

Implicit Government Guarantees and Continuous Innovation in Manufacturing Firms: Incentives or Disincentives? --Micro evidence from A-share listed companies

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Abstract: This paper explores the impact of implicit government guarantees on the continuous innovation of manufacturing enterprises using A-share listed companies from 2008 to 2017 as the research sample. It is found that the higher the implicit government guarantee is, the more it inhibits the continuous innovation of enterprises, and the mechanism of excessive indebtedness, inefficient investment, rent-seeking cost, and zombie enterprises is further found.

1. Introduction

Innovation is an important driving force to lead the transformation and upgrading of China's manufacturing industry and drive China's economic growth in the new era. Enterprise technology innovation is not only the main pulling force of national innovation development but also helps enterprises gain short-term competitive advantages and is an important source of sustainable development¹. Although large-scale R&D investment is a prerequisite for producing a large number of high-quality innovations, transient innovations can only bring temporary economic benefits to enterprises, and Long-term corporate technology innovation is necessary for sustainable economic growth. Today, the problem of inefficient innovation in Chinese manufacturing firms remains prominent. One issue worthy of consideration is that the relationship between government and enterprises largely interferes with the efficiency of allocating resources for science and technology innovation. Implicit government guarantees, as an important political resource for enterprises, may distort the capital allocation structure among different industries and enterprises, reinforcing the mismatch of financing modes faced by enterprises in innovation development², which in turn hinders enterprises' innovation decisions and reduces innovation efficiency. Resulting in the current In this context, this paper sorts out the credit mismatch and resource curse faced by enterprises in the development of technological innovation. In this context, the research sample of this paper selects all A-share listed manufacturing enterprises from 2008-2017 to study the impact and mechanism of the implicit government guarantee on the sustainability of technological innovation in manufacturing enterprises, which has important theoretical and practical significance for more effectively enhancing the technological

innovation vitality of manufacturing enterprises and promoting the high-quality development of China's economy.

2. Theoretical Review and Hypothesis Formulation

2.1 Implicit Government Guarantees and Technological Innovation in Manufacturing Firms

In China, the existence of implicit government guarantees for firms by local governments makes it easier for firms to obtain financial subsidies and tax incentives, as well as large amounts of cheap resources from banks, thus contributing to their value enhancement, but may also have a negative impact on firms' technological innovation. The implicit government guarantee makes enterprises government support and backing even if they are not doing well, which reduces their willingness to innovate, while the implicit government guarantee makes entrepreneurs more eager to continue to establish rent-seeking ties with local governments to maintain existing political resources, which leads to a lack of management attention to internal corporate governance and innovation incentives, and thus makes the innovation enthusiasm of individual inventors within the enterprise This leads to a lack of management attention to internal governance and innovation incentives, which in turn makes the enthusiasm of individual inventors within the firm less conducive to being stimulated. Thus, implicit government guarantees can inhibit sustained technological innovation.

Hypothesis 1 (H1): implicit government guarantees are negatively related to the sustained technological innovation of manufacturing firms.

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2.2 Mechanism of government implicit guarantee's influence on manufacturing firms' technological innovation

Firms with implicit government guarantees have lower financial crisis costs and less incentive to control financial leverage³, instead, they are more inclined to over-indebtedness, which forces innovation as a high-risk investment activity to decrease due to the increase in corporate default risk and liquidity risk in order to balance the overall corporate risk. On the other hand, banks as creditors usually restrict firms from conducting high-risk R&D innovation and lobby corporate decision-makers to choose fixed asset investment in order to reduce their own risk and maintain normal profitability, i.e., the presence of creditors also inhibits corporate technological innovation and the degree of inhibition increases with the increase in the proportion of debt⁴.

Hypothesis 2 (H2): Implicit government guarantees will discourage manufacturing firms from continuing to innovate by increasing firms' over-indebtedness.

The implicit government guarantee makes it easier for enterprises to obtain financing preference from banks and abundant credit rationing^{5,6}, which will easily lead to "overconfidence" of enterprise management, manifested in the inefficient investment of blindly expanding enterprise scale to pursue short-term capacity enhancement⁷, and at the same time, the implicit government guarantee will also reduce the urgency of enterprise R&D and innovation, such as more eager to carry out M&A or diversified expansion, which disperses enterprise credit resources and causes the situation of continuous low innovation of enterprises.

Hypothesis 3 (H3): Implicit government guarantees will inhibit sustained innovation by manufacturing firms by reducing investment efficiency.

The level of implicit government guarantees to firms may not depend entirely on their actual business performance and development plans, but may instead depend more on the rent-seeking relationships established between firms and local government agencies. Firms use their limited resources in exchange for privileges rather than for production and R&D, and the resources they obtain through political rent-seeking tend to be allocated to low-risk, short-duration projects, thus having a crowding-out effect on the firm's sustained technological innovation output⁸.

Hypothesis 4 (H4): Implicit government guarantees will discourage manufacturing firms from continuing to innovate by increasing rent-seeking costs.

Implicit government guarantees play an important role in the formation and survival of zombie enterprises. On the one hand, zombie enterprises are not committed to high-risk and long-cycle R&D innovation; on the other hand, the survival of zombie enterprises is inseparable from the continuous blood transfusion from the government and banks, but this process will also impede the free flow of R&D capital, which not only indirectly makes it more difficult for non-zombie enterprises to obtain external financing, but also leads to the wrong flow of innovation resources to zombie enterprises⁹, thus further inhibiting enterprise technological innovation.

Hypothesis 5 (H5): Implicit government guarantees will inhibit sustained innovation by manufacturing firms by increasing the formation of zombie firms.

3. Data collection and variable definition

In this paper, all listed companies in China's A-share manufacturing industry from 2008-2017 are selected as the research sample, and companies that are specially treated as ST, *ST, PT, etc., and those with serious missing data in the sample observation period are excluded, and a total of 1704 sample companies with 13540 valid observations are obtained. The financial data of enterprises in this paper are obtained from the CSMAR database, the regional macroeconomic data are obtained from provincial statistical yearbooks, and all continuous variables are treated with a 1% tailoring. The core variables used in the empirical process are as follows.

(1) Implicit government guarantees¹⁰ (GP)

Table1 Measurement of implicit government guarantees

GP	Comprehensive indicators extracted by entropy weighting method
GP_LOAN	Credit level = long-term borrowings/total assets
GP_SUB	Level of government subsidies = government subsidies/operating income
GP_TAX	Tax benefit level = (total profit * income tax rate - income tax) / net profit

(2) Continuous innovation for manufacturing companies (HRDN)

Taking the average annual RD intensity of listed enterprises in their industries and cities as the benchmark, their annual innovation strategies are classified into two categories, above and below the benchmark R&D strategies, and then the following corporate R&D strategy indicators are constructed¹¹.

$$HighRD = \begin{cases} 1, & \text{if } RD > \text{Industry or Area average intensity} \\ 0, & \text{if } RD \leq \text{Industry or Area average intensity} \end{cases} \quad (1)$$

Among them is the company's R&D innovation strategy in the current period. If the company's current R&D investment intensity is higher than the industry or regional average R&D investment intensity, it is regarded as a high R&D strategy and recorded as 1; otherwise, it is recorded as 0.

To measure the sustainability characteristics of the company's R&D strategy, the following indicators were constructed to further calculate the characteristics of the company's innovation strategy over N consecutive periods.

$$HRDN = \sum_{t=N+1}^T HighRD_t \quad (2)$$

Where HRDN is an indicator of a company's innovation strategy over a continuous period of N periods. A larger HRDN indicates that the company chooses a high innovation strategy more frequently during the observation period.

(3) Control variables. With reference to the existing literature, this paper controls for factors that may affect the technological innovation behavior of firms, specifically: profitability, equity structure, book-to-market ratio, management shareholding, firm leverage, firm size, cash holdings, operating income growth rate, institutional investor shareholding, firm age, industry concentration, capital expenditure, fixed asset intensity, and nature of property rights.

4. Model construction and result analysis

To test hypothesis 1, the following fixed-order cumulative Logit test model is constructed.

$$O\text{Logit}(HRD_{T,N}) = \alpha + \beta_1 GP_{it} + \beta_2 C_{it} + \varphi_c + \gamma_t + \varepsilon_{ict} \quad (3)$$

where is the Logit variation of the firm's sustained N period R&D strategy in year T. If significantly less than 0, it indicates that the intensity of the implicit government guarantee causes firms to prefer a sustained low innovation strategy for a series of control variables, denoting firms, denoting industries, and denoting time. In addition, industry-fixed effects and time-fixed effects are included in this paper to represent random error terms. Regression analyses were conducted using STATA, and the results were as follows.

Table2 Baseline regression results

VARIABLES	Industry Relative Benchmarks			Regional relative benchmark		
	HRDV3	HRDV4	HRDV5	HRDC3	HRDC4	HRDC5
GP	-7.965*** (1.557)	-6.567** (1.773)	-6.061*** (2.020)	-8.683*** (1.589)	-7.248*** (1.767)	-6.208** (1.982)
Control variables	Control	Control	Control	Control	Control	Control
Year	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES
N	6,551	5,027	3,741	6,551	5,027	3,741
Pseudo R ²	0.0521	0.0465	0.0437	0.0790	0.0716	0.0686

Notes. *** p<0.01, ** p<0.05, * p<0.1; (Same as below)

The regression results show that implicit government guarantees are significantly and negatively related to sustained high innovation in manufacturing firms at the 1% level. The results in columns (3) and (6) of Table 2, for example, show that the intensity of implicit government guarantees for manufacturing firms of 1 unit above the industry average leads to a decrease in Logit variation of about 6.061 units for firms choosing high innovation frequency; the intensity of implicit government guarantees for manufacturing firms of 1 unit above the regional average leads to a decrease in Logit variation of about 6.208 units for firms choosing high innovation frequency. The government's implicit guarantee strength of 1 unit above the regional average for manufacturing firms leads to a decrease of about 6.208 units in the Logit variation for firms choosing high innovation frequency.

The following paper further empirically tests the mechanism of the role of implicit government guarantees in influencing firms' continuous innovation strategies by constructing models in four aspects: over-indebtedness (*EXLEVB*), inefficient investment (*InefficInvest*), rent-seeking costs (*rscost*) and zombie firms (*Zombie*) in conjunction with the research hypotheses.

$$EXLEVB_{ict} = \alpha + \beta_1 GP_{it} + \beta_2 C_{it} + \varphi_c + \gamma_t + \varepsilon_{ict} \quad (4)$$

$$InefficInvest_{ict} = \alpha + \beta_1 GP_{it} + \beta_2 C_{it} + \varphi_c + \gamma_t + \varepsilon_{ict} \quad (5)$$

$$rscost_{ict} = \alpha + \beta_1 GP_{it} + \beta_2 C_{it} + \varphi_c + \gamma_t + \varepsilon_{ict} \quad (6)$$

$$Zombie_{ict} = \alpha + \beta_1 GP_{it} + \beta_2 C_{it} + \varphi_c + \gamma_t + \varepsilon_{ict} \quad (7)$$

Among them, are obtained from the CSMAR database, Equal to the ratio of corporate overhead to main operating income, Use "three consecutive years of negative net income" to identify, The remaining variables were defined

as before, and the regression results are shown in Table 3.

Table3 Mechanism Testing

VARIABLES	(1) EXLEVB	(2) InefficInvest	(3) rscost	(4) Zombie
GP	1.899*** (0.114)	0.190*** (0.0329)	0.0785*** (0.0300)	3.364** (1.315)
Control variables	Control	Control	Control	Control
Constant	-0.498*** (0.0720)	0.119*** (0.0182)	0.385*** (0.0194)	0.531 (0.829)
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
N	11,178	9,817	8,519	11,053
R-squared	0.223	0.197	0.478	
Pseudo R ²				0.2756

The coefficients of GP in Table 3 are 1.899, 0.19, 0.0785, and 3.364, respectively, and all of them are significantly positive at the 1% or 5% statistical level. This result indicates that the implicit government guarantee will make manufacturing enterprises over-consume bank credit, use the abundant resources brought by the implicit government guarantee more for productive expansion such as fixed asset investment rather than R&D innovation investment, and invest more resources in unproductive rent-seeking activities to maintain political ties with local governments, which will increase the formation of zombie enterprises and thus crowd out This will increase the formation of zombie enterprises, which in turn will crowd out the technological innovation investment of manufacturing enterprises and inhibit their continuous innovation.

5. Conclusions

Implicit government guarantees inhibit sustained innovation in manufacturing firms. In the full-sample regression results, the negative effects of implicit government guarantees on manufacturing firms' sustained innovation are all significant. It reveals the mechanism that implicit government guarantees reduce the cost of financial crises, induce firms to abandon their commitment to innovation decisions, increase non-productive expenditures, and squeeze out R&D funds, thus affecting the long-term sustainable innovation of manufacturing firms.

There are four main channels through which the implicit government guarantees inhibit the sustainable innovation of manufacturing firms: the over-indebtedness effect, the inefficient investment effect, the rent-seeking effect, and the zombie enterprise effect. Specifically, the implicit government guarantee will inhibit the continuous innovation of manufacturing enterprises by increasing the level of indebtedness, reducing the efficiency of investment, increasing the cost of rent-seeking, and increasing the formation of zombie enterprises.

In order to effectively improve the technological innovation vitality and sustainable innovation capacity of China's manufacturing enterprises, it is not only necessary for the government to adjust its own relationship with the market, reasonably define its responsibilities, abandon "over-protection" of some enterprises, strengthen the

supervision of the financial market, and improve the allocation efficiency of financial resources, and promote the transformation of credit resources from indirect financing, which prefers "rigid" assets, to direct financing, which is more "entrepreneurial", to guide and incentivize financial services to support the technological innovation and industrial upgrading of manufacturing enterprises, and to promote the high-quality development of China's economy.

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