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Optimization of Tax Business Environment and Breakthrough in Enterprises' Key Technologies

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Abstract: At present, China's economy has shifted from a high-speed growth stage to a high-quality development stage. The achievement of breakthroughs in key technologies by enterprises is not only related to the improvement of their own core competitiveness, but also a strategic fulcrum for building a modern industrial system and consolidating the foundation of national security and development. Based on the data of A-share listed companies from 2015 to 2023, this paper takes the pilot policy of tax "streamlining administration, optimizing services and delegating power" as a quasi-natural experiment, constructs a multi-period difference-in-differences model, and conducts empirical analysis to examine the impact and mechanism of the optimization of the tax business environment on enterprises' breakthroughs in key technologies. The above conclusions reveal the economic benefits brought by the optimization of the tax business environment, and provide empirical evidence and useful enlightenment for China to continuously promote and deepen the optimization of the tax business environment and advance high-quality economic development.

Keywords: Optimization of tax business environment; "Streamlining administration, optimizing services and delegating power" reform; Enterprises' key technology breakthroughs.

1. Introduction

At present, China's economic development has shifted from a phase of rapid growth to one of high-quality development. During this strategic transition, the CPC Central Committee attaches great importance to the central role of scientific and technological innovation. The report to the 20th National Congress explicitly states that innovation should be regarded as the primary driver of high-quality development and that achieving high-level self-reliance in science and technology must serve as the strategic underpinning of national development. Against the backdrop of global industrial-chain restructuring and increasingly intense international competition in science and technology, breaking through bottlenecks in "chokepoint" technologies such as high-end chips, core software, and key materials has become a critical task for building a modern industrial system and safeguarding national security and development.

Enterprises are the core actors in technological innovation: they both conduct R&D on key technologies and serve as the direct vehicles for translating scientific achievements into commercial applications. However, when Chinese firms tackle key technologies they still face major challenges. First, R&D is characterized by heavy investment, long cycles, and high risks; companies are often constrained by tight finances, high institutional transaction costs, and low efficiency in collaborative innovation. Second, uncertainty and lack of transparency in policy implementation make firms cautious about innovation-related investment decisions, reducing both the intensity and the stability of key technology R&D.

To address these problems, the State Taxation Administration has in recent years continuously deepened the tax-collection and administration reform centered on "streamlining administration, delegating power, improving regulation, and upgrading services." By simplifying administrative approval, combining deregulation with stronger oversight, and optimizing services, the reform improves the tax business environment and raises the quality of government services. It has already lowered enterprises' tax-compliance costs, made policies easier to access, and enhanced institutional stability. Its core objective is to foster a more stable, fair, transparent, and predictable tax system that stimulates market vitality and strengthens corporate confidence.

2. Theoretical Analysis

The tax business environment is a system collection including taxation rules, collection and administration processes, service methods and law enforcement standards. As a key component of the overall business environment, its quality directly affects the scale of enterprises' R&D investment and the direction of technological upgrading. This paper holds that the tax "streamlining administration, delegating power and optimizing services" reform promotes enterprises' breakthroughs in key technologies through three paths: promoting enterprise collaborative innovation, reducing institutional transaction costs, and improving resource allocation efficiency.

First, the optimization of the tax business environment can support enterprises' breakthroughs in key technologies by improving resource allocation efficiency. Resource allocation efficiency refers to the ability of enterprises to optimally allocate scarce resources among various departments and processes to maximize benefits under given technical conditions. Taking "delegating power" as the entry point, the tax "streamlining administration, delegating power and optimizing services" reform has greatly reduced pre-tax approvals and link restrictions, reduced administrative intervention, relaxed market access, and made price signals re-emerge as the dominant force guiding resource flow. On

the one hand, processes such as tax registration, invoice collection, and tax declaration and payment have been compressed into "one-stop online handling", releasing the time, human resources and funds that enterprises originally spent on "running approvals and waiting for seals"; on the other hand, local governments have greater autonomy in collection, administration and services after the delegation of power, and can formulate more precise tax service measures in light of regional industrial characteristics. Thus, resources are separated from cumbersome administrative processes and accelerated to flow into the "production-R&D-innovation" chain, providing continuous, stable and low-friction factor support for enterprises to tackle key technologies. By stimulating the endogenous motivation of the market and the enthusiasm of local governments, "streamlining administration and delegating power" not only improves the resource allocation efficiency at the macro level, but also endows micro entities with greater operational autonomy (Zhang Xixi, 2025), enabling them to flexibly adjust factor structures and business strategies in accordance with the principle of efficiency, and ultimately achieve the dual goals of industrial structure upgrading and core technology breakthrough.

Second, the optimization of the tax business environment can drive the breakthrough of key technologies of enterprises by reducing institutional transaction costs. According to the information asymmetry theory proposed by George Akerlof and others, there are differences in the degree of information mastery of goods or services between the two parties in market transactions. This information gap will push up search, negotiation and supervision costs, cause market efficiency loss, and increase overall transaction costs. Focusing on the government-enterprise relationship, information asymmetry is reflected in the fact that enterprises need to invest a lot of human and financial resources to deal with cumbersome administrative approvals, policy changes and regulatory requirements; in inter-enterprise cooperation, information opacity will also increase the difficulty of technological transactions and collaborative innovation. If these resources can be redirected to R&D links, the efficiency of fund use can be improved, and the process of breaking through key technologies can be accelerated. Through simplifying tax handling processes, streamlining data submission, and shortening tax handling time, the tax "streamlining administration, delegating power and optimizing services" reform has significantly reduced the tax administrative burden on enterprises and the institutional transaction costs of tax compliance (Liang Pinghan et al., 2020), returning valuable time and funds to enterprises to enable them to focus more on core technology fields; at the same time, the promotion and application of digital platforms such as electronic tax bureaus and mobile tax handling have further improved work efficiency and information transparency, and continuously reduced institutional transaction costs. The level of transaction costs directly affects enterprises' production and operation decisions. The reduction of costs makes it easier for enterprises to carry out production and transaction activities, thereby enhancing their ability to break through key technologies (Chu Deyin et al., 2024).

Third, the optimization of the tax business environment can promote the breakthrough of key technologies by advancing enterprise collaborative innovation. As an important measure to optimize the business environment and stimulate the vitality of market entities, the tax "streamlining administration, delegating power and optimizing services" reform plays a key role in supporting scientific and technological innovation and enterprises' breakthroughs in key technologies. In the process of advancing the reform, the government should not only earnestly perform its duties as an organizer and coordinator, but also abide by scientific laws, endow more autonomy to innovation entities such as universities, research institutes and enterprises, promote the coordinated efforts of the government and the market, and establish an organizational model and operation mechanism for national strategic scientific and technological forces and social resources to jointly tackle major scientific and technological problems. By optimizing government services, such as building innovation service platforms, strengthening the protection and application of intellectual property rights, and establishing talent incentive mechanisms, it can effectively encourage entrepreneurs to carry out innovation and entrepreneurship activities and fully mobilize the enthusiasm of various innovation entities. At the same time, it promotes the optimal allocation and resource sharing of scientific research forces among universities, research institutes and enterprises, further improves and gives play to the functions of industry associations and scientific and technological service institutions, focuses on key industrial fields and key links of the industrial chain, gathers innovation resources, deepens the level of cooperation, guides industry-university-research collaborative innovation within the industrial chain, and improves the breadth, depth and fund guarantee level of collaborative innovation (Wu Cilian et al., 2024), so as to promote enterprises to jointly establish new R&D institutions, engineering innovation centers and collaborative innovation communities with universities and research institutes to carry out collaborative technological research.

In summary, the following hypotheses are proposed:

H1: The optimization of the tax business environment can promote enterprises' breakthroughs in key technologies;

H2: The optimization of the tax business environment can promote enterprises' breakthroughs in key technologies by promoting enterprise collaborative innovation, reducing institutional transaction costs, and improving resource allocation efficiency.

3. Research Design

3.1. Model Design

To examine the relationship between the tax business environment and enterprises' key technology breakthroughs, this paper takes the pilot policy of tax "streamlining administration, delegating power and optimizing services" reform as a quasi-natural experiment to investigate the impact of tax business environment optimization on enterprises' key technology breakthroughs, and constructs the following multi-period difference-in-differences model:

$$Patent_{it}=\alpha_0+\alpha_1 Reform_{it}+\alpha_2 Controls_{it}+u_i+y_t+P_k+\varepsilon_{it} \quad (1)$$

3.2. Variable Selection and Explanation

3.2.1. Explained Variable

Enterprises' key technology breakthroughs (Patent). Following the research of Zheng Shilin et al. (2024), this paper refers to 1,047 technologies covered in 21 key technology fields in the Catalogue for Industrial Foundation Innovation and Development (2021 Edition), matches the keywords of these technologies with the patent descriptions of the fifth-level codes of the International Patent Classification (IPC), and identifies the IPC codes corresponding to patent applications in relevant technical fields. It aggregates the number of annual patent applications of enterprises in these key technology fields, adds 1 to the number and takes the natural logarithm to construct the proxy indicator for enterprises' key technology breakthroughs.

3.2.2. Core Explanatory Variable

Whether the enterprise implements the tax "streamlining administration, delegating power and optimizing services" policy in the current year (Reform). This paper takes the pilot policy of tax "streamlining administration, delegating power and optimizing services" reform as a quasi-natural experiment, and classifies cities implementing the reform in accordance with the provisions of State Taxation Administration Document No. Zongfa [2017] No. 101 and State Taxation Administration Document No. Zonghan [2018] No. 461. If the region where enterprise i is located is subject to the policy treatment in year t, the variable is assigned 1 for year t and subsequent years when the region launches the "streamlining administration, delegating power and optimizing services" reform of the tax system, otherwise 0.

3.2.3. Control Variables

Considering that enterprises' key technology breakthroughs are affected by various factors, this paper sets the following control variables based on existing research literature: (1) Basic enterprise information. Firm Size (Size): the natural logarithm of the annual total assets of the company; Listing Age (ListAge): the natural logarithm of the difference between the observation year and the listing year. (2) Enterprise financial information. Asset-Liability Ratio (Lev): the ratio of total liabilities to total assets; Return on Equity (ROE): the ratio of net profit to owners' equity; Loss Status (Loss): assigned 1 if the enterprise incurs a loss, otherwise 0. (3) Internal enterprise structure. The Largest Shareholder's Shareholding Ratio (Top 1): the proportion of the number of shares held by the largest shareholder of the listed company to the total share capital of the listed company. (4) Regional characteristic variables: Per Capita Gross Domestic Product (PGDP): the final result of regional production activities (100 million yuan); Regional Tax Burden (TaxB): the ratio of urban tax revenue to regional gross domestic product.

4. Empirical Results and Analysis

4.1. Benchmark Regression Results

This paper aims to explore the potential impact of tax business environment optimization on enterprises' key technology breakthroughs. To this end, the multi-period difference-in-differences method is used for in-depth analysis of sample data, and the benchmark results are shown in Table 2. Column (1) estimates the regression model without introducing control variables, only considering enterprise, year and city fixed effects. The obtained regression coefficient is 1.9039, which is significantly positive at the 1% significance level. It initially indicates that under the background of tax business environment optimization, the level of enterprises' key technology breakthroughs has been improved. Column (2) further introduces a series of control variables on the basis of Column (1) and re-estimates. The results show that the estimated coefficient of whether to implement the tax "streamlining administration, delegating power and optimizing services" policy rises to 1.9652, and remains significantly positive at the 1% statistical level. This fully indicates that the optimization of the tax business environment has a significant promoting effect on enterprises' key technology breakthroughs. The empirical results are consistent with Hypothesis H1.

4.2. Robustness Tests

4.2.1. Placebo Test

To ensure that the improvement of enterprises' key technology breakthroughs is driven by the implementation of the tax "streamlining administration, delegating power and optimizing services" policy rather than other random factors, this paper further adopts the double random placebo test method to verify the robustness of the conclusions. Specifically, this paper constructs virtual policy implementation years and virtual treatment groups, generates corresponding interaction terms, and repeats the process of randomly generating implementation years 500 times. The test results show that the simulated regression coefficients are approximately normally distributed around zero, and all simulated estimated coefficients are smaller than the regression coefficient 1.9652 of the actual policy pilot implementation. This result indicates that the empirical conclusions of this paper are not disturbed by unobservable factors, thus effectively excluding the possibility that changes in enterprises' key technology breakthroughs may be caused by other accidental factors.

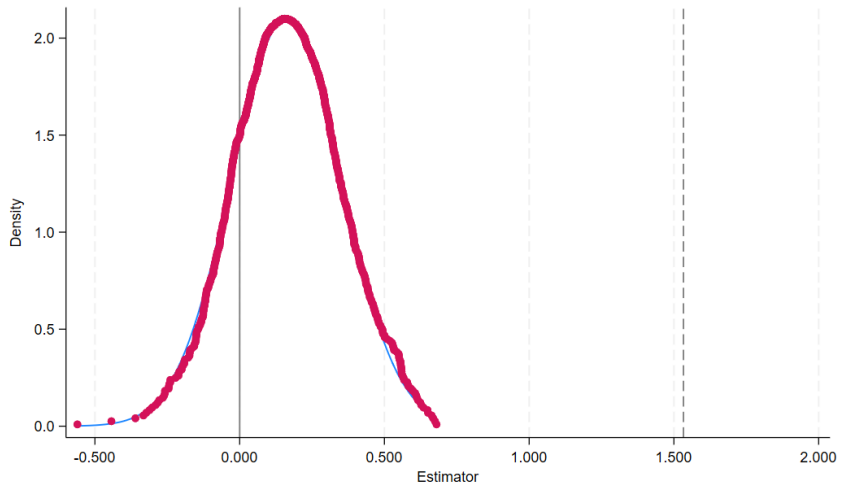

Figure 1. Placebo Test Results

4.2.2. Excluding Relevant Policies

During the implementation of the tax "streamlining administration, delegating power and optimizing services" policy, the government has also introduced other relevant tax incentive policies, which may have an impact on enterprises' key technology breakthroughs. To accurately evaluate the independent effect of the tax "streamlining administration, delegating power and optimizing services" policy, this paper incorporates the VAT refund on remaining input tax policy, the additional deduction policy for R&D expenses and the Golden Tax Phase III Project into the model for analysis. The specific regression results are shown in Column (3) of Table 1. The results show that the regression coefficient of the tax "streamlining administration, delegating power and optimizing services" policy is still significantly positive at the 5% significance level. This indicates that after excluding the interference of other relevant policies in the same period, the promoting effect of the tax "streamlining administration, delegating power and optimizing services" policy on enterprises' key technology breakthroughs remains significant.

Table 1. Regression Results

Variable Name	(1)	(2)	(3)
	Dependent variable: breakthrough in firms' key technologies		Exclude relevant policies
Whether the tax "delegating power, regulating, and improving services" policy is implemented	1.904***	1.965***	1.862**
	(0.696)	(0.688)	(0.753)
Firm-level control variables	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
City fixed effects	Yes	Yes	Yes
Number of observations	40661	40661	37509
R^2	0.796	0.801	0.803

Note: Robust standard errors in parentheses; *** significant at the 1% level, ** significant at the 5% level.

5. Mechanism Analysis

The baseline regression confirms that an improved tax-related business environment fosters breakthroughs in key technologies. Theoretical discussion further suggests that this effect runs through three channels: collaborative innovation, institutional transaction costs, and resource-allocation efficiency. We therefore treat these variables as mediators and estimate the following system:

$$M_{it}=\alpha_0+\alpha_1\ Reform_{it}+\alpha_2\ Controls_{it}+u_i+y_t+P_k+\varepsilon_{it} \quad (2)$$

$$Patent_{it}=\alpha_0+\alpha_1\ Reform_{it}+\alpha_2\ M_{it}+\alpha_3\ Controls_{it}+u_i+y_t+P_k+\varepsilon_{it} \quad (3)$$

5.1. Raising Resource-Allocation Efficiency

Following Richardson (2006), we use the absolute value of the residual from an investment model as an inverse proxy for Resource-Allocation Efficiency (RAE); larger values indicate lower efficiency. Column (1) of Table 2 shows that the interaction term is significantly negative at the 1 % level, implying the reform improves internal capital allocation. In column (2) both the reform and RAE enter the breakthrough equation; the negative sign on RAE confirms a mediating role, although the indirect effect is modest—likely owing to firm-level governance, industry heterogeneity and implementation lags.

5.2. Cutting Institutional Transaction Costs

We adopt the selling-, general- and administrative-expense ratio (AgC1_1) from Chu et al. (2024) as a proxy for institutional transaction costs; higher ratios denote heavier burdens. Column (3) reports a negative and significant (1 %) coefficient on the reform, evidencing a cost-reduction effect. Column (4) shows that lower costs in turn raise the probability of technological breakthroughs, indicating that streamlined tax procedures free resources for R&D and enhance innovative capacity.

5.3. Boosting Collaborative Innovation

We measure collaborative innovation by the number (×100) of co-applied invention patents filed in the current year. Column (5) displays a positive and significant (1 %) coefficient on the reform, confirming that improved tax services stimulate joint R&D. Column (6) reveals that both the reform and collaborative innovation positively affect breakthroughs, implying that government platforms and IP services help firms pool external knowledge and focus resources on core technologies, thereby strengthening competitiveness.

Table 2. Mechanism Analysis Results

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Resource allocation efficiency	Breakthrough in firms' key technologies	Institutional transaction costs	Breakthrough in firms' key technologies	Collaborative innovation	Breakthrough in firms' key technologies
Whether the tax "delegating power, regulating, and improving services" policy is implemented	-0.009*** (0.002)	1.552** (0.789)	-0.019*** (0.002)	1.733** (0.690)	12.250*** (4.066)	1.975*** (0.682)
Resource allocation efficiency		-11.756*** (2.920)				
Institutional transaction costs				-8.464*** (1.786)		
Collaborative innovation						0.012*** (0.004)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
City fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	34731	34731	40356	40356	40656	40656
R^2	0.414	0.807	0.914	0.802	0.550	0.801

Note: Robust standard errors in parentheses; *** significant at the 1% level, ** significant at the 5% level.

6. Conclusion

Using 2015–2023 A-share listed-firm data and treating the staggered rollout of the tax "delegating power, regulating and improving services" pilot reform as a quasi-natural experiment, this paper estimates a multi-period difference-in-differences model to identify how an improved tax-related business environment affects firms' breakthroughs in key technologies. The results show that a better tax business environment significantly raises the probability and intensity of such breakthroughs; this finding survives a battery of robustness checks, including parallel-trend and placebo tests. Mechanism analysis indicates that the effect operates through three channels: improving resource-allocation efficiency, lowering institutional transaction costs, and fostering collaborative innovation. The study documents the economic gains from optimizing the tax business environment and provides empirical guidance for further reform and high-quality development in China.

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