The Impact of Tax and Cutting Taxes and Fees on Enterprise Innovation——Based on 2017-2021 Panel Data of China's A-share Listed Companies

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Abstract. At present, tax reduction is an important national policy to promote enterprise development based on the current economic environment, and its policy implementation targets a wide range of coverage and has received wide attention from all walks of life. In order to investigate whether tax reduction can promote enterprise innovation and what effect it has on enterprise innovation. Based on a systematic review of the literature, this paper uses the panel data of Chinese A-share listed companies from 2017-2021 as a sample, and firstly, uses a multiple regression model to examine the impact of tax reduction on enterprise innovation; Secondly, the moderating variable, degree of marketisation, is introduced to examine the impact of tax cuts on business innovation under different degrees of marketisation; finally, a heterogeneity analysis is conducted to examine the regional and industry heterogeneity of the impact of tax cuts on business innovation. The study finds that tax and fee reductions can effectively promote enterprise innovation, with different effects in different regions and industries, and the degree of marketization has a positive moderating effect on tax and fee reductions to promote enterprise innovation. Accordingly, it systematically reveals the relationship between tax and fee reduction and enterprise innovation; provides a new measurement indicator for the study of the impact of tax and fee reduction on enterprise innovation; and puts forward relevant policy recommendations.

Keywords: Cutting taxes and fees, Enterprise innovation, Regional heterogeneity, Moderating effect.

1. Introduction

Based on the panel data of China's A-share listed companies from 2017 to 2021, this paper explores the impact of tax cuts and fee reductions on firm innovation, and analyzes the moderating effect of the degree of marketization and the heterogeneity of regional and firm nature. It is found that tax and fee reduction significantly promote enterprise innovation, especially the incentive effect on strategic innovation is more significant. In areas with a higher degree of marketization, tax cuts and fee reductions have a more significant incentive effect on enterprise innovation due to market development, industry competition and a sound intellectual property protection system. In addition, tax and fee reductions have a more obvious role in promoting innovation in the eastern region and other types of enterprises.

In the part of literature review, this paper synthesizes several related studies. Keen (2001) [1] proposed that tax incentives could improve the level of national welfare, while Buettner (2014) [2] believed that tax cuts could significantly change social welfare, and the government should provide more tax incentives for technology enterprises to promote innovation. Saderuddin (2018) [3] proposed that tax incentives can promote enterprise development from the perspective of audit. Howell (2016) [4] analyzed the impact of VAT reduction on enterprise innovation ability from the perspective of private enterprises, and believed that VAT reduction can improve enterprise innovation ability, but the impact on innovation investment is limited. Lan Fei (2020) [5] analyzed the impact of "replacing business tax with value-added tax" policy on enterprise R&D and industrial upgrading, and believed that tax reform could stimulate enterprise R&D investment. Afcha & Guillen (2013) [6] pointed out that R&D tax incentives can significantly promote enterprises' innovative behavior. Mukherjee (2017) [7] believes that high corporate tax burden will significantly affect the innovation ability of enterprises, but the impact of tax reduction on corporate innovation is not clearly defined.

Guceri et al. (2019) [8] pointed out that the increase of social security responsibility will prompt enterprises to increase investment in technology research and development, thus promoting technological innovation. Sun Y (2015) [9] pointed out that tax incentives can significantly increase enterprise innovation investment and have a positive impact on enterprise profits. Jia J et al. (2017) [10] indicates that tax reduction has a significant positive promoting effect on enterprise innovation, and the effect is different for different types of enterprises.

The research contribution of this paper is to provide a new measurement index, that is, to measure the policy intensity by the amount of tax reduction and fee reduction, which directly reflects the effect of tax reduction and fee reduction on enterprise innovation. The research results provide a theoretical basis for the rational formulation of tax policies, and help promote enterprise innovation and economic development through tax incentives.

2. Research design

2.1. Sample selection and data source

At the enterprise level: Since R & D expenditure, number of patents and other data are related to the core competitiveness of enterprises, generally enterprises will not disclose them at will. Therefore, this paper selects China's A-share listed companies from 2017 to 2021 as the preliminary screening sample. The sample data were processed: financial and real estate companies and the samples of companies with missing variables were excluded, and all continuous variables were processed by double-sided 1% tail reduction. The enterprise-level data mainly comes from CSMAR and Wind, covering important information such as basic information, patent status and financial characteristics of listed companies.

Government level: At the beginning of each year, the national government website and the provincial finance and tax websites will publish the tax reduction and fee reduction information of the previous year. These data are based on the tax reduction and exemption policy documents issued by the whole country and provinces (or municipalities directly under the central government), and have high authenticity and reliability. In this paper, the collected amount of tax reduction and fee reduction is taken as the explanatory variable in the empirical analysis.

Marketization Index: It is derived from China's provincial marketization database and selects data from 2017-2022. The index consists of four indicators: economic freedom, financial marketization, government intervention and social security level. Among them, economic freedom reflects the degree of market competition, market access and property rights protection; Financial marketization measures the degree of marketization of banking and securities markets; The degree of government intervention reflects the relationship between government and enterprises. The level of social security involves social welfare and pension insurance. By quantifying these indicators, the Fan Gang Marketization index is obtained, which comprehensively reflects the overall level and change trend of China's marketization.

2.2. Build model

Based on the above theoretical basis and research assumptions, the research hypotheses of H1 and regional differences and firm heterogeneity were tested, and the following models were established:

$$R\&D_{it} = \beta_0 + \beta_1 \text{Retax}_{t-1} + \theta \text{Control}_{it} + \delta_i + \gamma_t + \varepsilon_{it} \tag{1}$$

$$\text{innov}_{it} = \beta_0 + \beta_1 \text{Retax}_{t-1} + \theta \text{Control}_{it} + \delta_i + \gamma_t + \varepsilon_{it} \tag{2}$$

$$\text{Control}_{it} = (\text{Size}, \text{Age}, \text{IAR}, \text{CF}, \text{ROA}, \text{LEV}, \text{RDB}, \text{RE}, \text{Year}, \text{Loc}, \text{Ind}) \tag{3}$$

To verify the hypothesis H2 builds the following model:

$$\text{Innov}_{it} = \beta_0 + \beta_1 \text{Retax}_{t-1} + \beta_4 \text{Retax}_{t-1} * \text{Market} + \beta_5 \text{Market} + \theta \text{Control}_{it} + \delta_i + \gamma_t + \varepsilon_{it} \tag{4}$$

The explained variable R&Dit represents the R&D input of firm i in year t, while innovit represents the innovation output of firm i in year t. This paper considers innovation input and innovation output respectively. Innovation investment is the logarithm of total R&D; Innovation output can be divided into three types of heterogeneous innovation: lnp, lnp1 and lnp2. The explanatory variable Retaxt-1 represents the amount of tax and fee reductions collected in year t-1. γt represents the time fixed effect, εit represents the random disturbance term, and β0 represents the intercept. This paper focuses on the coefficient β1 of the explanatory variable reTAX-1. If β1 is positive, it indicates that the intensity of tax reduction and fee reduction can promote enterprise innovation; otherwise, it indicates that tax reduction and fee reduction are not conducive to promoting enterprise innovation.

3. Empirical analysis

3.1. Tax and fee reduction and enterprise innovation

Table 1 shows the impact of tax and fee reductions on R&D and innovation output of enterprises. In terms of control variables, firm size, R&D background and firm years have significant positive effects on innovation input and output. The main explanatory variables show that tax reduction and fee reduction are significantly positively correlated with innovation input and innovation output at the level of 1%. Further analysis shows that tax and fee reductions promote strategic innovation (1% level) more than substantive innovation (10% level). This may be because strategic innovation is more flexible in policy incentives, and companies can apply for R&D subsidies through patent achievements, increasing the number of patents in the short term. The results show that tax and fee reduction can significantly promote enterprise innovation, but attention should be paid to improving the quality of innovation. This verifies the hypothesis of this paper: tax reduction and fee reduction can promote enterprise innovation.

Table 1. Tax and fee reduction and enterprise innovation return results

Dependent variable	(1)	(2)	(3)	(4)
	R&D	Lnp	Lnp1	Lnp2
Retax	0.0707***	0.0980***	0.0529*	0.1268***
	(0.0131)	(0.0181)	(0.0136)	(0.0181)
size	0.7823***	0.1025***	0.2522***	0.0334**
	(0.0105)	(0.0153)	(0.0115)	(0.0153)
ROA	0.9037***	0.7801***	0.4234**	0.7843***
	(0.1553)	(0.2263)	(0.1706)	(0.2271)
LEV	0.2454***	0.5479***	-0.1448*	0.8386***
	(0.0688)	(0.1003)	(0.0757)	(0.1007)
Age	0.0196***	0.0456***	0.0118	0.0321***
	(0.0068)	(0.0099)	(0.0075)	(0.0099)
RE	0.0104***	0.0323***	0.0103***	0.0313***
	(0.0021)	(0.0030)	(0.0023)	(0.0031)
CF	0.0081***	0.0121***	0.0065***	0.0119***
	(0.0015)	(0.0022)	(0.0017)	(0.0023)
RDB	0.0424***	0.0194***	0.0230***	0.0077***
	(0.0008)	(0.0011)	(0.0008)	(0.0011)
ind	-0.0007***	-0.0013***	-0.0007***	-0.0012***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Year fixation	Y	Y	Y	Y
Observed number	12082	12082	12082	12082
R^2	0.5296	0.1460	0.1536	0.1135

(***, ** and * respectively represent significant regression coefficients at 1%, 5% and 10% levels; () represents t value)

3.2. The moderating effect of marketization degree

This paper introduces market-oriented index as a moderating variable to study its impact on the relationship between tax reduction and fee reduction and enterprise innovation. The results show that

marketization index has a significant positive moderating effect on innovation input and innovation output (columns (5) to (8) of Table 2). This shows that under different marketization levels, the effect of tax and fee reduction on technological innovation is different. Areas with a higher level of marketization, due to market development, industry competition and perfect intellectual property protection system, can stimulate the enthusiasm of market players and reduce the transaction costs of enterprises to obtain research and development resources. Therefore, tax reduction and exemption policies have a more significant incentive effect on enterprise innovation in these regions, which verifies the second hypothesis of this paper: the higher the degree of marketization, the better the incentive effect of tax reduction and fee reduction on enterprise innovation.

Table 2. Regression results of moderating effect of marketization degree

Dependent variable	(1)	(5)	(2)	(6)	(3)	(7)	(4)	(8)
	R&D	R&D	Lnp	Lnp	Lnp1	Lnp1	Lnp2	Lnp2
Retax	0.0707***	-0.2128***	0.0980***	-0.4856***	0.0529*	-0.3349***	0.1268***	-0.4312***
	(0.0131)	(0.0521)	(0.0181)	(0.0720)	(0.0136)	(0.0543)	(0.0181)	(0.0720)
Retax *market		0.0254***		0.0523***		0.0253***		0.0500***
		(0.0045)		(0.0062)		(0.0047)		(0.0062)
Control variable	Y	Y	Y	Y	Y	Y	Y	Y
Year control	Y	Y	Y	Y	Y	Y	Y	Y
Observed number	12082	12082	12082	12082	12082	12082	12082	12082
R^2	0.5296	0.1508	0.1460	0.1555	0.1536	0.1410	0.1135	0.1181

(***, ** and * respectively represent significant regression coefficients at 1%, 5% and 10% levels; () represents t value)

4. Summary

Based on the data of Chinese listed companies from 2017 to 2021, this paper examines the effect of tax and fee reduction on Chinese enterprise innovation through multiple regression analysis. After the baseline regression, this paper changes the explanatory variables and adds the control variables for robustness test. According to the empirical research results, this paper draws the following conclusions:

(1) Tax and fee reduction will significantly improve the innovation ability of enterprises, and the incentive effect on strategic innovation is significantly greater than that on substantive innovation. The reason for this may be that substantive innovation is more difficult to achieve because it is subject to greater scrutiny, higher standards, and therefore higher technical content.

(2) The degree of marketization has a positive moderating effect on the impact of tax and fee reduction on enterprise innovation. And this positive adjustment effect is more prominent in R&D investment and strategic innovation.

(3) The promotion effect of tax and fee reduction on enterprise innovation will show distinct different impacts due to the different regions and the different nature of property rights. First of all, compared with the western and central regions, tax and fee reductions have a greater impact on the eastern region. This may be because, compared with the western and central regions, the talent system, intellectual property protection system and technology in the eastern region are relatively complete. Secondly, the impact of tax and fee reduction on other enterprises is greater than that of state-owned enterprises, which may be caused by the market competition in the industries involved in state-owned enterprises is not so fierce.

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