad (8)$$

where x_i represents the i th observation of variable x and X_{\min} and X_{\max} refer to the minimum and maximum values of x . After applying the transformation, the data will be distributed in the interval of (0.1, 1]. Finally, the relative efficiency of each firm's financing is calculated according to the DEA-BCC model using the processed data.

3. Analysis of the Results of the Constructed Model

3.1. Descriptive Statistics. A total of 721 private enterprises were obtained after processing. The panel data from 2017 to 2020 were selected and a total of 2291 observations were obtained, and the descriptive statistical analysis of key variables is shown in Supplementary Table 1.

3.2. Analysis of Financing Efficiency. The measured financing efficiency results (technical efficiency, pure technical efficiency, and scale efficiency) of SMEs in China between 2017 and 2020 are shown in Table 2.

Table 2 presents the financing efficiency of SMEs in the economically underdeveloped region of Jilin Province that is consistently lower than the national average level of SMEs' financing efficiency between 2017 and 2020 and also significantly lower than the financing efficiency of SMEs located in economically developed regions of Guangdong and Zhejiang Provinces, respectively. The reasons are mainly based on both internal and external aspects.

3.3. Internal Rationale for SMEs

3.3.1. Differences in the Innovation Capacity of Enterprises. Table 2 presents the gap of the scale efficiency between Jilin Province and SMEs in the economically developed regions of Guangdong Province and Zhejiang Province that had been gradually decreasing between 2017 and 2020, indicating that SMEs in Jilin Province had been gradually realizing optimal scale production; however, the gap in pure technical efficiency had been gradually expanding, reflecting that the innovation and R&D capabilities of SMEs in Jilin Province were significantly different when compared with those in Guangdong Province and Zhejiang Province. The innovation ability of enterprises affected the overall development since it played a crucial role. The innovation capability of an enterprise included scientific and technological

TABLE 1: Evaluation indicators of financing efficiency.

	Indicator name	Defined formula
Input indicator	Interest cost	$X_1 = \text{Interest expense} - \text{interest income from bank deposits}$
	Gearing ratio	$X_2 = \text{total liabilities}/\text{total assets}$
	Net debt ratio	$X_3 = (\text{Interest-bearing liabilities} - \text{money funds})/\text{consolidated equity} * 100\%$
Output indicators	Current asset turnover ratio (times)	$Y_1 = \text{net income from main business}/\text{total current assets}$
	Cost margin	$Y_2 = \text{total profit}/\text{total cost} * 100\%$
	Income from the main business	$Y_3 = \text{cost of main business} + \text{gross profit}$

TABLE 2: National SME financing efficiency results between 2017 and 2020.

Years	Province	TEC	PTE	SE
2017	China	0.5597	0.9725	0.5731
	Guangdong Province	0.5417	0.9757	0.5549
	Zhejiang Province	0.6350	0.9879	0.6407
	Jilin Province	0.3390	0.9840	0.3450
2018	China	0.8810	0.9466	0.9310
	Guangdong Province	0.8812	0.9444	0.9333
	Zhejiang Province	0.8939	0.9555	0.9360
	Jilin Province	0.8710	0.9363	0.9303
2019	China	0.8339	0.9375	0.8884
	Guangdong Province	0.8289	0.9345	0.8864
	Zhejiang Province	0.8468	0.9422	0.8965
	Jilin Province	0.7247	0.8673	0.8207
2020	China	0.7376	0.9215	0.8010
	Guangdong Province	0.7200	0.9129	0.7883
	Zhejiang Province	0.7496	0.9404	0.7987
	Jilin Province	0.6580	0.8345	0.7880

Data source: computed based on wind database.

R&D capability, strategic management capability of innovation resources, and innovative organizational structure capability. Thus, the scientific and technological R&D capability will be directly applied to product development, production, and design, which will be directly transformed into the core competitiveness of the enterprise and enhance the market value of the enterprise. The strategic management capability of innovation resources of enterprises refers to the rational allocation of limited innovation resources to maximize benefits, which is an important research aspect in the process of enterprise development. For an enterprise's structure capability towards organizational innovation, it should focus on making breakthrough innovations, that is, creating new technologies outside of the existing technology range, rather than extending along with the available technology level. Guangdong Province and Zhejiang Province are rich in geographical resources and have strong knowledge spillover affecting enterprises. The innovation capability of SMEs had been increasing, the product and service renewal cycle had been decreasing, and the profitability of enterprises had been gradually increasing, which provided a stable ground for financing. In contrast, the overall development of Jilin Province was slower, the innovation ability of enterprises was not strong, and most of them relied on fixed product items, resulting in weak overall core competitiveness, so the financing efficiency was lower. The national GEM listed enterprises that added 2.59 new patents per household, including 6.21 new patents per

household in Guangdong Province and 2.75 new patents per household in Zhejiang Province. However, 0 new patents per household were in Jilin Province in 2019.

3.4. Input-Output Differences

3.4.1. Input Indicators. Finance costs are incurred by enterprises in the process of raising funds needed for production and operation, including interest expenses, discount interest on bills, exchange gains, and losses as well as fees paid to financial institutions. Enterprise interest expense is the cost of capital employed by the enterprise in the production and operation of debt financing and is the capital cost of the enterprise borrowing from banks and other external units of the industry. The management of interest expense plays a very important role in improving business operation, economic efficiency, and financing efficiency. The average value of interest expense of the listed SMEs in Jilin Province was 4,405,700 yuan, which was much higher than Guangdong Province's 2,420,300 yuan and Zhejiang Province's 2,178,700 yuan between 2017 and 2020. The financing cost of SMEs in Jilin Province was still very high, which led to high financial pressure and low financing efficiency of enterprises.

The indicator of gearing links the firm and the external environment. Risk transmission between enterprises, banks, and the macrofinancial system is achieved through this medium. A moderate gearing ratio enables the expansion

and reproduction of enterprises, allowing them to realize economies of scale more quickly and increase corporate shareholder returns when borrowing rates are lower than investment yields. However, a higher gearing ratio is not better. As leverage climbs, the marginal return from debt to the enterprise gradually decreases. The higher the gearing ratio, the higher the financial risk of the enterprise, and very high a gearing ratio can exacerbate the risk of corporate bankruptcy. In addition, the financing cost of SMEs also increases as the gearing ratio of enterprises climbs. The average value of gearing ratio of SMEs listed on GEM in Jilin Province was 54.53%, while the average value of Guangdong Province was only 41.16% and the average value of Zhejiang Province was as low as 37.83% between 2017 and 2020. The high gearing ratio in Jilin Province led to higher financing costs than did Guangdong Province and Zhejiang Province. Therefore, the financing efficiency of SMEs in Jilin Province was even lower.

Net debt ratio refers to the ratio of interest-bearing liabilities minus monetary funds to the owner's equity of an enterprise. Unlike the gearing ratio, the net debt ratio excluded the effect of interest-free debt. After taking into account SMEs' long- and short-term debt, noncurrent debt due within one year, and bonds payable, the net debt ratio could more accurately reflect the leverage level of SMEs. The average value of net debt ratio of SMEs listed on the national GEM was 4.77% and the average value of net debt ratio of SMEs listed on Jilin GEM was 838.74% between 2017 and 2020, while the average value of Guangdong Province was only 0.33% and the average value of Zhejiang Province was as low as -3.24%. The net debt ratio in Jilin Province was very high and the high leverage ratio led to a significantly higher financing cost than did Guangdong Province and Zhejiang Province, so the financing efficiency of Jilin SMEs was even lower.

3.4.2. Output Indicators. The asset turnover ratio reflected the efficiency of the utilization of all current assets for an enterprise. The faster the turnover of current assets is, the more it could save money, improve the efficiency of capital utilization, enhance the enterprise's ability to generate income, and, thus, improve the efficiency of enterprise financing to some extent. The average value of asset turnover rate (times) of SMEs listed on the national GEM was 1.15, while the average value of the asset turnover rate of SMEs listed on the Jilin GEM was only 1.03 between 2017 and 2020; the average value of Guangdong Province was 1.24 and the average value of Zhejiang Province was 1.24. The asset turnover rate of Jilin Province was significantly lower than those of Guangdong Province and Zhejiang Province. Therefore, the utilization efficiency of the assets of SMEs in Jilin Province was not strong, which led to the weak income-generating ability of enterprises, slow return of capital, and low financing efficiency of enterprises.

Cost margin reflected the efficiency of enterprises to obtain profits. The higher the indicator, the greater the profit and the better the economic efficiency of the enterprise. The average value of cost margin of SMEs in Jilin Province was

-2.93%, which was much lower than 6.75% in Guangdong Province and 10.3% in Zhejiang Province, and the profitability of SMEs in Jilin Province was weaker than Guangdong Province and Zhejiang Province between 2017 and 2020.

The main revenue generation source was the business income of the enterprise engaged in continuous and major business activities, which played a pivotal role in the economic benefits of the enterprise and was the focus of business income management. The larger the scale of the main business income, the faster the capital turnover and the higher the economic efficiency of the enterprise. The scale of main business income could also reflect the market share of SMEs and their position in the industry. The average value of main business income of SMEs listed on the GEM of Jilin Province was about 682 million yuan between 2017 and 2020, while the average value of Guangdong Province was about 2.035 billion yuan, which was three times that of Jilin Province, and the average value of Zhejiang Province was 1.186 billion yuan, which was about 1.74 times that of Jilin Province. The main business incomes of SMEs in Guangdong Province and Zhejiang Province were significantly higher than that of Jilin Province, indicating the strong profitability of the two provinces and the higher efficiency of enterprise financing.

Consequently, Jilin Province generally had high values in input indicators and relatively low values in output indicators. SMEs had high financing costs, high net debt, and high leverage, while enterprises had slow liquidity turnover, low operating profit, and poor main business income. Therefore, the development of SMEs in Jilin Province was inferior to that of SMEs in Guangdong and Zhejiang, and the financing efficiency of enterprises was lower.

3.5. External Factors

3.5.1. Differences in the Support Policies Applied to Local SME. Guangdong Province issued 357 policies, including the Regulations on Promoting the Development of SMEs in Guangdong Province, which formulated relevant policy plans in fifteen aspects such as business environment, financing promotion, entrepreneurship support, innovation support, market development, and service measures, to optimize the business environment of SMEs and fully promoted the development of SMEs between 2017 and 2021.

Zhejiang Province issued more than sixty policies that provided benefits to enterprises represented by the "Regulations on the Promotion of Private Enterprise Development in Zhejiang Province" and "Regulations on Local Finance in Zhejiang Province." Special policies were formulated locally for the current situation of SME operations in response to different market environments. To encourage the financing of SMEs, effective support measures were proposed in the policy to create an environment for stable development.

On the other hand, Jilin Province had issued 14 policies and regulations that helped the development of SMEs, including the Regulations on the Promotion of SME Development in Jilin Province, focusing on eight aspects of

research, including financial support, service measures, rights, interests protection, and innovation support. However, the number of policies in Jilin Province was smaller, and the overall policies and regulations were weakly targeted, lacking local characteristics, and could not accurately and effectively address the core issues of SME financing development around the status quo, so the policies and regulations had a limited role in promoting SMEs in Jilin Province and could not help improve the efficiency of SME financing in Jilin Province.

3.5.2. Differences in Financial Support Systems

(1) *Financial Institutions.* The scale and quality of financial institutions in Guangdong Province and Zhejiang Province were significantly better than those in Jilin Province. Firstly, 106,623 people were employed in new and small institutions in Guangdong Province and 119,092 people in Zhejiang Province in 2020 when the number of employees was under consideration, while the number of employees in Jilin Province was 41,014. Secondly, the total assets of new and small financial institutions in the banking industry in Guangdong Province were 295,765 billion yuan, the total assets of financial institutions in Zhejiang Province were 198,698 billion yuan, and the total assets of financial institutions in Jilin Province, however, were 35,847.8 billion yuan when total assets were a concern in 2020. Finally, when the number of new and small financial institutions was a concern in 2020, the number of business outlets in Guangdong Province was 6,569; they were 6,445 and 2,391 in Zhejiang Province and Jilin Province, respectively. Differences in the level of development of financial institutions led to the cost as well as the difficulty of obtaining financial support for SMEs. The high level of development of financial institutions in Guangdong and Zhejiang provinces greatly improved the financing efficiency of local SMEs, while the financing cost of SMEs in Jilin Province would increase due to the restricted development of financial institutions, and the financing efficiency would be reduced due to the backward service level of financial institutions.

3.6. *Financial Technology.* Guangdong Province took the lead in building a “digital government + financial technology” platform and implemented precise measures to address the problems of difficult and expensive financing for SMEs. Employing advanced blockchain, cloud computing, and other financial technologies to establish a financing stage for SMEs led us to collect information on more than 11 million enterprises in the province. Thus, enterprise risk evaluation, business credit analysis, and evaluation of SMEs in the province were conducted with ease. Through the financial technological means to improve the credit evaluation system of SMEs, we provided integrated online intelligent financing services such as information collection, credit evaluation, information sharing, financing matching, and risk compensation for enterprises. As of June 30, 2020, the total number of enterprises served by the Guangdong SME financing platform was 36,266, and the total amount of

financing was 13.756 billion yuan. “The platform also became an important financial infrastructure in Guangdong Province.” It had greatly promoted the financing of SMEs in Guangdong Province. Since the occurrence of the new crown pneumonia epidemic, the Guangdong Provincial-Local Financial Supervision Bureau has further deepened the structural reform of financial supply measurement, enhanced the ability of financial services to the real economy, and promoted the development of the real economy by relying on the “small- and medium-sized financing” platform to promote financial technology.

Zhejiang Province improved the convenience and flexibility of financing for small- and medium-sized enterprises by building an “online and offline integrated, digital, and intelligent financial service platform during the epidemic.” It organized financial supervisory departments and 44 banking institutions, 54 insurance institutions, and 129 securities and futures branches to send 10,000 financial instructors to visit more than 10,000 small- and medium-sized enterprises and provided one-to-one services. Besides, it used emerging technologies such as big data to more accurately identify the financing needs of small- and medium-sized enterprises, met the diversified financial needs of the real economy with higher quality, and supported small- and medium-sized enterprises to resume work and production.

Jilin Province, on the other hand, required the financial institutions to increase efforts to serve enterprises and actively built a platform for cooperation between banks and enterprises to solve the financing problems encountered by science and technology-based SMEs. Consequently, Jilin Province was significantly behind Zhejiang Province and Guangdong Province in terms of financial technology.

4. Results

SMEs have generically a poor foundation and weak resistance to risks and are extremely vulnerable to external factors, especially abrupt public emergencies, for example, the new crown pneumonia epidemic that began in late 2019 spread rapidly around the world, causing a serious impact on the international economic and social order and also bringing unprecedented challenges to China’s economic development, making the survival and development of SMEs more difficult and financing efficiency significantly decreased [1–5]. Table 3 presents the financing efficiency of SMEs in 2020 concerning the results of three regions, namely, Guangdong Province, Zhejiang Province, and Jilin Province.

5. Discussion

5.1. Internal Factors of Enterprises

5.1.1. *Low Profitability of Enterprises and Difficulty in Resuming Production.* Due to the impact of the sudden epidemic and the impact of increased costs and reduced market activity in 2020, small- and medium-sized enterprises (SMEs) experienced difficulties in resuming work and production [7–11]. The small size of SMEs, a single mode of

operation, and weak risk resistance caused SMEs to be affected negatively, which originally relied on physical production and operated through traditional offline sales channels. Thus, higher costs were inevitable. Not only did the business operating costs such as production, raw materials, and logistics of enterprises increase, but also the increases in expenses such as staff salaries, loans, and site rentals became pressure on the normal operation of SMEs. Thus, the income of SMEs plummeted, and the survival of enterprises faced great challenges, with a large number of SMEs facing the risk of closing down when the epidemic severed.

5.1.2. Difficulty of Returning to Work for the Staff of the Enterprise. To resume SME operations in a short period and reduce enterprise losses, some enterprises had to recruit a large number of employees to return to work. However, many regions put restrictions on the movement of people, communities and towns were isolated, and everyone was homebound, resulting in employees of enterprise not being able to return to work on time, increasing the difficulty for enterprises to resume production due to the rapidly spreading epidemic. Business production could not be continued, and financing efficiency was naturally low.

5.1.3. High Cost of Epidemic Prevention. In the slow pace of enterprises gradually resuming production and operation, the relevant local authorities set more stringent standards as measures to prevent epidemic for SMEs; for example, the stock of epidemic prevention supplies was guaranteed, and the degree of the gathering of personnel was regulated, and so forth. This was because the enterprises could not meet the standards of epidemic prevention; it would cause a great negative social impact in case of a gathering infection. However, these regulations increased the production cost of SMEs, further increasing the financial pressure on SMEs and further reducing the efficiency of financing.

5.2. External Factors

5.2.1. Poorly Connected Supply Chain and Intensified Financing Problems. The epidemic led to the disruption of global supply chains and industrial chains, the real economy came to a halt, commodity prices fell, the dollar appreciated, and people just demanded much liquidity in the capital market rather than value, which is a typical characteristic of the crisis. The unstable external environment severely affected the order of social product development, the circulation of commodities slowed down, and economic activities such as enterprise capacity cooperation and foreign investment got disrupted. Specifically, the disruption of production development led to a poor supply of upstream and downstream materials for the production and sales of SMEs. In particular, for enterprises highly dependent on cross-regional sales of products, logistics could not be transported normally, sales were hindered, and products

were backlogged, which directly affected the production efficiency of enterprises [10–13].

Stably operating enterprises in the supply chain were interlinked and closely connected. SMEs in the supply chain often carried out purchase and sales activities in the form of deferred payment or advance payment to allow enterprises to get short-term funds quickly and met the capital needs of financing enterprises. However, the problem of the billing period of supply chain financing was a problem for SMEs to face. Most SMEs chose to extend the billing period, which would increase the risk of the enterprise's capital chain breakage; such a risk was difficult to recover quickly in the short term due to the long-term effect of the epidemic. The production pressure and financing risk of SMEs were transmitted upward and downward which affected all SMEs along the industrial chain, thus leading to increased pressure on the whole supply chain, spreading the risk along the supply chain, and affecting the efficiency of enterprise financing. [8–11]

5.2.2. Weak Market Demand and Difficult Business Turnover. SMEs still have a lot of difficulties to deal with after resuming work and production, including suspension of business, low order volume, low operating income, and even another work stoppage. Although the government issued support policies to help SMEs resume production as quickly as possible, the slowdown of economic growth and the recovery of effective market demand have not met expectations, so most SMEs still encounter a severe test of survival. After the epidemic, enterprises have difficulties in survival, the social unemployment rate has increased steeply, residents' income has decreased sharply, market demand is still weak, and social per capita consumption has dropped rapidly, which was reflected in the sharp contraction of China's domestic demand and negative GDP growth on a macro level [12–17]. In this context, even if SMEs quickly resumed production, they also would face the problem of product stagnation, especially as countries have entered the state of epidemic prevention and control, governments have introduced policies to restrict the import of goods, and the demand for foreign products in various countries has dropped significantly, which makes the survival environment of many SMEs dependent on exports in China even worse, with serious corporate losses.

5.2.3. Number of Core Technical Personnel. Core technical personnel are employees who have specialized skills, master core business, and control key resources and have far-reaching influence on the enterprise. For technology-intensive enterprises, technical manpower is an important part of enterprise knowledge, occupies an important position in the enterprise, and is vital to the innovation and development of the enterprise. With the development of modern technology, human capital has gradually become a sustainable competitive advantage for enterprises, and they created most of the profits and values of enterprises and are the source of their core competitiveness.

TABLE 3: Comparison of SME financing efficiency: public emergencies.

Provinces	2020 (postepidemic)			Province	2019 (preepidemic)		
	Integrated technical efficiency	Pure technical efficiency	Scale efficiency		Integrated technical efficiency	Pure technical efficiency	Scale efficiency
National	0.7376	0.9215	0.8010	National	0.8339	0.9375	0.8884
Guangdong Province	0.7200	0.9129	0.7883	Guangdong Province	0.8289	0.9345	0.8864
Zhejiang Province	0.7496	0.9404	0.7987	Zhejiang Province	0.8468	0.9422	0.8965
Jilin Province	0.6580	0.8345	0.7880	Jilin Province	0.7247	0.8673	0.8207

Data source: wind database, calculation, and collation.

Historical experience shows that the number of core technical personnel of enterprises has a positive stimulating effect on the turnover of products and the increase of enterprise value. We sorted the sample enterprises according to the number of core technical personnel in descending order and found that the median number of core technical personnel in the sample enterprises was 3. Therefore, the number of core technical personnel was 3 as the cut-off point of the data, and those greater than or equal to 3 were SMEs with a large number of core technical personnel, and those less than 3 were SMEs with a small number of core technical personnel, and the grouping was tested for financing efficiency, and Supplementary Table 2 was obtained.

From Supplementary Table 2, when more core technical personnel are included in the enterprises, SMEs' financing efficiency is higher. Otherwise, SMEs' financing efficiency is lower. It shows how many core technical personnel directly affect the level of financing efficiency of enterprises.

On the one hand, the number of technicians is positively correlated with the technological progress and innovation of SMEs. With more core technical personnel in SMEs, the time cost of enterprise innovation is reduced and the pace of enterprise innovation is accelerated. The technological level of SMEs keeps pace with the technological progress of society due to the promotion of core technical personnel. The more core technical personnel there were, the better it is to keep the SME to self-develop updated products and to meet the changing needs of consumers with the times. Only continuous innovation will increase the competitiveness of SMEs themselves and enable them to occupy a stable place in the competitive market. Thus, improving the technologically added value to their products and enhancing the efficiency of their financing could be easily targeted. Core technical staff can organize coordination and realize skill-sharing among the employees in the enterprise so that the professional knowledge and skills will have complementary impacts. Hence, the optimal combination matching can be effectively accomplished when projects are executed. The company can resolve the technical problems of product development, alleviate the problem of unreasonable product structure and improve the problem of slow product upgrade, and promote the upgrading of enterprise products and rational optimization of production structure when the professional guidance of core technical staff is widely utilized so that the enterprise operation becomes more flexible.

On the other hand, core technical personnel can effectively inhibit the path dependence of SMEs on technology introduction. Frequent technology introduction may form the path dependence of enterprises, which may lead to the waste of the resources of technological innovation, increase the cost burden of enterprises, inhibit the innovation enthusiasm of enterprises, and is not conducive to the long-term stable development of SMEs. If the number of core technical personnel is guaranteed, dependent technology introduction can be reduced or effectively avoided, reducing the pressure of capital turnover of enterprises and improving the efficiency of enterprise financing.

In addition, the core technical personnel have roles of the participants, executors, and discoverers of the innovation activities of the company and occupy a certain position in the company. Since they have high expertise barriers, shareholders and executives will not propose their projects apart from core technicians and it is difficult to effectively supervise the new activities after they start, which can also be interpreted as shareholders and executives having information weakness in innovation activities. Therefore, allowing certain equity incentives to the core technical staff eventually increases the motivation of R&D. With the increase of R&D motivation, the promotion of innovative thinking, facilitation of more innovative projects, and promotion of increment in the degree of corporate innovation could be reached.

At the same time, the core technical staff is knowledgeable, forward-looking, and highly receptive to new things, has its objective and rational understanding of the market, and can provide professional advice with strong implementation. SMEs have more flexible incentive methods for talents than large enterprises. They can stimulate core technical personnel to develop new technologies and research new products through equity incentives, subscription rights incentives, performance wages, and other incentive methods. Thus, the salary and income of core technical personnel are closely linked to the interests of the enterprise [12, 14, 20, 21]. Therefore, the more core technical people employed in SMEs are, the stronger the expertise would be provided. Therefore, the higher the technological innovation capacity of the enterprise, the higher the efficiency of inputs and outputs brought by technological innovation. The progress of production technology and the long-term development of SMEs are closely related as well as the improvement of the efficiency of SME financing.

5.2.4. Enterprise Size. The size of an enterprise can directly affect the operation and future development of the company to a certain extent. It has been shown that as the size of a company gets larger, the innovation R&D of the company decreases. On the other hand, innovative R&D has a positive effect on the improvement of total factor productivity and the efficiency of capital use. Therefore, we use firm size as a grouping criterion to measure the size of the firm and study the impact of different firm sizes on the efficiency of corporate financing.

The sample enterprises are arranged in descending order according to the number of enterprises, and the median enterprise size is 1075. Therefore, enterprises with more than or equal to 1075 persons are called larger SMEs, and those with less than 1075 persons are called smaller SMEs. From Supplementary Table 3, it can be seen that while SMEs are more efficient in financing with a small number of persons, SMEs are less efficient in financing with a larger number of persons. This gap mainly comes from the purely technical efficiency differences in financing, where the number of enterprises is small, the incentive to innovate is sufficient, and the technical efficiency is high. Specifically, it is reflected in the five following aspects.

Firstly, small and medium enterprises can save costs by eliminating tedious and complicated processes. A project of an enterprise is bound to go through several procedures from proposing a proposal to final approval. On the one hand, if the number of enterprises is small, some of the approval procedures are bound to be streamlined and integrated, thus speeding up the project approval process, reducing unnecessary repetitive procedures, and saving time and cost. On the other hand, when the scale of enterprises is small, the operating costs of enterprises are lower. Besides, the overhead costs are relatively less, saving financial costs. Therefore, the financing efficiency of the enterprise is relatively high.

Secondly, the number of enterprise employees is small and the operation items are generally simple. The financial data of each enterprise has more authenticity, high accuracy, information transparency, and is more conducive to social supervision. Thus, the problem of artificial falsification out of interest is avoided. In comparison, investors and creditors are more willing to choose such enterprises for investment. As a result, the financing efficiency of enterprises naturally increases. As opposed to the small number of enterprises, the complexity of business projects raises, the problem of interest disputes arises, the possibility of falsification of corporate financial data increases, the credibility value of enterprises decreases, the difficulty of financing increases, and the efficiency of financing decreases in the large enterprises.

The relationship between business managers and employees is much closer when fewer people are engaged in the business. Managers can fully consider the needs and strengths of their employees, and the rules and regulations are more relevant and flexible. Managers can use personalized reward and punishment systems to motivate employees and can also make flexible personnel transfers, thus matching employees' skills with job requirements in a highly efficient manner. Moreover, management can better coordinate and manage, stimulate employees' creativity, and

improve their work efficiency. Therefore, the productivity and financing efficiency of SMEs are easily reachable.

In addition, it is not the case that the larger the number of people in the firm and the larger the firm, the stronger the innovation of the R&D workers. When compared with large enterprises, SMEs have certain advantages in innovation incentives. On the one hand, the investment of any new project requires an extremely long time for a repeated demonstration for large enterprises because traditional projects have already achieved scale benefits. However, large enterprises lack a strong incentive to innovate, and once the new project is determined, a large amount of investment is required, and the promotion of new projects would crowd out the financial resources of the original project. Thus, large enterprises do not blindly give up the stable traditional production to bring income. However, the demand for survival and development requires constant innovation for SMEs. Although the scale of innovation is far less than that of large enterprises, innovation is the philosophy of survival for SMEs. On the other hand, the establishment of innovation projects in large enterprises is influenced by society, and large enterprises may decide to invest in their innovation projects according to the extent to which the social projects are promoted.

In contrast, the innovation activities of small enterprises often "originate from production and serve production." In addition, SMEs have their advantages in terms of innovation incentives. SMEs can stimulate innovation through equity incentives and subscription rights incentives, which are more technically efficient and have stronger positive effects. Consequently, SME innovation is significantly better than large enterprises and more productive than larger enterprises, thus bringing higher financing efficiency to SMEs.

Finally, SMEs are small and extremely sensitive to cash flow and can gain keen insight into unusual problems with funding. In the absence of financing constraints, the growth rate of enterprises is relatively fast, and the distribution of industry size tends to be even. However, the situation will change under the restriction of financing constraints. The financing constraint does not affect large enterprises much because they have sufficient capital strength of their own and can ease the pressure of corporate capital through bond financing, stock financing, and so forth. However, SMEs have few collateralizable assets and few corporate dividends to meet the criteria for issuing stocks and bonds, so they rely more on debt financing [4, 7, 9, 15] and are more concerned about the efficiency of debt financing.

6. Conclusion

Small- and medium-sized enterprises (SMEs) are important foundations to implement mass entrepreneurship and innovation and play an irreplaceable role in increasing employment, promoting economic growth, scientific and technological innovations, and providing particularly social harmony and stability and imminently are strategic entities to the national economy. Besides, they are vital for social development in underdeveloped regions. However, the low-efficiency financing of SMEs has gradually become a major factor that restricts the high-quality development of SMEs in

the current conditions. Therefore, to determine which factors play key roles in financing efficiency of SMEs in underdeveloped regions in China, two kinds of regions are selected, which are called underdeveloped and economically developed provinces, to different factors that have an impact on the underdeveloped province.

The comparison reveals that the financing efficiency of SMEs in economically underdeveloped regions is not only lower than the national average figure but also much lower than the financing efficiency level in economically developed regions, which is the result of the combined effect of internal and external factors that enterprises face. Further, this paper finds that unexpected public events, core technical personnel, and enterprise size have an impact on the financing efficiency of SMEs when running group testing.

This paper puts forward rationalized suggestions for improving the financing efficiency of SMEs in Jilin Province from three dimensions: government, financial institutions, and enterprises. First, the government should coordinate the overall situation and consolidate the foundation of relevant systems, relax the market access threshold of small and new financial institutions in economically backward regions, improve the social integrity construction system, promote demand-side reform, change the role of the government and guide the flow of financial resources to backward regions, and enhance the degree of financial agglomeration in core cities and give play to the financial radiation effect. Second, banks in backward regions should strengthen the strategic goal of serving SMEs, promote the internal talent mobilization of banks and improve the service framework, promote the construction of bank risk management mechanism, use financial technology to promote the digital transformation of commercial banks, and focus on service differentiation and explore new customer needs. Nonbank financial institutions in underdeveloped regions should optimize financial services by using financial technology, continuously strengthen financial product innovation, strengthen the management of financial service standardization, realize the expansion of new and small financial institutions, and establish a risk early warning mechanism. Finally, SMEs in underdeveloped regions should take innovation as the core driving force of enterprise development, change financing concepts and broaden financing channels, clarify job responsibilities and promote flat management, and pay attention to the introduction and training of talents to improve the financing efficiency of SMEs in Jilin Province and achieve sustainable and high-quality development of enterprises.

Data Availability

Data will be provided upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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Supplementary Materials

Additional data support of this paper are given. Supplementary Table 1 depicts the basics of statistical data, while Supplementary Tables 2 and 3 present the difference in fund raising efficiency among various middle- and small-sized enterprises. (*Supplementary Materials*)

References

- [1] C. Miao, *Research on Financing Efficiency and Influencing Factors of China's New Third Board Enterprises*, South China University of Technology, Guangzhou, China, 2015.
- [2] T. Hongbo, “The development of modern capital structure theory: from MM theorem to financing contract theory,” *Financial Research*, vol. 2, no. 2, pp. 70–77, 2006.
- [3] L. Xiaoyan, *Research on the Efficiency of Highway Enterprise Financing*, Chang'an University, Xi'an, China, 2014.
- [4] W. Ningning, *An Empirical Study of Cash Dividend Policy of Listed Companies in China Based on Signaling Theory-based on Real Estate Industry*, Jiangsu University, Zhenjiang, Jiangsu, 2011.
- [5] F. Jingxian, *An Empirical Study on Financing Efficiency of SMEs in Beijing, Tianjin, and Hebei*, Hebei University, China, 2021.
- [6] L. Guoxin, “The impact of the new crown pneumonia epidemic on enterprises and financial countermeasures,” *Hainan Finance*, vol. 7, no. 7, pp. 83–87, 2020.
- [7] Y. D. Xu, “Challenges, and responses of SMEs under the impact of the global epidemic,” *Finance and Accounting Monthly*, vol. 12, no. 12, pp. 114–118, 2020.
- [8] W. Zujin, “The impact of the new crown pneumonia epidemic on enterprise supply chain logistics construction,” *Logistics Technology and Applications*, vol. 25, no. 4, pp. 108–111, 2020.
- [9] Q. H. Huang, Z. B. Zhou, and M. Zhou, “The impact of the new crown pneumonia epidemic on small and medium-sized enterprises in China and coping strategies,” *Journal of Southwestern University (Social Science Edition)*, vol. 46, no. 3, 2020.
- [10] H. Chengying, W. Yuechun, C. Yali, and G. Xiaoxu, “Measurement analysis of the impact of the new coronavirus pneumonia epidemic on the Chinese economy,” *Quantitative and technical-economic research*, vol. 37, no. 5, pp. 3–22, 2020.
- [11] L. Jinsong, “Reflections on the problem of difficult and expensive financing for SMEs,” *Financial Research*, no. 11, pp. 115–123, 2015.
- [12] W. Li and L. Yefeng, “Research on the financing of small and medium-sized enterprises from the perspective of credit resource allocation,” *Think Tank Times*, no. 51, 2018.
- [13] W. Huacheng, C. Feng, and Y. Kangtao, “Supervision or hollowing out: major shareholders' shareholding ratio and the risk of share price collapse,” *Management World*, no. 2, p. 45, 2015.

- [14] J. Jia, *Research on the Impact of Equity Incentives on Technological Innovation Performance*, Hebei University of Economics and Business, Shijiazhuang, China, 2020.
- [15] W. Jing and M. Yunshi, "Equity incentives for technicians and the improvement of corporate financial performance," *Guangdong Social Science*, vol. 6, no. 06, pp. 47–55, 2020.
- [16] W. Xiongyuan, O. Caiyue, and S. Zhenyang, "Equity pledge, control transfer risk, and tax avoidance," *Economic Research*, vol. 53, no. 1, pp. 138–152, 2018.
- [17] B. Li and S. Yuejing, "An empirical study on the factors influencing the financing methods of Chinese listed companies," *China Soft Science*, vol. 7, no. 7, pp. 122–131, 2013.
- [18] H. Weifeng, L. Yijun, and W. Yuyu, "Research on equity pledges of major shareholders and corporate risk-taking," *China Soft Science*, vol. 5, no. 5, pp. 110–122, 2018.
- [19] H. F. Gu and B. Yuchen, "Controlling shareholders' equity pledges, financing constraints, and corporate innovation," *Statistics and Information Forum*, vol. 36, no. 10, pp. 55–66, 2021.
- [20] Z. Guojian, L. Dongjie, and L. Bin, "Major shareholders' equity pledge, possession, and corporate value," *Journal of Management Science*, vol. 17, no. 9, pp. 72–87, 2014.
- [21] W. Jiang, "Major shareholders' shareholding, debt financing, and M&A premium," *Friends of Accounting*, vol. 7, no. 7, pp. 70–77, 2020.