



Innovation and Tax Burden of Manufacturing SMEs

Statistical Analysis of the Data Based on the Annual Reports of Companies Listed on the New OTC Market

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Abstract. The innovation ability of small and medium-sized manufacturing enterprises is of great significance to the development of the real economy with the rapid development of the digital economy. This paper analyzes the data of the 2020 annual report of manufacturing enterprises listed on the New OTC Market, explores the relationship between enterprise tax burden and innovation ability under the impact of the epidemic situation, and then puts forward suggestions on tax reduction and fee reduction policy. The results show that the overall tax burden has a significant negative impact on R & D investment and output, but the relationship between indirect tax and direct tax burden and R & D input and output is more complex. Further study on the relationship between various taxes and innovation capability shows that in the context of the continued normalization of the epidemic situation, we should pay more attention to value-added tax, administrative charges of tax nature, resource tax, and property tax for further tax and fee reduction of the manufacturing industry.

Keywords: Tax Burden · Enterprise Innovation · Cut Taxes and Administrative Fees

1 Introduction

The real economy is an important foundation and a key link in the development of China's economy. The outbreak of COVID-19 in 2020 hit the real economy heavily, and the rapid expansion of the digital economy exacerbates the negative impact of the new industrial revolution on China's manufacturing industry, so that the innovation ability of the manufacturing industry under the background of the digital economy has attracted much attention. In 2020, the government clarified the core position of science and technology in the national innovation strategy and clearly required us to enhance the innovation capabilities of Chinese enterprises. In China, there are more SMEs than large enterprises, and the market is more dynamic, but they are also more affected by the epidemic and the digital economy. In short, SMEs currently face more problems, difficulties, and innovation needs. However, due to the high risk, uncertainty

and positive externalities of innovation, the motivation and initiative of enterprises to innovate is not high. Therefore, the government needs to adopt various means to support and stimulate the innovation ability of enterprises. To encourage enterprises to innovate, the government has introduced and implemented a series of preferential tax policies. But the results are not ideal. Related research shows that 50.2% of entrepreneurs still think that the burden of social security and taxation is too heavy. Under such an economic background, it is of great significance to study the impact of tax and fee burden on the innovation ability of manufacturing SMEs for further implementing tax reduction policies and promoting economic development.

2 Literature Review

Enterprise innovation requires a lot of capital, technology, and R&D talents, and internal cash flow is indispensable. And a high level of the tax burden is a major internal capital outflow for an enterprise. Wang Hong (2020) pointed out that the internal funds flowing out of enterprises paying taxes and fees will crowd out the innovation funds of enterprises [1]. Howell (2016) found that the increase in corporate income tax will reduce the after-tax profits and self-use funds of enterprises, thereby reducing the motivation of entrepreneurs to carry out innovative activities [2]. Li Chuanxian and Li Qihang (2022) found that “Cut Taxes and Administrative Fees” overall will encourage enterprises to innovate [3]. There are many similar conclusions. For example, Mukherjee et al. (2016) conducted an analysis of corporate income tax in US states from 1990 to 2006 and found that there is a negative relationship between income tax burden and corporate innovation activities [4]. Shi Shaobin (2017) believes that tax and fee reduction play an important role in alleviating the operating pressure of enterprises [5]. Once the pressure on business operations is relieved, there will be more energy to invest labour and material resources in R&D and innovation. Furthermore, Chu Deyin’s (2017) research found that the reduction of the corporate tax burden will improve the “quality” and “quantity” of corporate innovation performance [6]. This broadens the perspective of the research. But many scholars have come to different conclusions. Li Yanyan (2016) believes that government policies cannot have an impact on enterprise innovation [7]. Therefore, no matter what policies the government adopts can not effectively promote enterprises to increase investment in innovation. Li Aige et al. (2013) found that the impact of the tax burden on enterprise innovation investment is more complex, showing an inverted U-shaped relationship [8]. The research of Yu Yongze et al. (2017) verified the views of Li Aige et al., but Yu Yongze et al. proposed that factors such as government effectiveness, trade scale, and education expenditure play a conducive role in this relationship [9]. The impact of tax and fee burden on enterprise innovation is relatively complex, and few studied the enterprise burden under special circumstances from the enterprise level. Li Linmu and Wang Chong (2017) analyzed the relationship between the innovation ability of the enterprises listed on the New OTC Market and the tax burden [10]. On this basis, this paper analyzes the manufacturing enterprises listed on the New OTC Market to further explore the tax reduction and fee reduction policies to improve the innovation ability of small and medium-sized manufacturing enterprises under the epidemic environment. Under the circumstance that enterprises are in urgent need of innovation and

the space for tax reduction and fee reduction is limited, by studying the impact of tax and fee burden on enterprise innovation, put forward suggestions on further tax and fee reduction.

3 Research Design

3.1 Data Sources and Variable Design

We takes the manufacturing enterprises listed in the “New OTC Market” as the sample. Regrettably, by the end of April 2022, the enterprise annual report data for 2021 is incomplete and inaccurate, so we can only select the enterprise data for 2020 as a sample for research. While collecting the annual report data, considering the spill over of the company’s internal innovation achievements, we no longer only use the data of the parent company but choose the data of the consolidated statements. According to the existing research literature, 18 control variables were selected by comprehensively considering the entrepreneur’s business characteristics and tax preferences [11–14]. Table 1 shows the variables selection.

3.2 Regression Model

Considering the influence of the above variables on the innovation ability of enterprises, a general linear regression model is established as shown in formula (1):

$$y_i = \alpha \cdot Burden + \beta \cdot Control + \varepsilon_i \quad (1)$$

Due to the endogeneity of tax burden and enterprise scale, we select 2SLS as the method of regression to ensure the robustness and effectiveness of the model.¹

4 Empirical Analysis

Since we used 2SLS, instrumental variables were tested. According to the test results, instrumental variables have passed the under-identification test and over-identification test significantly, indicating that the tool variables selected are effective and meet the correlation². The regression results are shown in Table 2.

According to Table 2, the relationship between tax burden and innovation ability is as follows:

¹ “I” represents the enterprise, and “Y” is the explanatory variable. “Burden” refers to the tax burden among the explanatory variables, while “Control” represents the control variable, that is, the factors that may affect the innovation ability of enterprises (except the explanatory variables).

² Due to space constraints, all test results are no longer listed separately. Only the regression results are presented.

Table 1. Variables selection³

Variable Type	Variable	Specific Indicators	Variable Type	Variable	Specific Indicators
Explained Variable	Innovation Ability	R & D investment ratio	Control Variable	Control Variables of Enterprise Characteristics	Tax credit rating
		R & D personnel investment ratio			Enterprise scale
		New patents			Enterprise life
Explanatory Variables	Commodity Tax	VAT burden rate			property rights
		Consumption tax burden rate			Labor intensity
		Tax burden rate of urban maintenance and construction			Capital intensity
		Resource tax and environmental tax burden rate			Asset liability ratio
		Administrative charges with tax nature		Entrepreneur Characteristics Control Variables	The age of the chairman of the company
		Total tax burden rate of the above commodities			Gender of the company's chairman
Income Tax	Burden rate of land value added tax	Social relations between Chairman and general manager			
	Enterprise income tax burden rate	Proportion of independent directors			
					The chairman is also the general manager

(continued)

³ Due to space constraints, the variable calculation method is not listed, and can be obtained by the author if necessary.

Table 1. (continued)

Variable Type	Variable	Specific Indicators	Variable Type	Variable	Specific Indicators
		Burden rate of social security fee		Tax Preference and Government Subsidy Control Variables	VAT preference
		Total of the above income tax burden rate			Enterprise income tax preference
	Property Tax	Property tax, vehicle and ship tax, land use tax and stamp tax			Other tax preferences
	Total Tax Burden Rate				government grants
					Priority of state support
					Does it include small and micro enterprises

4.1 The Influence of Total Tax Burden on Enterprise Innovation Ability

The regression results in Table 4 show that although the overall tax burden has no significant negative impact on the R & D personnel investment ratio, there is a significant negative correlation between the overall tax burden and the R & D investment and patent output. Tax reduction and fee reduction can promote enterprise innovation in theory, but the government is facing huge financial pressure under the epidemic situation (The fiscal revenue and expenditure are shown in Fig. 1⁴), so the tax reduction space is very limited to some extent, and increasing the proportion of direct tax is an important direction of tax system reform. Therefore, in such a complex situation, it is worth studying how to optimize the tax structure.

4.2 The Influence of Indirect Tax and Direct Tax on Enterprise Innovation Ability

Different from the previous conclusion, the regression results show that the influence of indirect tax and direct tax on the three explanatory variables presents the opposite direction. This may be because commodity trading under the impact of the epidemic has put forward higher requirements on the digital technology and business mode of enterprises. Faced with a heavy tax burden and the possible accumulation of innovative

⁴ In 2013, the Third Plenary Session of 18th C PC Central Committee proposed to gradually increase the proportion of direct tax; China Statistical Yearbook data has not yet released 2021 data. The data are obtained from the China Statistical Yearbook.

Table 2. Regression results

	R & D investment ratio	_cons	patent	_cons	R & D personnel investment ratio	_cons
Total tax burden	-1.565**	-73.82***	-0.894**	-6.469	-0.139	5.367
Total burden rate of indirect tax	-1.733***	-29.35**	0.797**	-14.19**	-2.714***	56.55***
Direct tax burden rate	2.174***	43.98**	-0.331**	-22.82***	0.836***	66.99***
Consumption tax rate	-1.481	-10.64	0.876	-101.6***	-0.517	-26.13
Enterprise income tax burden rate	0.530**	-46.81***	-0.0475	-14.59***	0.476**	7.650
VAT burden rate	-1.920**	-20.32	0.891**	-14.66**	-3.067***	51.11***
Tax burden rate of urban maintenance and construction	-25.56***	-26.77**	16.08**	-19.33***	-65.68***	75.23***
Resource tax and environmental tax burden rate	223.6***	-38.12***	-60.71**	-12.01**	132.3**	44.30***
The burden rate of administrative charges with tax nature	-33.93***	-9.766**	-10.03	3.441**	-84.66***	78.12***
Land value added tax rate	-19.31	-42.07**	-23.72	-23.96**	-49.00	46.58**
Burden rate of social security fee	-2.086***	-66.48***	-0.360	-13.94***	-3.446***	-36.24***
Property tax burden rate	3.558***	-11.00***	-0.635**	-15.03***	-0.634**	-15.21***

Note: ***, **, denote 5% and 10% significance levels respectively.

Table 3. Direction of indirect tax

	R & D investment	patent	R & D personnel input
excise tax	(-)	(+)	(-)
Administrative charges with tax nature	-	(-)	-
Urban construction tax	-	+	-
Value-added tax	-	+	-
Resource tax and environmental tax	+	-	+
Indirect tax	-	+	-

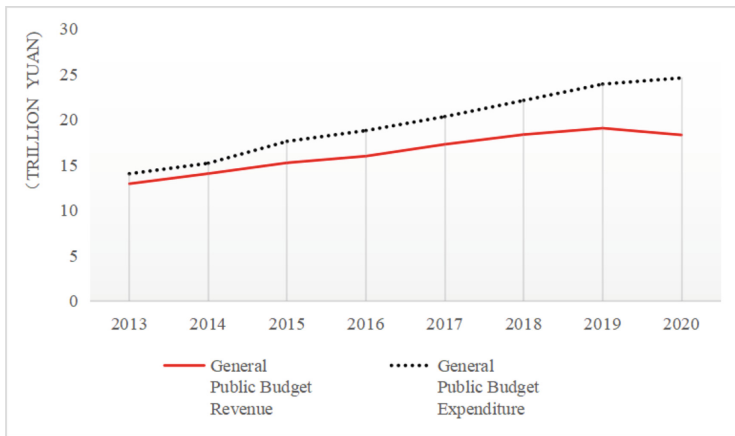


Fig. 1. Scale of my country's fiscal revenue and expenditure from 2013 to 2020

R & D investment, enterprises were forced to choose to accelerate the speed of innovation and income increase this year. The reason for the positive correlation between direct taxes and innovation capability may be that corporate income tax is negative due to deferred income tax. In the complex and special social environment, we must pay attention to both sides. However, the specific impact of taxes is not clear, so the following will analyze the impact of tax categories on enterprise innovation ability.

4.3 The Influence of Various Taxes and Fees on the Innovation Ability of Enterprises

To better see the impact direction of various taxes, it will be more intuitive to directly convert the coefficient of the impact of taxes and fees on the innovation ability of enterprises into symbols, as shown in Table 3⁵.

⁵ (-), (+) indicated that the negative effect and positive effect were not significant.

It can be seen from Table 3 that the negative impact of indirect taxes on R & D funds and personnel investment mainly comes from administrative fees, urban construction tax and value-added tax. The results of data standardization show that the influences of these three factors are ranked in descending order: value-added tax, urban construction tax, and administrative management fees, as shown in Table 4.

Table 5 reports the impact of direct taxes and fees on the innovation capability of enterprises. The negative impact of direct taxes and fees on R & D output mainly comes from property tax. Although property tax harms R & D personnel input and patent output, it has a positive impact on R & D expenditure input, this may be due to the increase of property along with the improvement of innovation ability. Due to the time lag between R & D investment and achievement output, the positive impact of R & D investment on patent output is not timely shown. The negative impact of property tax on R & D personnel may be due to the stickiness of the proportion of R & D personnel. The enterprise may eliminate some employees, but it may not be able to find talents matching the demand in time, but as time goes on, it will bring high quality and suitable R & D personnel. Therefore, property tax has a positive impact on business development in the long run.

Table 4. Standardized regression coefficient

	R & D investment ratio	_cons (1)	R & D personnel investment ratio	_cons (2)
S Administrative charges with tax nature	-0.00684***	-16.08***	-0.0171***	62.37***
S VAT rate	-0.203**	-38.35***	-0.348***	38.34**
S city maintenance and construction tax burden ratio	-0.0128***	-32.50***	-0.0330***	60.52***

(t statistics in parentheses ** p < 0.1 *** p < 0.05)

Table 5. Direction of direct tax influence

	R & D investment	patent	R & D personnel input
Land value added tax	(-)	(-)	(-)
corporate income tax	+	(-)	+
Social security fee	-	(-)	-
property tax	+	-	-
Direct tax	+	-	+

5 Policy Suggestion

Based on the results of empirical analysis and the main preferential tax policies in 2021, this paper holds that the tax and fee reduction policies for small and medium-sized manufacturing enterprises can be improved at least in the following aspects:

- (1) From the perspective of indirect tax, we should continue to meet the exemption of VAT, pay attention to administrative costs, and levy resource tax.

First of all, the VAT is still the most influential tax on enterprise innovation. Although the impact of urban construction tax on enterprise innovation is second only to value-added tax, it is based on VAT, so the burden of VAT is still a major source of pressure for innovation of small and medium-sized manufacturing enterprises. Secondly, among the indirect taxes, administrative fees are the only tax that harms the three indicators of enterprise innovation ability, and there are two significant negative correlations. It's mean that enterprises are negatively affected by it to different degrees, whether in terms of innovation input or innovation achievements. Therefore, more attention should be paid to the administrative charges of enterprises. Finally, considering the financial pressure of the government and the weaker negative impact of resource tax on innovation ability, it is suggested to increase the collection of resource and environmental tax.

- (2) From the perspective of direct tax, we should attach importance to enterprise income tax and increase property tax.

Based on the empirical results, we can see that the impact of enterprise income tax on Enterprise R & D innovation activities is significant and higher than other direct taxes. In the long run, property tax can promote the innovation activities of enterprises, and the increase of innovation activities will further increase the property of enterprises. This mutual promotion and driving mechanism mean that property tax will be an important breakthrough to increase the proportion of direct tax.

- (3) It is necessary to master the tax reduction structure of indirect tax and direct tax, and develop steadily.

Although the total tax burden hurts the innovation ability of enterprises, under the background of the implementation of large-scale tax and fee reduction policy under the epidemic environment, the impact of direct tax and indirect tax on enterprise innovation ability is different from that in the past. Therefore, even in the general direction of tax reform with increasing the proportion of direct tax, we should pay attention to the proportion of the direct tax and indirect tax, and not rush for success.

6 Conclusion

Innovation ability is the driving force of enterprise development. Under the background of the repeated epidemic situation and heavy damage to the real economy, the innovation ability of manufacturing enterprises is more important. Further tax cuts should continue to focus on VAT and corporate income tax, but should pay more attention to the negative impact of management fees and the important role of property tax in increasing the proportion of direct tax. It is of great significance for the government to help SMEs in the limited space of tax reduction and fee reduction. of course, there are still some

deficiencies in this paper, which need to be further improved. First, the data is only in 2020, and the amount of data is not large enough; Second, it does not consider the upgrading and transformation of enterprises, only from the two aspects of innovation input and innovation output of enterprises, which lacks the profound Path to further help the development of enterprises.

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