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Research on the Incentive Effect of Government Tax Preference on Independent Innovation of Emerging Enterprises

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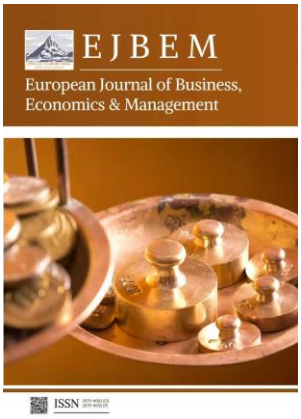

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Abstract: Currently, emerging industries are gradually becoming the main drivers of the transformation of China's industrial structure, and independent innovation serves as the core force behind the development of these industries. For the government, stimulating independent innovation among emerging enterprises has become a key policy objective. Appropriate financial and tax incentives can partially offset the losses caused by the externalities of independent innovation, while also reducing the risks and costs associated with innovation activities. However, questions remain regarding whether such tax incentives can effectively promote independent innovation and which types of preferential policies yield the strongest incentives. To address these issues, this paper employs an empirical analysis approach to construct a relationship model that examines the impact of tax incentives on enterprise independent innovation, providing a reference for the formulation of government incentive policies. The regression analysis indicates that tax incentives not only increase the innovation investment of strategic emerging enterprises but also encourage the generation of more innovative outcomes and enhance overall innovation efficiency.

Keywords: tax preference; incentive effect; independent innovation; emerging enterprise

1. Introduction

Emerging industries are driven by major breakthroughs in cutting-edge science and technology and serve as new engines for economic and industrial development. These industries are characterized by intensive knowledge and technology content, relatively low consumption of material resources, substantial growth potential, and high overall economic and social benefits. In recent years, under strong national guidance, local governments have implemented a variety of policies to steer and encourage emerging enterprises to engage in independent innovation. Such policies aim to enhance the technological competitiveness and sustainable growth of firms within emerging sectors.

Despite these supportive measures, enterprises often exhibit hesitation in pursuing innovation due to high innovation risks, uncertain returns, and the externalities associated with knowledge creation. Innovation externalities, in particular, arise when the benefits of an enterprise's innovative activities spill over to other firms or society at large, thereby reducing the direct incentives for the innovating firm. To mitigate these challenges and stimulate independent innovation, governments have introduced a range of fiscal and tax incentive policies. These tools are designed to lower innovation-related risks, offset potential losses, and encourage firms to invest in research and development (R&D) activities.

Empirical evidence shows that well-designed tax incentives can significantly promote enterprise innovation, though their impacts vary across industries, ownership structures, and different stages of a firm's development [1–3].For example, government-subsidized R&D and tax incentives may exert heterogeneous effects between state-owned and private firms, or between high-tech and traditional sectors [2,6] . Moreover, the regional economic environment and local policy implementation mechanisms can further affect the magnitude of the incentive effect.Recent studies in artificial intelligence and machine-learning-based economic analysis provide additional quantitative tools for evaluating policy effectiveness, offering new insights into how innovation incentives function across various industries [4–5].Although different types of fiscal and tax incentives increase firms' available resources, they operate at distinct stages of the R&D cycle and influence innovation outcomes through different mechanisms. Text-mining-based empirical studies also confirm that both tax and fiscal incentives contribute positively to regional innovation capability, albeit through differentiated effects [12].

However, the practical implementation of financial and tax tools is often complex. In some cases, enterprises may manipulate R&D reporting or redirect government subsidies for other purposes, which can reduce the overall efficiency and effectiveness of innovation activities. These findings emphasize the importance of assessing the actual effectiveness of tax incentives and identifying the conditions under which they best foster independent innovation [7].

To address these issues, this paper employs an empirical analysis approach to construct a relationship model that examines the influence of tax incentives on the independent innovation of enterprises. By analyzing both investment and innovation output, this study aims to provide evidence-based insights for policymakers seeking to design targeted and efficient government incentive programs that enhance enterprise innovation capacity.

2. Promotion Effect of Tax Preferences on Enterprises' Independent Innovation

Tax policies play a necessary and effective role in promoting independent innovation, although their impact may exhibit certain indirectness and time lag. From the perspectives of tax regulation, government functions, and the technological innovation process, preferential fiscal and tax policies can stimulate firms' innovation activities by reducing financing pressure, mitigating R&D risks, and guiding long-term investment decisions [8].

2.1. Policy-Oriented Role in Independent Innovation

Tax policy is a crucial instrument of fiscal policy through which the government can influence macroeconomic development and industrial transformation. Based on economic growth objectives, industrial development priorities, and the actual needs of enterprises, governments formulate targeted preferential tax policies for different regions and industries. Such policies not only reflect governmental support and encouragement for strategy. Such policies also reflect government support for strategic industries and help channel resources to priority sectors, improving resource allocation efficiency and ensuring that emerging and high-tech industries obtain essential inputs for development [9].For example, preferential tax policies for science and technology enterprises can directly reduce the financial burden on firms while facilitating the flow of social and financial resources toward high-tech industries, thereby accelerating industrial upgrading and innovation capacity.

2.2. Reducing the Risk of Independent Innovation Activities

Technological innovation inherently involves risks, including substantial early-stage investments, long development cycles, and high uncertainty, which can deter enterprises from pursuing innovation. To address these challenges, enterprises need to rigorously control the direction of R&D and strengthen the commercialization of scientific research

outcomes. At the same time, governments can implement fiscal and monetary policies to support R&D activities and alleviate innovation risks. Tax incentives are an effective tool in this regard.

For instance, policies such as additional deductions for R&D expenses and exemptions from value-added tax on research instruments can lower the direct costs of technological innovation. Accelerated depreciation and delayed tax payment policies can reduce immediate tax liabilities, improve capital turnover, and relieve liquidity pressure, thereby mitigating the financial risks associated with large-scale investments. Furthermore, measures such as investment credits and pre-tax additional deductions for R&D expenses can enhance after-tax profits, increasing the resources available for further innovation.

2.3. Encouraging Enterprises to Take Initiative in Technological Innovation

Effective tax incentives can substantially enhance innovation enthusiasm, particularly for emerging technology firms. In China, relevant regulatory frameworks define recognition criteria for innovation-oriented enterprises, including R&D investment intensity, the share of R&D personnel, and innovation-driven competitiveness, and these criteria are subject to dynamic evaluation rather than one-time recognition [10].

To benefit from preferential tax treatments, emerging enterprises are incentivized to increase R&D investments in both financial and human resources. The structured and transparent policy framework encourages firms to proactively enhance their innovation capabilities, fostering independent technological development and sustaining competitive advantage in rapidly evolving industries. By aligning corporate interests with policy incentives, tax preferences help cultivate a culture of proactive innovation within emerging sectors.

3. Current Situation of Preferential Tax Policies for Emerging Enterprises in China

As shown in Table 1, the current preferential tax policies for strategic emerging industries in China are still developing and remain somewhat incomplete. The Chinese government has implemented a preferential tax system primarily targeting key sectors within strategic emerging industries, but coverage and implementation depth vary. Income tax incentives are the most prominent, especially in industries such as the new generation of information technology, integrated circuits, and energy conservation and environmental protection. Compared with turnover-based tax preferences, income tax incentives directly reduce taxable income, thereby increasing enterprises' free capital flow and enhancing their capacity for innovation. Furthermore, income tax preferences tend to have a broader impact, with some provisions effectively lowering the overall income tax burden for enterprises within strategic emerging sectors. Currently, most tax preferences are applied during the mid-to-late stages of innovation activities, when firms begin to realize returns from R&D investment [11].

Table 1. Current preferential tax policies for strategic emerging industries in China.

Tax category	Specific preferential policies
Income tax preference	For the R & D expenses that the enterprise has not formed intangible assets and are included in the current profits and losses, on the basis of deduction according to the provisions and facts, 75% of the R & D expenses shall be added and deducted. If the intangible assets are formed, 175% of the cost of the intangible assets shall be amortized The part of technology transfer not exceeding 5 million Yuan is exempted from tax, and the part exceeding 5 million Yuan is reduced by half.

	Integrated circuit design enterprises enjoy the income tax preference of "two exemptions and three reductions" or "five exemptions and five reductions".
	Enterprises engaged in qualified environmental protection, energy conservation and water conservation projects can enjoy the preferential income tax according to the three exemption and three half reduction.
	For the purchase of the specified special equipment for environmental protection, energy conservation and water saving, and production safety, 10% of the taxable income shall be credited according to the investment amount of the equipment.
	The income from the comprehensive utilization of resources and the production of products in line with the provisions of the state industrial policies can be reduced by 90% and included in the total income.
	The income tax of high and new technology enterprises and advanced technology service enterprises that meet the state key requirements shall be calculated according to the 15% tax rate.
	For the new generation of technology and information industry, the general taxpayers who sell the software products developed and produced by themselves shall collect the value-added tax at 16% of the legal tax rate, and refund the part whose actual tax burden of value-added tax exceeds 3%.
Value added tax preference	The export tax rebate rate for biological industry, biomedical products and some high-tech products encouraged by national industrial policies has been increased from 13% to 16%; the export tax rebate rate of biomedical products such as HIV drugs and recombinant human insulin lyophilized powder increased from 5% to 11% and 13% respectively.
	For the new material industry that sells some new material products produced by itself, the realized value-added tax shall be levied or refunded by 50%.
Consumption tax preference	Solar cells, fuel cells and other new energy batteries are exempt from consumption tax.
Other tax preference	The vehicle and ship tax and vehicle purchase tax of new energy vehicles and vessels shall be exempted, and the vehicle and ship tax of energy-saving vehicles and vessels shall be reduced by half.

In contrast, turnover tax preferences have a narrower incentive scope. These policies are generally focused on the industrialization stage of innovation outputs, providing tax relief for innovative products during market circulation. The reduction is based on turnover growth, and the financial benefit from such policies is comparatively smaller. Nevertheless, turnover tax preferences have been implemented across various industries within strategic emerging sectors, contributing to the commercialization of innovation achievements. As shown in Table 1, the specific preferential tax policies are as follows:

4. Measurement Model of Incentive Effect of Tax Preference on Emerging Enterprises Independent Innovation

4.1. Hypothesis

According to the relevant theories of public economics, tax preferences can increase the private returns on technological innovation investments, effectively mitigate the losses caused by technological innovation externalities, and thus promote enterprise innovation. Tax preferences can be broadly categorized into income tax preferences and turnover tax preferences. Income tax preferences directly reduce the payable income tax for enterprises, primarily targeting the intermediate stages of R&D activities. In contrast, turnover tax

preferences reduce tax liabilities based on increments in product circulation, mainly focusing on innovative products that have entered the industrialization stage, thereby indirectly increasing enterprise profits and the cash available for further investment or distribution. Both types of preferences increase the resources available to enterprises, but they operate at different stages of the R&D process.

Based on these considerations, this paper examines the relationship between government-implemented preferential tax policies and the independent innovation of emerging enterprises, leading to the following hypotheses:

1) **Hypothesis 1:** Tax preferences have an incentive effect on the independent innovation of emerging enterprises.
2) **Hypothesis 2:** Income tax preferences have an incentive effect on the independent innovation of emerging enterprises.
3) **Hypothesis 3:** Turnover tax preferences have an incentive effect on the independent innovation of emerging enterprises.

4.2. Variable Selection

There is no universally accepted standard for measuring the independent innovation capabilities of enterprises. Some studies use the intensity of R&D investment as an indicator of innovation input and the number of patent applications as a measure of innovation output [10]. Based on this approach, innovation efficiency is often considered a third measure of enterprise independent innovation capability, typically evaluated using data envelopment analysis (DEA).

4.2.1. Explained Variables

In this study, independent innovation capabilities are measured from three perspectives: innovation input, innovation output, and innovation efficiency.

1) **Innovation input (inp):** Reflects the intensity of R&D investment. Higher R&D intensity indicates that the enterprise places greater importance on independent innovation and invests more capital into innovation activities.
2) **Innovation output (outp):** Measured by the number of patent applications filed by the enterprise, reflecting the tangible outcomes of innovation activities.
3) **Innovation efficiency (effi):** Evaluated using the data envelopment analysis method applied within a frontier production function framework, representing the efficiency of converting innovation inputs into outputs.

4.2.2. Explanatory Variables

The main explanatory variables selected are total tax burden, income tax burden, and turnover tax burden.

1) **Total tax burden (tax):** Measured as the ratio of actual taxes and fees paid by the enterprise during the current period to current operating income, representing the overall tax pressure on the enterprise.
2) **Income tax burden (itax):** Due to differences in nominal income tax rates across companies, the ratio of actual income tax paid to total profit is used as a measure. A higher income tax burden indicates fewer benefits from tax preferences.
3) **Turnover tax burden (ttax):** Includes value-added tax, consumption tax, and tariffs. To capture the overall turnover tax impact, the ratio of total turnover taxes to current operating income is used, as simply subtracting the nominal VAT rate does not provide an accurate measure.

4.2.3. Control Variables

To account for other factors affecting independent innovation, the following control variables are included:

1) **Total assets scale (tas):** Measured as the logarithm of total assets. Larger enterprises typically have more abundant resources and greater capacity to invest in R&D innovation, making total assets a key control variable.
2) **Revenue growth rate (rgr):** Reflects the growth capability of the enterprise. Higher revenue growth often correlates with greater future development potential and stronger willingness to pursue independent innovation.
3) **Asset turnover rate (atr):** Indicates asset management and utilization efficiency. Faster turnover implies higher liquidity, which can reduce R&D risk and facilitate innovation activities.
4) **Return on equity (roe):** Measures enterprise profitability. Enterprises with higher profitability possess more free resources for innovation after meeting operational and production needs.
5) **Asset liability ratio (alr):** Represents the degree of debt financing. Higher leverage increases operational risk, which may reduce the willingness to engage in independent innovation.

4.3. Model Building

Based on the hypotheses and selected variables, the relationship between independent innovation capability and tax burden is modeled as follows:

$$Inno_{i,t} = \beta_0 + \beta_1 tax_{i,t} + \beta_2 tas_{i,t} + \beta_3 rgr_{i,t} + \beta_4 atr_{i,t} + \beta_5 roe_{i,t} + \beta_6 alr_{i,t} + \varepsilon \quad (1)$$

$$Inno_{i,t} = \beta_0 + \beta_1 itax_{i,t} + \beta_2 tas_{i,t} + \beta_3 rgr_{i,t} + \beta_4 atr_{i,t} + \beta_5 roe_{i,t} + \beta_6 alr_{i,t} + \varepsilon \quad (2)$$

$$Inno_{i,t} = \beta_0 + \beta_1 ttax_{i,t} + \beta_2 tas_{i,t} + \beta_3 rgr_{i,t} + \beta_4 atr_{i,t} + \beta_5 roe_{i,t} + \beta_6 alr_{i,t} + \varepsilon \quad (3)$$

In the above formulas, Inno represents the enterprise's independent innovation capability, which includes innovation input, innovation output, and innovation efficiency. i represents different companies; t represents different years; β_i is estimated parameters; ε is the random error term of the model. Model (1) ~ (2) is built to test Hypothesis 2 and Hypothesis 3. They verify the relationship between income tax burden and turnover tax burden and corporate independent innovation, to indirectly verify whether the preferential income tax and turnover tax policies implemented by the government will encourage enterprises to innovate independently.

4.4. Data Sources

Strategic emerging industries were formally recognized as important development targets in the 2012 National Strategic Emerging Industry Development Plan issued by the Chinese government. This study selects A-share listed strategic emerging enterprises from 2014 to 2019 as the research sample. Initially, 1,916 stocks were identified from the China Strategic Emerging Industry Comprehensive Index, jointly issued by China Securities Index Co., Ltd. and the Shanghai Stock Exchange in 2019. After excluding companies from the New Third Board, ST companies, and those with missing data, the final sample comprises 548 companies, yielding 3,217 observations.

4.5. Analysis Results

As shown in Table 2, regression analysis is performed on the sample data to examine the effects of tax burdens on innovation indicators.

Table 2. Regression analysis results of sample data.

Variables	inp	outp	effi
tax	-0.0529**	-4.7391***	-0.0032***
	(-2.38)	(-6.09)	(-5.51)
tas	-0.5122***	98.4342***	0.0923***
	(-5.27)	(29.36)	(35.03)
rgr	-7.0338***	-73.8362***	-0.0237

	(-11.59)	(-3.48)	(-1.39)
atr	-0.0061	75.7211	0.2246***
	(-0.01)	(1.68)	(5.93)
roe	-4.1818***	55.0158***	0.0654***
	(-11.79)	(4.45)	(6.65)
alr	0.0005*	-0.0122	-0.0002
	(1.69)	(-1.15)	(-0.53)
Sample size	3217	3217	3217
F value	110.1	236.07	371.28
R^2 value	0.1639	0.2973	0.3992

The symbols *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively. Coefficients marked with *** denote highly significant relationships, implying robust empirical results unlikely to occur by chance.

The regression results indicate a significant negative correlation between total tax burden and innovation input at the 5% significance level, with a coefficient of -0.0529. This implies that for every unit increase in total tax burden, R&D investment decreases by 0.0529 units. Similarly, there is a highly significant negative correlation between total tax burden and innovation output (-4.7391, $p<0.01$) and innovation efficiency (-0.0032, $p<0.01$), suggesting that higher tax burdens reduce both the quantity and efficiency of enterprise innovation. The F-values of the models (110.1, 236.07, 371.28) and the adjusted R^2 values (0.1639, 0.2973, 0.3992) demonstrate that the models fit the observations reasonably well.

In conclusion, the total tax burden of emerging enterprises exerts a restraining effect on independent innovation activities. Reducing the total tax burden through preferential tax policies effectively encourages enterprises to increase R&D investment, enhance innovation outputs, and improve innovation efficiency. These findings provide empirical support for the positive role of tax preferences in promoting the independent innovation of strategic emerging enterprises.

5. Conclusion

Emerging industries, which are increasingly playing a leading role in China's industrial transformation, serve as a key indicator of the country's future technological innovation trajectory. Recognizing their strategic importance, the government places significant emphasis on fostering independent innovation within these sectors. To support this objective, various fiscal and tax policies have been implemented to encourage strategic emerging enterprises to actively engage in R&D and innovation activities.

In this paper, we empirically examined the incentive effect of tax preferences on the independent innovation of emerging enterprises. A relationship model was constructed to analyze how different types of tax burdens-total tax burden, income tax burden, and turnover tax burden-affect innovation input, output, and efficiency. The regression analysis of the sample data revealed that tax incentives exert a clear positive influence on enterprise innovation. Specifically, reducing the total tax burden not only encourages higher levels of R&D investment but also enhances the generation of innovation outputs, such as patent applications, and improves overall innovation efficiency.

Furthermore, the analysis highlights that income tax preferences are particularly effective in promoting R&D activities during the intermediate stages of innovation, while turnover tax preferences support the commercialization and industrialization of innovative achievements. These findings underscore the differentiated roles of various tax instruments in stimulating enterprise innovation at different stages of the innovation lifecycle.

From a policy perspective, the results suggest that the government can further optimize tax incentive structures to more effectively promote independent innovation. By tailoring tax policies to the specific needs of emerging enterprises-considering their scale, growth potential, and innovation stage-policymakers can not only reduce the financial

risks associated with R&D but also stimulate enterprises to increase their investment in innovation resources, including human capital and technological assets. Additionally, continued monitoring and refinement of preferential tax policies can help ensure that incentives are effectively targeted and contribute to sustainable technological advancement.

In conclusion, the empirical evidence presented in this study confirms that preferential tax policies are a crucial tool for promoting the independent innovation of strategic emerging enterprises. By alleviating the financial burden of innovation and providing targeted incentives, tax policies can guide enterprises toward greater innovation investment, higher innovation output, and improved innovation efficiency. These insights offer valuable reference points for the formulation and refinement of government policies aimed at sustaining long-term technological development and enhancing the overall competitiveness of emerging industries.

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