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Retraction

Retracted: Government Intervention, Financial Support, and Comprehensive Efficiency of Enterprise Independent Innovation: Empirical Analysis Based on the Data of Chinese Strategic Emerging Industries

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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] Z.-J. Zhou, Y. Wang, M.-M. Lu, and J.-M. Zhu, "Government Intervention, Financial Support, and Comprehensive Efficiency of Enterprise Independent Innovation: Empirical Analysis Based on the Data of Chinese Strategic Emerging Industries," *Mathematical Problems in Engineering*, vol. 2020, Article ID 8723062, 10 pages, 2020.

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Research Article

Government Intervention, Financial Support, and Comprehensive Efficiency of Enterprise Independent Innovation: Empirical Analysis Based on the Data of Chinese Strategic Emerging Industries

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Government intervention and financial support are two major means to promote the independent innovation performance of enterprises in strategic emerging industries, and government intervention has induced crowding-out effects on financial support, which leads to the uncertainty of the dual incentive effect of government intervention and financial support on enterprises' independent innovation. The research object of this paper is 657 strategic emerging enterprises listed in Shanghai and Shenzhen. We empirically studied the impact of government intervention and financial support on the comprehensive efficiency of independent innovation of strategic emerging enterprises. The empirical study draws the following conclusions. Firstly, the comprehensive efficiency of independent innovation of enterprises is in the trend of continuous improvement and technical efficiency and scale efficiency are also increasing, but the technical efficiency is lower than the scale efficiency, which shows that the improvement of independent innovation efficiency mainly depends on the expansion of innovation scale. Secondly, both government intervention and financial support promote the comprehensive efficiency of independent innovation of strategic emerging industry enterprises, but the incentive effect of government intervention is more obvious. Thirdly, there is an inverted U-shaped relationship between government intervention and the comprehensive efficiency of independent innovation. Fourthly, the regression coefficient of the interaction between government intervention and financial support and the comprehensive efficiency of enterprise independent innovation is negative, which indicates that government intervention has an inhibitory effect on the effect of financial support on the overall efficiency of enterprise independent innovation. Finally, we put forward countermeasures and suggestions.

1. Introduction

In recent years, the world economy has seriously slumped, international trade and investment have shrunk, and China's domestic consumption, investment, and exports have declined significantly. At present and in the future, China's economic development is facing unprecedented risks and challenges, and it is urgent to find a new driving force for economic growth. Strategic emerging industries are the key industries for China to cultivate new driving forces for economic development, realize economic transformation, and gain new advantages in global competition. With government intervention and financial support, China's strategic emerging industries continue to invest in independent innovation, but the overall efficiency of enterprise independent innovation is not high. The comprehensive efficiency of enterprises' independent innovation represents the input-output ratio of enterprises in the process of innovation. It is a comprehensive summary of enterprises' independent

innovation input and output and is a key indicator to measure the sustainable development of enterprises. It reflects the ability of enterprises' independent innovation resource allocation, technology transformation, and new product output [1, 2]. Government intervention and financial support have dual incentive effects on the improvement of the comprehensive efficiency of enterprise independent innovation. The government uses financial subsidies and tax incentives to encourage enterprises to increase investment in independent innovation and accelerate the transformation of independent innovation achievements and the production of new products [3]. Financial institutions guide private and social capital into enterprises' independent innovation activities through bank credit and other financial instruments and allocate funds to strategic emerging industry enterprises with investment value, so as to ease the financial constraints faced by enterprises [4]. When the government invests too much money into the independent innovation activities of enterprises, the financing behavior of enterprises will deviate from the principle of market efficiency, and the incentive effect of financial support on enterprises' independent innovation will be weakened [5, 6].

Scholars have done a lot of research on the influence of government intervention on enterprises' independent innovation. The existing researches mainly focus on the ideal role of government intervention in the process of enterprise independent innovation. Scholars usually divide the role of government intervention in the process of enterprise independent innovation into three situations: the hand of aid, the hand of plunder, and the hand of inaction. One view is that the government provides financial funds for enterprises' independent innovation activities, which plays a "helping hand" to ensure the smooth development of enterprise innovation activities and improve the efficiency of independent innovation [7–13]. Another view is that government intervention can easily lead to government rent-seeking behavior in enterprise independent innovation activities, which plays a role of "predatory hand"; that is to say, government intervention increases the cost of enterprise independent innovation and hinders the improvement of comprehensive efficiency of enterprise independent innovation [14–22]. In addition, some scholars believe that the initial purpose of government intervention is to encourage enterprises to carry out independent innovation, but in special industries and under specific conditions, government intervention will play the role of "hands of inaction"; that is to say, government intervention has no effect [23–27].

In the study of the relationship between government intervention and enterprise independent innovation, we need to consider the financial support. In the presence of government intervention, financial support can not only ease the financing constraints of enterprises' independent innovation but also lead to insufficient investment in innovation. One view is that the government guides financial institutions to provide financial support for enterprises' independent innovation, so as to solve the problem of financial constraints of enterprises' independent innovation [28–32]. Another view is that government intervention distorts the allocation function of financial resources, resulting in insufficient investment in independent innovation and difficulty in improving the efficiency of independent innovation [33–35].

There are two deficiencies in the existing literature: firstly, when studying the effect of government intervention and financial support on enterprise independent innovation, most scholars are interested in the impact of government intervention and financial support on the input and output of independent innovation, and few pieces of literature study the influence of government intervention and financial support on the final output (i.e., comprehensive efficiency) of enterprise independent innovation. The independent innovation of enterprises includes three stages: innovation input, innovation output, and innovation final output. If we ignore the research on the final output of independent innovation (i.e., comprehensive efficiency), we cannot completely open the "black box of independent innovation." Secondly, when studying the effect of government intervention and financial support, the existing literature ignores the induced effect and crowding-out effect of government intervention on financial support, so the dual incentive effect of government intervention and financial support on enterprises' independent innovation cannot be correctly evaluated. Thirdly, in the analysis of the impact of government intervention on enterprise independent innovation, the indicators selected in the existing literature are relatively single, which cannot correctly measure the effect of government intervention.

Based on the data of 657 strategic emerging enterprises listed in Shenzhen and Shanghai from 2012 to 2018, we empirically analyze the impact of government intervention and financial support on the comprehensive efficiency of independent innovation, so as to open the black box of independent innovation of strategic emerging industry enterprises. When selecting the sample companies, the following principles should be followed: select the strategic emerging industry listed companies in the wind database; the initial starting time of the sample is set to 2012; the selected listed companies are in the growth period; exclude the listed companies with ST and ∗ST types; exclude the listed companies with tax rate less than 0 or greater than 1.

The innovation of this paper is as follows. Firstly, we divide the process of enterprise independent innovation into three stages, innovation input, innovation output, and innovation final output, and conduct empirical research on the impact of government intervention and financial support on the final output of enterprise independent innovation, so as to open the last stage of enterprise independent innovation black box. Secondly, it analyzes the dual incentive effect of government intervention and financial support on enterprise independent innovation and the influence of government intervention on financial support effect. Thirdly, we establish the index system of government intervention to make the measurement of the effect of government intervention more accurate.

2. Measurement of the Efficiency of Government Intervention, Financial Support, and Independent Innovation

2.1. Measurement of Government Intervention. By means of financial subsidies and tax incentives, the government intervenes in the comprehensive efficiency of enterprise independent innovation. According to the latest accounting standards, this paper selects the government subsidy index under other income accounting subjects in enterprise financial statements as the measurement index. Tax incentives include the deduction of R&D expenses, value-added tax, and income tax. The selection methods of these three tax preference indicators are as follows. Referring to the research of Han Renyue, this paper takes the actual amount of enterprise R&D expenses in 2012–2016 and the actual amount of enterprise R&D expenses in 2017 and 2018 multiplied by 50% and 75%, respectively, as the indicators to measure the additional deduction of R&D expenses. Referring to the practice of Wang Chunyuan, this paper uses the VAT deduction of new fixed assets of enterprises in the year as the measurement index of VAT preference. Referring to the practice of Li Xiangju, we take corporate income tax as the reverse indicator of tax preference.

Tax incentives include an additional deduction of R&D expenses, preferential treatment of value-added tax, and preferential treatment of income tax. When we study the input and output stages of enterprise independent innovation, we need to use a number of indicators to measure the effect of government intervention, and in the stage of comprehensive efficiency of enterprise independent innovation, we pay more attention to the comprehensiveness of multiple indicators. Referring to the existing literature, this paper uses the panel factor analysis method and uses the final comprehensive index as the measurement index of government intervention [36, 37].

2.1.1. Measurement Model of Government Intervention. In order to standardize the government intervention indicators and eliminate the differences in the number and unit of each variable, we establish the following factor analysis model:

$$\begin{aligned} X &= \left(x_1, x_2, x_3, \cdots, x_p\right), \\ F &= \left(F_1, F_2, F_3, \cdots, F_m\right), \\ e &= \left(e_1, e_2, e_3, \cdots, e_p\right), \end{aligned} \tag{1}$$

where X is the standardized government intervention matrix, x_p is the components of the government intervention matrix, F is the common factor of X, F_m is the components of the common factor matrix, e is the special factor of X, and e_p is the components of the special factor e.

The expressions of formula (1) are as follows:

$$\begin{cases} x_1 = a_{11}F_1 + a_{12}F_2 + a_{13}F_3 + \cdots a_{1m}F_m + e_1, \\ x_2 = a_{21}F_1 + a_{22}F_2 + a_{23}F_3 + \cdots a_{2m}F_m + e_2, \\ x_3 = a_{321}F_1 + a_{32}F_2 + a_{33}F_3 + \cdots a_{3m}F_m + e_3, \\ \cdots \\ x_p = a_{p1}F_1 + a_{p2}F_2 + a_{p3}F_3 + \cdots a_{pm}F_m + e_p. \end{cases} \tag{2}$$

The above formula can be simplified into the matrix form:

$$\begin{aligned} X &= AF + e, \\ A &= \left(a_{ij}\right). \end{aligned} \tag{3}$$

According to the requirements of the factor analysis model, $\mathrm{Cov}(F, e) = 0$, $\mathrm{Cov}(F) = 1$, and the covariance of e is a diagonal matrix. X is the standardized government intervention matrix, x_p is the component of the government intervention matrix, F is the common factor of X, F_m is the component of the common factor matrix, a_{ij} is the factor load matrix, A is the factor load matrix, and e is the special factor of X.

2.1.2. Panel Factor Analysis of Government Intervention Indicators

(1) Test of Factor Analysis. Whether the sample data is suitable for factor analysis needs to be tested for applicability. There are two commonly used fitness test methods, namely, KMO measure and Bartlett's spherical test. The applicability of factor analysis on government intervention indicators was tested. The test results are as follows. From 2012 to 2018, the KMO statistical values of government intervention are in the range of 0.6–0.8, and the probability values corresponding to LR test statistics are all less than 0.05. It can be seen that many indicators of government intervention are suitable for factor analysis. The test results are listed in Table 1.

(2) Analysis of Panel Factor. This paper makes factor analysis on the cross-sectional data of government intervention from 2012 to 2018 and obtains the final government intervention panel data. The normalized data in 2012 were rotated to obtain the eigenvalue and contribution rate. The eigenvalues of factor 1 and factor 2 are greater than 1, which are 1.3424 and 1.2332, respectively. The cumulative variance contribution rate of factor 1 and factor 2 after the maximum orthogonal rotation is 90.63%, which indicates that factor 1 and factor 2 can be extracted as public factors of subsidies and taxes. See Table 2 for details. Referring to the factor analysis process of 2012 government intervention indicators, the four indicators of government intervention from 2013 to 2018 were reduced in order (the calculation results are not listed). The results of factor 1 and factor 2 are named as subsidy factor G1 and tax factor G2, and the comprehensive

Table 1: Applicability test of government intervention factor analysis from 2012 to 2018.

Particular year	2012	2013	2014	2015	2016	2017	2018
Statistical value of KMO	0.6886	0.7637	0.7248	0.7087	0.7339	0.7096	0.7078
LR test: chi2(6): Prob > chi2	43.59	44.75	47.97	87.91	126.61	135.98	127.52
	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 2: Eigenvalues and variance contribution rate of raw data and maximum orthogonal rotation data of government intervention in 2012.

	Original data			After maximum orthogonal rotation		
Factors	Eigenvalues	Variance contribution	Cumulative contribution rate of variance	Eigenvalues	Variance contribution	Cumulative contribution rate of variance
Factor 1	1.47861	0.3697	0.3697	1.3424	0.4570	0.4570
Factor 2	1.07837	0.2696	0.6393	1.2332	0.4493	0.9063
Factor 3	0.6983	0.1749	0.8142	—	—	—
Factor4	0.5824	0.1398	0.954	—	—	—

score of government subsidy and tax factor is taken as the measurement index g of government intervention. See Table 3 for details.

(3) Comprehensive Score of Government Intervention and Its Descriptive Statistical Analysis. Using the method of panel factor analysis, this paper calculates the score of government subsidy factor and tax factor and then obtains the comprehensive score of government intervention. The results of descriptive statistical analysis are shown in Table 4. It can be seen from Table 4 that the average value of subsidy factor is greater than that of tax factor, indicating that the promotion effect of government subsidy on independent innovation effect of strategic emerging industry enterprises is greater than that of tax preference. The standard deviation of subsidy factor is larger than that of tax factor, indicating that the data stability of subsidy factor is inferior to that of tax factor. The minimum and maximum values of $G1$, $G2$, and $G3$ are close to each other, indicating that the data of the three are relatively stable as a whole.

2.2. Measurement of Financial Support. Financial support means include bank loans and foreign direct investment, and bank loans include short-term loans and long-term loans.

Referring to the existing literature, this paper selects short-term bank loans as one of the measurement indicators of financial support, long-term bank loans as one of the indicators to measure financial support, and the overseas borrowed funds in the total project investment approved by the relevant government departments as the index to measure the foreign direct investment. In the same way as the government intervention indicators, we will reduce the dimension of financial support indicators to get the comprehensive score of financial support.

2.2.1. Panel Factor Analysis of Financial Support. The applicability of factor analysis is tested for financial support indicators, and the test results are shown in Table 5. It can be seen from Table 5 that the KMO values of financial support indicators are greater than 0.7 from 2012 to 2018, and the probability corresponding to LR test statistical values is less than 0.05, indicating that the financial support indicators of each year can be factor analyzed.

The eigenvalues of factor 1 and factor 2 are greater than 1, and the eigenvalues of factor 1 and factor 2 are 1.69389 and 1.30467, respectively. The cumulative variance contribution rate of factor 1 and factor 2 is 99.95%. Therefore, factors 1 and 2 are extracted as common factors of domestic investment $F1$ and foreign investment $F2$. See Tables 6 and 7 for details.

2.2.2. Comprehensive Score of Financial Support and Its Descriptive Statistical Analysis. Using the panel factor analysis method, we calculate the comprehensive score of financial support. The results of descriptive statistical analysis are shown in Table 8. It can be seen from Table 8 that the average and maximum values of domestic investment factor and foreign investment factor are close, and the minimum value of comprehensive factor is far less than that of domestic investment factor and foreign investment factor. The standard error of domestic investment factors is much larger than that of foreign investment factors and the labeling difference of comprehensive factors, which indicates that the data stability of domestic investment factors is not high.

2.3. Measurement of the Comprehensive Efficiency of Enterprise Independent Innovation

2.3.1. Input and Output Variables of Enterprise Independent Innovation. Referring to the existing literature, we take capital input in R&D and personnel input in R&D as the independent innovation input variables of strategic emerging industry enterprises and the number of patent applications and main business income as the output variables of independent innovation [38]. The input and output variables of enterprise independent innovation are shown in Table 9.

Table 3: Naming of government intervention factors.

Sign of factor	High load index	Factor naming
G_1	Government grants Additional deduction of R&D expenses	Subsidy factor
G_2	Preferential treatment of value-added tax Income tax	Tax factor

Table 4: Descriptive statistics of comprehensive scores of government intervention.

Variable	Mean	Std. dev.	Min	Max
$G1$	0.0949	1.0536	−4.3724	4.9740
$G2$	0.0445	0.8175	−3.6354	4.6622
$G3$	0.0085	0.5489	−2.8774	4.3763

2.3.2. Evaluation Model of Enterprise Independent Innovation Efficiency. DEA-CCR model and DEA-BBC model are commonly used to evaluate efficiency. BBC model focuses on pure technical efficiency and scale efficiency, while this paper focuses on measuring the comprehensive efficiency of independent innovation, so DEA-CCR model is selected to measure the comprehensive efficiency of enterprise independent innovation [39, 40].

Suppose the number of DMUs is m. For any DMU0, it is assumed that there are n types of inputs and s types of outputs, x_{ij} represents the type i input of the jth DMU, and y_{rj} represents the type r input of the jth DMU. DEA-CCR model can be expressed as follows:

$$\begin{aligned} &\min\left[\theta-\varepsilon\left(\sum_{i=1}^{n}s_i^- + \sum_{r=1}^{s}s_r^+\right)\right],\\ &\text{s.t.}\sum_{j(\neq k)=1}^{m}x_{ij}\lambda_j + s_i^- \le \theta X_0,\\ &\sum_{j(\neq k)=1}^{m}y_{rj}\lambda_j + s_r^+ \le Y_0,\quad \lambda\ge 0, s_r^+\ge 0, s_i^-\ge 0. \end{aligned} \tag{4}$$

where $i = 1, 2, \ldots, n$; $j = 1, 2, \ldots, m$; $r = 1, 2, \ldots, s$; m represents the number of decision-making units, n represents the number of input variables, s represents the number of output variables. s_i^+ represents the relaxation variable of the rth output, s_i^- represents the relaxation variable of the ith input, and θ represents the comprehensive efficiency.

2.3.3. Cross-Sectional Data and Descriptive Statistical Analysis of the Comprehensive Efficiency of Independent Innovation. Using DEA-CCR model, we get the cross-sectional data of the comprehensive efficiency of independent innovation of strategic emerging industry enterprises. Descriptive statistical analysis of the cross-sectional data of each year is carried out, and the results are shown in Table 10.

As can be seen from the regression analysis results in Table 10, the overall efficiency of enterprise independent innovation was generally in the trend of continuous improvement; its value increased from 0.264 in 2012 to 0.746 in 2018. In the process of improving the comprehensive efficiency of enterprise independent innovation, its technical efficiency and scale efficiency are increasing, but the former is lower than the latter.

2.3.4. Panel Data of Comprehensive Efficiency of Independent Innovation and Its Descriptive Statistical Analysis. Based on the annual cross-sectional data of the comprehensive efficiency of enterprise independent innovation, we get the panel data of the comprehensive efficiency of enterprise independent innovation. We make a descriptive statistical analysis on the panel data of the comprehensive efficiency of enterprise independent innovation. The results are shown in Table 11.

It can be seen from Table 11 that the average value of scale efficiency is greater than that of pure technical efficiency, indicating that the expansion of innovation scale has a more obvious effect on promoting the efficiency of independent innovation of enterprises. The standard errors of comprehensive efficiency, pure technical efficiency, and scale efficiency are very close, which indicates that the efficiency of independent innovation is relatively stable. The maximum values of comprehensive efficiency, pure technical efficiency, and scale efficiency all reach 1, but their minimum values are obviously different.

3. Empirical Research on the Influence of Government Intervention and Financial Support on the Comprehensive Efficiency of Independent Innovation

3.1. Index Selection. The explained variable is the comprehensive efficiency of independent innovation (crste), and its value is the comprehensive efficiency value calculated by DEA-CCR. The explanatory variables are government intervention (G) and regulatory variable financial support (F). The values of these two variables have been obtained by factor analysis.

The controlling variables are enterprise scale (size), the profitability of enterprises (ep), the age of enterprises (age), the capital structure level (lev), and the types of enterprise ownership (own). The enterprise scale is the logarithm of the total assets of the enterprise, the profitability is the proportion of net profit and operating income, the age of an enterprise is the number of years from the time the company was listed to the research deadline, and the capital structure level is the asset-liability ratio. The values of the type of enterprise ownership are as follows: the value of state-owned enterprise holding is 0, and the value of others is 1.

3.2. Tobit Model. The range of the explained variable (comprehensive efficiency of independent innovation) in this paper is (0, 1], while some explanatory variables are less

Table 5: Applicability of financial support factor analysis in 2012–2018.

Particular year	2012	2013	2014	2015	2016	2017	2018
Statistical value of KMO	0.711	0.7503	0.7253	0.7390	0.7459	0.7384	0.7402
LR test: chi2(6): Prob > chi2	1186.93 0.0000	1719.61 0.0000	2298.65 0.0000	2158.06 0.0000	3568.46 0.0000	3194.84 0.0000	3063.46 0.0000

Table 6: Eigenvalues and variance contribution rate of raw data and maximum orthogonal rotation data of financial support in 2012.

Factors	Original data			After maximum orthogonal rotation		
	Eigenvalues	Variance contribution	Cumulative contribution rate of variance	Eigenvalues	Variance contribution	Cumulative contribution rate of variance
Factor 1	1.72184	0.5739	0.5739	1.69389	0.5646	0.5646
Factor 2	1.27672	0.4256	0.9995	1.30467	0.4349	0.9995
Factor 3	0.00144	0.0005	1.0000	—	—	—

Table 7: Naming of financial support factors.

Sign of factor	High load index	Factor naming
F_1	Short-term loans from banks Long-term loans from banks	Domestic investment factor
F_2	Foreign direct investment	Foreign investment factors

Table 8: Descriptive statistics of comprehensive scores of financial support.

Variable	Mean	Std. dev.	Min	Max
F_1	0.1216	1.0020	−4.4420	4.8377
F_2	0.1952	0.5644	−2.5980	5.5670
F_3	0.1572	0.2850	−5.0457	5.5145

than zero. If the panel OLS or panel effect model is used for empirical analysis, the regression result will be biased. Therefore, using the methods of existing literature, this paper uses Tobit model to study the comprehensive efficiency of enterprise independent innovation [41, 42]. The specific expression of Tobit model is as follows:

$$\begin{cases} Y_i^* = \beta_0 + \beta^T X_i + \mu_i, \\ Y_i = Y_i^*, \text{ if } Y_i^* \geq 0, \\ Y_i = 0, \text{ if } Y_i^* < 0, \end{cases} \quad (i = 1, 2, \ldots, n), \tag{5}$$

where Y_i is the explanatory variable, X_i is the explanatory variable, Y_i^* is the potential variable, β^T is the parameter vector, and μ_i is a random error term. In this paper, Y_i is the comprehensive efficiency value of independent innovation, X_i is government intervention, and Y_i^* is financial support.

When $Y_i^* < 0$, the probability density function is as follows:

$$\begin{aligned} P(Y = 0) &= P\left(Y_i^* \leq 0\right) = \varphi\left(-\frac{\beta'^T x_i}{\sigma}\right) \\ &= 1 - \varphi\left(-\frac{\beta'^T x_i}{\sigma}\right). \end{aligned} \tag{6}$$

Tobit model follows the concept of maximum likelihood method. When $Y_i = Y_i^*$, its likelihood function is expressed as follows:

$$I\left(\beta'^T\right) = \sum_{Y_i > 0} \ln\left[\frac{1}{\sigma}\varphi\left(\frac{Y_i - \beta'^T x_i}{\sigma}\right)\right] \sum_{Y_i = 0} \ln\left[1 - \varphi\left(\frac{Y_i - \beta'^T x_i}{\sigma}\right)\right]. \tag{7}$$

The derivative method is used to maximize β and σ, so as to obtain the maximum likelihood value.

3.3. Results and Analysis of Empirical Research

3.3.1. Analysis of the Lag Effect of the Comprehensive Efficiency of Independent Innovation. Since the output of independent innovation has a lag effect, this paper adds the square term of the efficiency of independent innovation in the Tobit model to test the lag effect and "inverted U" relationship of the comprehensive efficiency of independent innovation.

The regression result of the lag effect of the comprehensive efficiency of independent innovation is shown in model (a) in Table 12. According to the regression result, the regression coefficient between the efficiency of independent innovation in the lag period and that in the current period is positive; it shows that the efficiency of independent innovation in the lag period can improve the comprehensive efficiency of independent innovation in the current period.

Table 9: Input and output variables of enterprise independent innovation.

Primary variables	Secondary variables	Sign of variables	Definition and calculation of variables
Input variables	Capital input in R&D	lnR&D	Take logarithm for R&D capital investment of enterprises
	Personnel input in R&D	lnL	Take logarithm for the number of R&D personnel
Output variables	Number of patent applications	lnPAT	Take logarithm for the number of patent applications
	Income from main business	lnMBI	Take logarithm for the income from main business

Table 10: Descriptive statistics of comprehensive efficiency of enterprise independent innovation from 2012 to 2018.

Years	Variables	Mean	Sd	Min	Max
2012	Crste	0.264	0.0622	0.0379	1
	Vrste	0.288	0.0636	0.0648	1
	Scale	0.37	0.0347	0.0429	1
2013	Crste	0.372	0.0696	0.0627	1
	Vrste	0.289	0.0663	0.0612	1
	Scale	0.581	0.0212	0.1855	1
2014	Crste	0.402	0.049	0.0802	1
	Vrste	0.552	0.0382	0.255	1
	Scale	0.548	0.035	0.114	1
2015	Crste	0.42	0.048	0.2	1
	Vrste	0.549	0.0394	0.26	1
	Scale	0.619	0.0341	0.2826	1
2016	Crste	0.662	0.0533	0.17	1
	Vrste	0.581	0.0596	0.271	1
	Scale	0.679	0.0346	0.1803	1
2017	Crste	0.649	0.041	0.281	1
	Vrste	0.601	0.0402	0.0802	1
	Scale	0.687	0.0183	0.282	1
2018	Crste	0.746	0.0379	0.3724	1
	Vrste	0.866	0.0428	0.3762	1
	Scale	0.61	243.2	0.361	769

Crste represents the comprehensive efficiency of independent innovation, Yrste represents pure technical efficiency, and Scale represents scale efficiency.

Table 11: Descriptive statistics of panel data of independent innovation comprehensive efficiency of strategic emerging enterprises.

Variables	Mean	Sd	Min	Max
Crste	0.562	0.0689	0.0379	1
Vrste	0.589	0.0727	0.0648	1
Scale	0.635	0.0776	0.0429	1

But there is no "inverted U" relationship between the efficiency of independent innovation in the first stage of lag and the efficiency of independent innovation in the current period.

3.3.2. Analysis of the Effect of Government Intervention and Financial Support. Using Tobit model, this paper analyzes the effect of government intervention and financial support on the comprehensive efficiency of enterprise independent innovation, and the regression analysis result is shown in model (a) in Table 12. In order to test the nonlinear relationship between government intervention and the comprehensive efficiency of enterprise independent innovation, as well as the nonlinear relationship between financial support and the comprehensive efficiency of enterprise independent innovation, the square terms of government intervention and financial support are added to the regression analysis model. The regression results are shown in model (3) in Table 12.

Table 12: Tobit panel regression results.

Variables	Model (1)	Model (2)	Model (3)
$vrste_{it-1}$	0.0636**	0.0717**	0.0909**
	(0.72)	(0.89)	(1.81)
Vrste2 it-1	−0.0013	−0.0026	−0.0019
	(−0.82)	(−0.98)	(−0.91)
	(−1.00)	(−0.87)	(−1.08)
G	0.015**	0.0151**	0.0143**
	(2.24)	(2.25)	(2.12)
F	0.0047*	0.0047*	0.0038*
	(1.54)	(1.55)	(1.20)
$G \times F$	—	−0.0062*	−0.0057*
	—	(−1.42)	(−1.23)
G^2	—	—	−0.0097*
	—	—	(−0.98)
F^2	—	—	−0.0009
	—	—	(−1.54)
Lnsize ep	−0.0005	−0.0007	−0.0004
	(−0.22)	(−0.32)	(−0.17)
Age	0.0004	0.00038	0.00038
	(0.3)	(0.25)	(0.27)
	0.0001	0.0001	0.00021
	(0.11)	(0.12)	(0.2)
Lev	−0.0008	−0.0008	−0.0007
	(−0.77)	(−0.79)	(−0.75)
Own	−0.0015	−0.0018	−0.0017
	(−0.33)	(−0.39)	(−0.37)
Constant	0.892***	0.8925***	0.8931***
	(22.10)	(22.26)	(22.29)
Wald test	14.34**	14.72**	11.01*
Log likelihood	−96.73	−92.51	−80.12

Wald test statistics pass 5% significance test, indicating that the model fits well.

According to the regression results of model (1), the regression coefficient between government intervention and the comprehensive efficiency of independent innovation is positive and has passed the significance level of 5%, which indicates that government intervention promotes the improvement of comprehensive efficiency of independent innovation of enterprises. The regression coefficient is 0.0150, which indicates that, for every 1% increase of government intervention, the comprehensive efficiency of enterprise independent innovation will increase by 0.015%. The

regression coefficient between financial support and the comprehensive efficiency of independent innovation is positive and has passed the significant level of 10%, which indicates that financial support also promotes the improvement of comprehensive efficiency of independent innovation. The regression coefficient is 0.0047, which indicates that when the financial support increases by 1%, the comprehensive efficiency of enterprise independent innovation will increase by 0.015%. Comparing the two regression coefficient values, we can see that the promotion effect of government intervention on the comprehensive efficiency of independent innovation is far greater than that of financial support, which indicates that, in recent years, the government intervention in the allocation of innovation resources of enterprises is too strong, and the allocation efficiency of financial resources is relatively low.

According to the regression analysis results of model (3), the regression coefficient between the square term of government intervention and the comprehensive efficiency of enterprise independent innovation is negative and has passed the significance level of 10%, which indicates that there is an inverted U-shaped relationship between government intervention and the comprehensive efficiency of independent innovation. The regression coefficient between the square term of financial support and the comprehensive efficiency of independent innovation is negative, which fails to pass the significance level of 10%, which indicates that there is no "inverted U" relationship between financial support and comprehensive efficiency of independent innovation.

It can be seen that the degree of government intervention in the independent innovation of strategic emerging industry enterprises is in a reasonable range, which indicates that the reasonable increase of government intervention can improve the comprehensive efficiency of enterprise independent innovation. When the government intervention exceeds a certain range, the comprehensive efficiency of independent innovation will decline.

3.3.3. The Inhibitory Effect of Government Intervention on Financial Support. The interaction between government intervention and financial support is added to the regression analysis to study how government intervention affects the promotion of financial support on the overall efficiency of enterprise independent innovation. The regression analysis results are shown in model (2) in Table 12.

The regression analysis results show that the regression coefficient of the interaction between government intervention and financial support and the comprehensive efficiency of independent innovation is negative and has passed the significant level of 10%, which indicates that the government intervention has an inhibitory effect on the promotion effect of financial support on the comprehensive efficiency of enterprise independent innovation. The regression coefficient is 0.0062, which indicates that when the interaction items increase by 1%, the comprehensive efficiency of enterprise independent innovation will decrease by 0.0062%. Due to the "inverted U" relationship between government intervention and the comprehensive efficiency of enterprise independent innovation and the inhibitory effect of government intervention on financial support effect, increasing government intervention may lead to the decline of comprehensive efficiency of enterprise independent innovation. Therefore, we must make good use of both government intervention and financial support, increase the induced effect of government intervention on financial support, and reduce the crowding-out effect of government intervention on financial support.

According to the regression analysis results, the coefficients of the control variables lnsize, lev, and own are all negative, but they fail to pass the 10% significance level, which indicates that the enterprise scale, capital structure level, and enterprise ownership type have a negative impact on the comprehensive efficiency. The coefficients of control variables ep and age are both positive, but they fail to pass the 10% significance level proposal, which shows that the profitability and age of enterprises have a positive impact on the overall efficiency, but this effect is not obvious.

4. Conclusions and Suggestions

Strategic emerging industries are the key industries to cultivate new driving forces for economic development and achieve high-quality economic development. However, enterprises in strategic emerging industries have insufficient independent innovation power and low innovation performance in China. Government intervention and financial support are two external means to promote the independent innovation performance of strategic emerging industry enterprises, and the government intervention has induced effect and crowding-out effect on financial support, which leads to the dual incentive effect of government intervention and financial support on independent innovation to be tested.

This paper takes 657 strategic emerging enterprises as the research object and empirically studies the influence of government intervention and financial support on the comprehensive efficiency of independent innovation. The conclusions are as follows. Firstly, the comprehensive efficiency of independent innovation is in the trend of continuous improvement and technical efficiency and scale efficiency are also increasing, but the technical efficiency is lower than the scale efficiency, which shows that the improvement of independent innovation efficiency mainly depends on the expansion of innovation scale. Secondly, both government intervention and financial support promote the comprehensive efficiency of independent innovation of strategic emerging industry enterprises, but the incentive effect of government intervention is more obvious. Thirdly, there is an inverted U-shaped relationship between government intervention and the comprehensive efficiency, while there is no inverted U-shaped relationship between financial support and the comprehensive efficiency. Fourthly, the regression coefficient of the interaction between government intervention and financial support and the comprehensive efficiency of enterprise independent innovation is negative, which indicates that government

intervention has an inhibitory effect on the effect of financial support on the overall efficiency of enterprise independent innovation. The reason is that government intervention has crowding-out effect on financial support and distorts the allocation of financial resources. In addition, excessive government intervention will lead the external financing behavior of innovation subject to deviate from the principle of market efficiency and further weaken the role of financial support.

The following measures should be taken:

(1) Pay attention to the capital investment and R&D personnel training, and promote the sustainability of independent innovation. First of all, improve the government fund guidance and tax preferential policies to promote enterprises to increase investment in independent innovation; secondly, improve the talent training system and policies to promote the effectiveness of enterprise researchers training.

(2) Appropriately expand government intervention, and improve the accuracy of government subsidies and tax incentives. Firstly, in the output and efficiency stage of enterprise independent innovation, the government should increase the incentive for the transformation of independent innovation achievements. Secondly, formulate accurate financial subsidies and tax preferential system for different types of strategic emerging enterprises' independent innovation activities, so as to improve the effect of government intervention.

(3) Coordinate the government intervention and financial support to improve the dual incentive effect. We should strengthen financial support for independent innovation activities and relax the control of financial resources, strengthen the guidance of financial institutions and encourage them to innovate financial instruments, and reduce the external financing constraint threshold of enterprises' independent innovation activities and reduce their financing costs.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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