International Journal of Scientific Engineering and Science
Volume 8, Issue 3, pp. 8-10, 2024. ISSN (Online): 2456-7361

An Empirical Test of Tax Incentives Enabling High-quality Development of High-tech Enterprises

Jingxian Wang[1]
[1]Graduate Student of Accounting Department of Jiangsu University, China
Email address: [1]18852895922@163.com

***Abstract*—*In the new normal of the economy, deeply understanding the internal logic of high-quality development in enterprises is of great significance. Tax incentives are a key measure to support the high-quality growth of companies. Through studying listed high-tech enterprises and using mediation models and heterogeneity analysis, the relationship between tax incentives and high-quality development of enterprises is explored in depth. The findings reveal that tax incentives significantly promote the high-quality development of high-tech enterprises. This effect is mainly achieved through two pathways: encouraging enterprises to increase investment in innovation, and alleviating financing constraints for enterprises. Especially in industries with fierce competition and less developed economic regions, the effects of tax incentives are more pronounced.*

***Keywords*—** *Tax incentives, High-tech enterprises, Innovation investment, Financing constraints.*

I. INTRODUCTION

In recent years, China has strongly supported high-tech enterprises, which have become key to the high-quality development of the national economy. The government has implemented various measures to promote the growth of these enterprises, such as stimulating R&D investment and optimizing the development environment through fiscal policies and tax incentives. Specific policies include increasing the pre-tax deduction ratio for R&D expenses and extending the loss carryforward period for enterprises. The question of whether a series of incentive policies like tax reductions and fee cuts effectively promote the high-quality development of high-tech enterprises has significant theoretical and practical implications for driving high-quality development of China's economy.

This study uses data from high-tech enterprises listed on the Shanghai and Shenzhen stock exchanges from 2018 to 2021 to empirically test the impact of tax incentives on enterprise development, thereby exploring the effects of innovation input and financing constraints on high-quality development, aiming to provide strategic recommendations for the high-quality development of China's high-tech enterprises.

II. HYPOTHESIS DEVELOPMENT

Tax incentives can, on the one hand, directly reduce the tax burden of high-tech enterprises, alleviating financial pressures, and on the other hand, indirectly encourage high-tech enterprises to rationally allocate limited resources (Zhou Chuanli, 2021). Li Xuhong and Ma Wen (2014) found that tax incentives affect the taxable income of enterprises by reducing income tax, value-added tax, excise tax, and by providing refunds, thus offering financial security for high-quality development of enterprises. Zhao Ying (2022), using panel data of small and micro enterprises from 2008 to 2015, discovered that income tax incentive policies have different effects on small and micro enterprises with different limits; tax incentives can reduce the tax burden on small and micro enterprises below the limit, promoting their high-quality development. Therefore, this paper proposes Hypothesis 1:

H1: Tax incentives have a significant positive effect on the high-quality development of high-tech enterprises.

The high-quality development of enterprises is inseparable from innovation activities, and the input into innovation activities relies on financial support. Tax incentives, by reducing or postponing cash outflows, provide assurance for the funds needed for enterprises to carry out R&D and innovation activities. Li Wei'an and others (2016) found through empirical testing that tax incentives enhance corporate innovation performance entirely by affecting corporate innovation investment. Li Wenjing and Zheng Manni (2016) discovered that tax incentives promote the number of non-invention patents of enterprises but do not significantly affect the quality of corporate innovation. Whether innovation investment plays a role between tax incentives and high-quality development of enterprises remains to be considered. Therefore, this paper proposes Hypothesis 2:

H2: Tax incentives promote the high-quality development of high-tech enterprises by encouraging innovation investment in high-tech enterprises.

Tax incentives can alleviate financing constraints for enterprises both internally and externally. On one hand, tax reductions increase the disposable cash of enterprises, providing space for internal financing; on the other hand, tax incentives improve corporate profits, significantly lowering the barriers to external financing. The protection of enterprise funding sources by tax incentives can effectively support high-tech enterprises in introducing and applying innovative technologies, thereby overall enhancing corporate strength and driving high-quality development. Therefore, this paper proposes Hypothesis 3:

H3: Tax incentives indirectly promote high-quality development of enterprises by alleviating the financing constraints of high-tech enterprises.

III. MATERIALS AND METHODS

Sample and Data

This paper selects data from high-tech enterprises listed on the Shanghai and Shenzhen stock exchanges from 2018 to 2021. Based on the initial sample data, financial and insurance companies, ST and *ST companies, and listed companies with incomplete key indicators were excluded, resulting in a total of 1622 sample companies and 6488 observations. The enterprise data used comes from the CSMAR database, and the industry data comes from the WIND database, both processed, statistically analyzed, and handled using STATA16.0 software.

Main Variables

In this paper, the increase of total factor productivity measured by LP method is taken as the explained variable, and the comprehensive tax burden ratio (the ratio of the total amount of taxes actually paid in cash to the operating income reflects the tax incentives) is taken as the explanatory variable. In the determination of intermediary variables, the natural logarithm of "R & D investment +1" is used to measure the innovation investment of enterprises, and the SA index is used to measure the financing constraints faced by high-tech enterprises. Return on total assets, nature of equity, working capital ratio and sustainable growth rate are control variables. Table 1 presents the explanations for the indexes above.

Model

In order to explore the impact of tax incentives on the high-quality development of high-tech enterprises, the following model is constructed:

$$\text{lntfp\_LP}_{it} = a_0 + a_1\text{Tax}_{it} + a_2\sum\text{controls} + \gamma_i + \varepsilon_{it} \quad (1)$$

TABLE 1. Definition of variables

Type of Variables	Name of Variables	Symbols of Variables	Description of Variables
Explained variable	High-Quality Development of Enterprises	lntfp_LP	Total Factor Productivity LP Method
Explanatory variable	Comprehensive Tax Burden Rate	Tax	Total amount of various taxes and fees actually paid in cash / Total operating revenue
Intermediary variable	Innovation Input	lnrds	Natural logarithm of (R&D expenses + 1)
Control variable	Financing Constraints	SA	SA Index
	Return on Total Assets	Roa	Net profit / Total assets
	Property Rights	Soe	1 for state-owned holding, 0 otherwise
	Working Capital Ratio	Wcapital	(Current assets - Current liabilities) / Total assets
	Sustainable Growth Rate	err	Equity capital return rate × (1 - Dividend payout ratio)
	Industry	Ind	Industry dummy variable

In model (1), $\sum\text{controls}$ represents the control variable, γ_i represents the control industry variable, ε_{it} is a random disturbance term. If the coefficient of a_1 is significantly negative, then hypothesis 1 is true.

In order to verify the intermediary effects of innovation input and financing constraints, the following intermediary effect models are constructed respectively:

$$\text{lnrds}_{it} = \omega_0 + \omega_1\text{Tax}_{it} + \omega_2\sum\text{controls} + \gamma_{1i} + \varepsilon_{1it} \quad (2)$$

$$\text{lntfp\_LP}_{it} = \sigma_0 + \sigma_1\text{Tax}_{it} + \sigma_2\text{lnrds}_{it} + a_2\sum\text{controls} + \gamma_{2i} + \varepsilon_{2it} \quad (3)$$

$$\text{SA}_{it} = \omega_0 + \omega_1\text{Tax}_{it} + \omega_2\sum\text{controls} + \gamma_{1i} + \varepsilon_{1it} \quad (4)$$

$$\text{lntfp\_LP}_{it} = \sigma_0 + \sigma_1\text{Tax}_{it} + \sigma_2\text{SA}_{it} + a_2\sum\text{controls} + \gamma_{2i} + \varepsilon_{2it} \quad (5)$$

In models (2) and (3), if the coefficients are significant at the same time, hypothesis 2 is valid; The same is true for hypothesis 3.

Descriptive Statistics

As shown in Table 2, the maximum value of enterprise development quality (lntfp_LP) is 11.367 and the minimum value is 3.701, indicating that there are great differences in development quality among enterprises. The minimum value of the comprehensive Tax burden ratio (Tax) was 0.001, and the maximum value was 0.775, indicating that the degree of tax reduction enjoyed by enterprises varied greatly.

TABLE 2. Descriptive Statistical Analysis of Variables

Variables	Observationvalue	Average value	Standard deviation.	Minimum value	Maximum value
lntfp LP	6488	7.134	.797	3.701	11.367
Tax	6488	.056	.039	.001	.775
lnrds	6488	18.25	1.183	10.718	23.702
SA	6488	-3.877	.217	-5.318	-2.923
Roa	6488	.052	.089	-.917	1.081
Soe	6488	.157	.364	0	1
Wcapital	6488	.27	.21	-1.109	.894
err	6488	.035	.186	-9.712	2.689

IV. RESULTS

Seen from table 3, the influence coefficients of the comprehensive tax burden ratio on the high-quality development of enterprises are all negative, and all are significant at the significance level of 1%. It shows that the comprehensive tax burden of enterprises has a negative incentive effect on the total factor productivity, which indicates that tax incentives have a significant positive incentive effect on the high-quality development of enterprises.

As can be seen from Table 4 (2) and (3), when tax incentives are increased, enterprises will invest more innovation factors, thereby improving the quality of enterprise development. Therefore, hypothesis 2 is valid.

As can be seen from Table 4 ((4) and (5), the higher the comprehensive tax burden ratio of enterprises, the greater the degree of financing constraints on enterprises, so that preferential tax policies can effectively alleviate the financing constraints of high-tech enterprises.

TABLE 3. Baseline regression analysis

	(1)	(2)	(3)	(4)	(5)
	lntfp_LP	lntfp_LP	lntfp_LP	lntfp_LP	lntfp_LP
Tax	-5.430*** (-21.638)	-5.932*** (-24.239)	-5.572*** (-23.524)	-4.730*** (-19.921)	-4.688*** (-19.732)
Roa		2.034*** (20.066)	2.046*** (20.904)	2.523*** (25.217)	2.275*** (18.386)
Soe			0.521*** (21.671)	0.484*** (20.475)	0.481*** (20.329)
Wcapital				-0.736*** (-16.605)	-0.740*** (-16.709)
err					0.194*** (3.405)
Ind	Yes	Yes	Yes	Yes	Yes
_cons	7.325*** (28.748)	7.229*** (29.238)	6.963*** (29.136)	7.056*** (30.138)	7.056*** (30.163)
N	6488	6488	6488	6488	6488
adj. R2	0.182	0.230	0.282	0.311	0.313

*** p<0.01, ** p<0.05, * p<0.1;The value in brackets is t value*

TABLE 4. The mediation effect test based on the perspective of innovation input and financing constraints

	(1) lntfp_LP	Innovation input		Financing Constraints	
		(2) lnrds	(3) lntfp_LP	(4) SA	(5) lntfp_LP
Tax	-4.688*** (-19.732)	-1.702*** (-4.503)	-3.929*** (-23.577)	0.170** (2.278)	-4.666*** (-19.646)
Roa	2.275*** (18.386)	2.479*** (12.597)	1.162*** (13.254)	-0.053 (-1.371)	2.268*** (18.342)
Soe	0.481*** (20.329)	0.683*** (18.145)	0.173*** (10.211)	-0.093*** (-12.508)	0.469*** (19.596)
Wcapital	-0.740*** (-16.709)	-1.273*** (-18.052)	-0.166*** (-5.213)	0.034** (2.452)	-0.736*** (-16.614)
err	0.194*** (3.405)	0.348*** (3.837)	0.038 (0.963)	0.041** (2.312)	0.199*** (3.500)
lnrds			0.449*** (81.705)		
SA					-0.130*** (-3.276)
Ind	Yes	Yes	Yes	Yes	Yes
_cons	7.056*** (30.163)	18.019*** (48.430)	-1.032*** (-5.396)	-3.840*** (-52.229)	6.557*** (23.502)
N	6488	6488	6488	6488	6488
adj. R2	0.313	0.211	0.663	0.082	0.314

*** p<0.01, ** p<0.05, * p<0.1;The value in brackets is t value*

V. DISCUSSION

Based on the data of Shanghai and Shenzhen A-share listed high-tech enterprises from 2018 to 2021, this paper empirically investigates the effect of tax incentives on high-quality development of high-tech companies. The results show that: (1) Tax incentives can significantly stimulate high-quality development of high-tech enterprises; (2) Tax incentives promote the high-quality development of high-tech enterprises by encouraging enterprises to increase innovation investment and easing financing constraints; Therefore, this paper puts forward the following suggestions for scientific planning of the high-quality development path of high-tech enterprises: (1) Strengthen the tax incentives for innovative human capital of high-tech enterprises. (2) Strengthen tax preferential policy support for financial services. (3) Tax authorities will strengthen quality and efficient government services.

ACKNOWLEDGMENTS

Jingxian Wang thanked Ms. Zhu (School of Finance and Economics, Jiangsu University) for her discussion and suggestions in data analysis

Funding

This work was supported by [National Social Science Fund of China（20BGL099)]、[Zhenjiang Soft Science research projec（RK2023005)]、[Jiangsu postgraduate practice and innovation program <SJCX22_1837>]

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