



The Impact of Tax Incentives on Firms' Innovation Performance - An Analysis of the Moderating Effect Based on Inspection Monitoring

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Abstract. At present, a new round of scientific and technological revolution and industrial change is advancing rapidly, scientific research paradigms are undergoing profound changes, disciplines are constantly cross-fertilizing, and the penetration and integration of science and technology and economic and social development are accelerating. It is imperative to enhance the participation and voice of enterprises, the main force of innovation, in the top-level design and decision-making deployment. As important tools for government regulation and control of enterprises, both inspection and tax incentives require institutional top-level design by the Central Party and enhanced participation by enterprises. At present, there are few studies on the relationship between inspection supervision and tax incentives on the innovation performance of enterprises. Therefore, this paper uses data from Shanghai and Shenzhen A-share supervisors to conduct a study, and the results show that tax incentives have a significant crowding-out effect on firms' innovation performance, while the effect of tax incentives on firms' innovation performance becomes positive after being moderated by inspection supervision.

Keywords: tax benefits · inspection supervision · deterrence theory

1 Introduction

In today's fast-moving society, tax incentives have become a powerful regulatory tool for governments. As an ex post facto subsidy, the main implementation method is to set different tax rates, tax bases, tax objects and scope to vigorously promote enterprises to carry out innovation [1]. The granting of tax incentives helps enterprises to attract more social capital investment and further alleviates the shortage of funds and other problems encountered by enterprises in carrying out innovation activities.

The impact of inspection and supervision as a non-economic system on enterprises' micro-decisions has become a hot topic of academic discussion. However, relatively few studies have been conducted on how inspection and supervision policies affect micro-firm activities, mainly including studies on corporate irregularities [2, 3], stock

price collapse risk [4], and investment efficiency [5], while few studies on corporate innovation activities have emerged.

Based on this, this paper uses a fixed effects model to investigate the impact of tax incentives on corporate innovation and further examines the moderating role of inspection and supervision.

2 Literature Review and Research Hypothesis

2.1 Literature Review

Since the 19th National Congress, inspection work has been innovative in its inheritance and developed in its innovation. The Party Central Committee believes that whether or not corruption is addressed determines the purity of the Party and can even disintegrate the Party and the state. Corruption hinders long-term economic development or growth and causes social problems [6]. X. Zhang et al. (2020) found that anti-corruption policies harmed business performance in the short term [7]; however, in the long term, these policies corrected the way companies allocate resources and positively impacted their innovative activities.

According to the signaling theory proposed by economist Michael Spencer, companies that receive tax incentives send positive messages to the outside world, providing external investors and stakeholders with more information for decision-making. Through a study of private technology companies listed on China's SME board, tax incentives have a clear effect. This phenomenon occurs because rent-seeking activities are more attractive than investment in innovation [8].

2.2 The Impact of Tax Incentives on Business Innovation

Tax incentives, as a means of financial support, reduce the amount of tax incurred by enterprises in carrying out R&D activities through tax adjustments, resulting in lower tax overheads, occurring after the innovative activities of enterprises, and the reduced tax costs are the expected income of enterprises. For example, Li Yanyan and other [9] scholars argue that tax incentives will enhance firms' willingness to invest in innovation by reducing their debt financing needs through lowering their tax burden and further reducing their cost of capital. Therefore, the following hypothesis is proposed.

H1: Other things being equal, tax incentives will have a catalytic effect on firm innovation.

2.3 Tax Incentives, Inspection Supervision and Corporate Innovation

Since the launch of the inspection and supervision policy, it has been refined and the impact of inspection and supervision on corporate micro-behaviour has deepened. According to information asymmetry theory, it is believed that there are different degrees of information asymmetry between government and enterprises, which has different effects on their behaviors. As ex-post support, tax incentives can be granted by the government after analyzing the development of innovative activities. As a result, firms may

be more inclined to invest in substantial innovation activities to get tax benefits. Based on this, the following hypothesis is proposed in this paper.

H2: Other things being equal, the moderating effect of inspection oversight between tax incentives and firm innovation performance is positive.

3 Research and Design

3.1 Sample Selection and Data Sources

This paper selects data on A-share listed companies in Shanghai and Shenzhen from 2010 to 2021 as the sample, excluding st and st* companies, financial and insurance companies and companies with missing years, and with a 1% winsor processing. Corporate financial data was obtained from the Guotaian database, corporate patent data from the China Research Data Service Platform, intellectual property protection strength data from the National Bureau of Statistics of China and inspection supervision data by manually mobile phone on the official website of the Central Commission for Discipline Inspection and Supervision. The final data was obtained for 643 listed companies.

3.2 Model Setting and Variable Definition

To test hypotheses 1 and 2, the following model was constructed.

$$\begin{aligned} innov_{it} = & \xi_0 + \xi_1 tr_{it} + \xi_2 fin_{it} + \xi_3 rdpr_{it} + \xi_4 size_{it} + \xi_5 growth_{it} + \xi_6 net_{it} \\ & + \xi_7 cashflow_{it} + \xi_8 listage_{it} + \sum ind + \sum year + \varepsilon_i \end{aligned} \quad (1)$$

$$\begin{aligned} innov_{it} = & \gamma_0 + \gamma_1 treat_{it} * tr_{it} + \gamma_2 tr_{it} + \gamma_3 treat_{it} + \gamma_4 Controls \\ & + \sum ind + \sum year + \varepsilon_i \end{aligned} \quad (2)$$

Among them, the explanatory variable corporate innovation performance *innov* is measured using Ln (total number of patents applied for inventions + 1 at one lag) and robustness tests are conducted using Ln (total number of patents applied for + 1 at one lag). While financial subsidies *rds* are measured using Ln (financial subsidies + 1); tax incentives *tr* are measured by the ratio of corporate income tax expense to EBIT; inspection and supervision data refer to the studies of scholars such as Chen Kejian [8] and Zhang Zenglian [23], and *Treat* is used to determine whether an enterprise receives inspection in the current year, and being inspected is 1, otherwise it is assigned to 0. In addition, this paper selects the level of financialisation, R&D number of personnel, firm size, firm growth, firm size change, cash flow ratio, and firm's years of listing to be used as control variables.

Table 1. Descriptive statistics results

VARIABLES	N	mean	sd	min	max
treat	7,716	0.146	0.353	0	1
tr	7,704	0.781	0.862	-2.691	4.435
innov	7,716	2.456	2.101	0	7.728
rdpr	5,352	5.542	9.823	0	50.23
net	5,352	0.141	0.280	-0.278	1.818
fin	7,716	0.0409	0.0749	0	0.417
size	7,716	23.00	1.411	20.34	27.03
cashflow	7,716	0.0502	0.0658	-0.145	0.232
growth	7,715	0.145	0.333	-0.481	2.032
listage	7,716	2.713	0.490	0.693	3.367

4 Empirical Analysis

4.1 Descriptive Results Analysis

Table 1 reports the results of descriptive statistics. Among them, the distribution of firms' innovation performance varies widely, with a mean value of 2.456, a maximum value of 7.728 and a minimum value of 0. The maximum value for tax incentives is 4.435, the minimum value is -2.691 and the mean value is 0.781, indicating that the variation in tax incentives between different enterprises is large. The mean value of inspection supervision was 0.146, indicating that 14.60% of the 643 enterprises selected had received inspections between 2010 and 2021, a low coverage rate. Among the control variables, the mean value of the number of R&D personnel was 5.628, with a maximum value of 88.20 and a minimum value of 0. The indicators of enterprise growth, with a large gap between the maximum small value of the net asset growth rate and a mean value of 0.196. The level of financialisation was low and the average size of the enterprises was good, with a large variation in development.

4.2 Basic Regression

Table 2 reports the regression results for models (1) and (2). Column (1) reports that the regression coefficient of tax incentives on firms' innovation performance is -0.073, which is significant at the 1% level, and hypothesis 1 is not tested, with an increase in tax incentives received by firms leading instead to a decrease in firms' innovation performance. Tax incentives received by firms in the current year are not necessarily returned, refunded or reduced in the current year, and even if the tax incentives received by firms are converted into R&D investment, this is a long-cycle activity that is difficult to convert into measurable and patentable outcomes [10]. While further examination of the moderating effect of inspection and supervision found that the coefficient of the interaction term between the two was positive and significant at the 5% level, indicating

Table 2. Base regression

	(1) innov	(2) innov	(3) innov1	(4) innov1
tr	-0.073*** (0.021)	-0.091*** (0.026)	-0.060* (0.031)	-0.087** (0.040)
treat		0.356** (0.125)		0.178 (0.120)
1.treat*tr		0.165** (0.061)		0.202** (0.076)
size	0.658*** (0.068)	0.649*** (0.067)	0.639*** (0.074)	0.633*** (0.074)
growth	0.047 (0.053)	0.054 (0.050)	-0.125** (0.053)	-0.120* (0.057)
listage	-0.174 (0.120)	-0.170 (0.125)	0.181* (0.088)	0.185* (0.089)
rdpr	0.044*** (0.011)	0.041*** (0.010)	0.045*** (0.009)	0.043*** (0.008)
net	0.075 (0.074)	0.076 (0.075)	-0.136*** (0.043)	-0.138*** (0.044)
fin	-0.028 (0.490)	0.127 (0.502)	0.171 (0.441)	0.278 (0.458)
cashflow	-1.056* (0.576)	-1.166* (0.547)	-1.178** (0.496)	-1.243** (0.469)
_cons	-12.187*** (1.455)	-12.033*** (1.424)	-12.524*** (1.665)	-12.413*** (1.663)
N	5352	5352	5352	5352
R-sq	0.576	0.581	0.572	0.575
adj.R-sq	0.573	0.578	0.570	0.572

Note: *, **, *** indicate statistical significance of 10%, 5%, and 1% respectively.

that inspection and supervision exhibited some positive moderating effect, which in turn led to tax incentives promoting higher corporate innovation performance. Hypothesis 2 was tested.

4.3 Robustness Tests

To ensure the robustness of the regression results, the innovation performance of the enterprises was replaced by Ln (total number of patent applications with lags + 1).

The specific regression results are shown in columns (3) and (4) of Table 2, which are consistent with the results of the base regression and passed the robustness test.

5 Conclusions and Recommendations

To curb corruption, since the 19th National Congress, the Party Central Committee has strengthened the strategic position of inspection supervision from the top across the board. This paper uses balanced panel data of listed firms from 2010 to 2021 to construct a fixed effects model to test the impact of tax incentives on firms' innovation performance based on the context of inspection and supervision. The conclusions drawn are.

Tax incentives have a significant crowding-out effect on firms' innovation performance, but will promote improved innovation performance under the moderating effect of inspection and supervision. It also passes the robustness test of the alternative variables.

Based on the above findings, this paper makes the following recommendations: (1) Enterprises themselves should strengthen information disclosure. Imperfect information is not only detrimental to external stakeholders' understanding of the current situation and future development prospects of the enterprise's budget, but also to government departments' supervision and coordination. (2) The government should construct a complete monitoring and evaluation policy to lay a good foundation for the implementation of tax incentives. It should also be continuously improved and perfected in the course of subsequent implementation.

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