

# Research on the Influence of VAT Credit Refund on Technological Innovation of Manufacturing Enterprises

Quanyue Liu

Lqy13971271536@163.com

School of Economics Anhui University ,Hefei,China

**Abstract:**VAT credit refund policy is an important measure to deepen the value-added tax reform in China. This policy has played a key role in helping enterprises rescue and stabilizing the economy. In order to further explore the leave for tax refund policy for the influence of manufacturing innovation, this paper introduced in April 2021 the benefit of nine categories advanced manufacturing enterprises to keep on tax refund policy, the use of double difference model, based on China's a-share manufacturing listed company's quarterly data regression analysis, We draw a conclusion that the tax rebate policy has played a role in promoting the level of technological innovation in the manufacturing industry.

**Key words:**tax policy;VAT credit refund;technological innovation

## 1 Introduction

In 2022, the policy of VAT credit refund has once again become the core focus of the government's tax policy. Specific policy adjustments have not only increased the proportion of tax rebates, but also changed the scope of tax rebates from incremental tax rebates to stock tax rebates, and expanded the scope of tax rebates from the original advanced manufacturing industry to qualified manufacturing industries. According to data released by the State Administration of Taxation, since the implementation of the VAT credit refund policy on April 1, 2022, a total of 2.1864 billion yuan of VAT rebate has been refunded to taxpayers' accounts in 2022, of which the manufacturing sector has benefited the most, accounting for 26.7 percent. The tax rebate policy has injected an important flow of funds into manufacturing enterprises, supporting them to invest in fixed and working capital to expand production scale and improve production efficiency. This policy also encourages enterprises to increase capital investment in technological innovation, promotes the upgrading and transformation of production methods and concepts, improves the competitiveness of enterprises in the market, and helps to build a stronger brand image and corporate culture.

Although the initial effect of the policy can be seen, its actual impact on the innovation investment of manufacturing enterprises still needs to be further studied, which provides an opportunity for this study to explore. Therefore, based on the VAT rebate policy, this paper selects China's A-share listed manufacturing companies as the research object, aiming to explore the impact of this policy on the level of enterprise technological innovation, hoping to provide useful insights for the further development of China's scientific and technological innovation, so as to promote the economy towards the direction of high-quality development.

## 2 Theoretical Analysis

VAT is a turnover tax based on the value added value.<sup>[1]</sup>China has adopted a widely used tax deduction system. According to this system, the amount of VAT that a company needs to pay is the amount of output tax minus the amount of input tax. When the input tax is greater than the output tax, the input retained tax credit will be formed, and the existence of this retained tax credit has a lot of adverse effects on the technological innovation of manufacturing enterprises.<sup>[2]</sup>

Therefore, the implementation of the policy of VAT credit refund means that the funds originally occupied by enterprises will be released, thus improving the cash flow of enterprises. Considering the incompleteness of the capital market and the financing constraints faced by enterprises, this policy is of great significance.

The important role of VAT credit refund is to provide a way for enterprises to improve their cash flow quickly, promote innovation and enhance competitiveness.<sup>[3]</sup>Cash is undoubtedly crucial in the business world, and this policy actually provides a visual way for companies to optimize cash flow, which is essential for capital-intensive innovation activities. The tax credit can be seen as a temporary 'deposit of funds' for companies, and the government's policy is equivalent to cashing out this 'deposit' in advance, allowing companies to operate more flexibly and invest more money in important areas such as research and development.<sup>[4]</sup>In addition, the government's signaling is also helping to increase the confidence of outside investors, which is expected to attract more investment, especially for start-ups, which will be a critical source of funding. In summary, the core objective of this policy is to improve the cash flow of enterprises so that they can operate and innovate better, while also helping to reduce financial risk.<sup>[5]</sup>

Based on the above analysis, this paper proposes the following hypotheses:

H1: The policy of VAT rebates plays a role in promoting technological innovation in manufacturing industry.

## 3 Research Design

### 3.1 Sample Selection and Data Sources

The research data of this paper come from the databases of CSMAR and WIND. Taking the data of China's A-share listed manufacturing enterprises from the third quarter of 2020 to the third quarter of 2022 as the research sample, the original data are processed as follows: (1) Deleting ST, ST\*, suspended or delisted companies or major restructuring companies during the sample period to improve the reliability of the data. (2) Deleting the listed companies after 2020 to ensure the continuity of the data. (3) remove outliers in the sample. (4) Stata17 software was used to further process the data: except for the core explanatory variables, other continuous variables were winsorized by 1% and 99%. Finally, 13782 valid samples were screened out.

### 3.2 The Research Method and the Model Set

This paper uses the difference-in-differences (DID) model to evaluate the incentive effect of the

tax rebate policy introduced in April 2021 on manufacturing technology innovation. According to the Ministry of Finance on clear advanced manufacturing final leave for VAT refund policy announcement, can enjoy the advanced manufacturing industry to leave for tax rebates, increased from the original four categories into nine categories, respectively, non-metallic mineral products, general equipment manufacturing industry, special equipment manufacturing, computer, communications, and other electronic equipment manufacturing industry, pharmaceutical manufacturing, Chemical fiber manufacturing; railway, shipbuilding, aerospace and other transportation equipment manufacturing; electrical machinery and equipment manufacturing; instrument and meter manufacturing. This paper regards the tax rebate policy of Finance and Taxation [2021] No. 15 as a "quasi-natural experiment". The lately added five types of advanced manufacturing enterprises are regarded as the experimental group, and the rest that do not meet the conditions of enjoying the policy are regarded as the control group.

Based on the scale and availability of data, this paper uses the quarterly data of all A-share listed manufacturing enterprises to conduct panel data fixed effect regression analysis. Since the announcement was issued and implemented in April 2021, this paper regards the third quarter of 2021 as the time node for the implementation of the policy, and sets the third quarter of 2020, the fourth quarter of 2020, the first quarter of 2021 and the second quarter of 2021 before this node as the ex-ante group. The fourth quarter of 2021, the first quarter of 2022 and the second quarter of 2022 in the current and subsequent implementation period are set as the ex-post group, and the following measurement model is constructed:

$$RD_{it} = \alpha + \beta \text{treat}_i \times \text{post}_t + \gamma X_{it} + \mu_i + \varphi_t + \varepsilon_{it}$$

The explained variable  $RD_{it}$  represents the technological innovation level of enterprise  $i$  in period  $t$ , which is measured by the logarithm of R&D investment. The core explanatory variable is  $\text{treat}_i \times \text{post}_t$ ,  $\text{post}_t$  is a time virtual variable, which is assigned the value of "0" before the implementation of the policy, and "1" during and after the implementation of the policy;  $\text{treat}_i$  is policy virtual variables, which is assigned control group assignment as "0" and experimental group as "1". In order to enhance the explanatory power of the model, the control variables  $X_{it}$  affect the level of technological innovation of enterprises include enterprise size (size), asset-liability ratio (lev), return on equity (ROE), growth rate of operating income (IRR) and ownership concentration (Stol).  $\mu_i$  denotes the individual fixed effect,  $\varphi_t$  denotes the time fixed effect.  $\varepsilon_{it}$  means random error term.

### 3.3 Descriptive Statistical Analysis

Table 1 shows the descriptive statistics of the main data in this paper. You can see that the average index of enterprise technology innovation level RD is 17.382, the standard deviation is 1.427, shows that the sample enterprise's technology innovation level is imbalance, innovation ability differences in a wide range of industries, leave for VAT refund policy for manufacturing in this study the influence of the level of technological innovation to create the natural conditions, It shows that the research in this paper is of certain significance.

**Table 1** Descriptive statistical analysis

Variable	Observe	Average	Standard	Minimum	Maximum
RD	13782	17.382	1.427	13.555	21.184
size	13782	22.139	1.177	19.941	25.755
Lev	13782	0.38	0.19	0.053	0.886
ROE	13782	0.051	0.071	0.234	0.316
IRR	13782	0.141	0.432	0.654	2.266
Stol	13782	33.793	14.242	9.386	74.239

## 4 Empirical Analysis

### 4.1 Benchmark Regression Analysis

Table 2 shows the benchmark regression results of this paper. In order to avoid the impact of other factors on the level of technological innovation in the manufacturing industry and enhance the reliability of the research results, this paper controls the time fixed effect and enterprise fixed effect, and conducts clustered standard errors. Paragraph (1) as a regression results of not adding control variables, and it can be seen that the coefficient of core of this article explain the variable  $treat_i \times post_t$  is positive and significant at 1% level, indicates no.15 of the Taxation[2021] for eligible manufacturing level of technological innovation have a significant role in promoting. Furthermore, control variables are gradually added to columns (2), (3) and (4) for analysis, and the coefficient of the core explanatory variable  $treat_i \times post_t$  is still positive and significant at the level of 1%, which is basically consistent with the benchmark regression results in Column (1). H1 in this paper is preliminarily verified.

**Table 2** Benchmark regression

VARIABLES	(1) RD	(2) RD	(3) RD	(4) RD
$treat_i \times post_t$	0.045 *** (3.52)	0.037 *** (3.07)	0.036 *** (2.97)	0.041 *** (3.41)
size		0.639 *** (19.74)	0.625 *** (19.93)	0.666 *** (19.89)
lev			0.032 (0.47)	0.141 * (1.91)
ROE			0.432 *** (5.19)	0.419 *** (4.88)
IRR				0.006 (0.63)
Stol				0.007 *** (3.51)
Constant	17.377 *** (4673.01)	3.227 *** (4.50)	3.521 *** (5.08)	2.432 *** (3.22)
Observations	13782	13782	13782	13782
R <sup>2</sup>	0.950	0.953	0.954	0.954

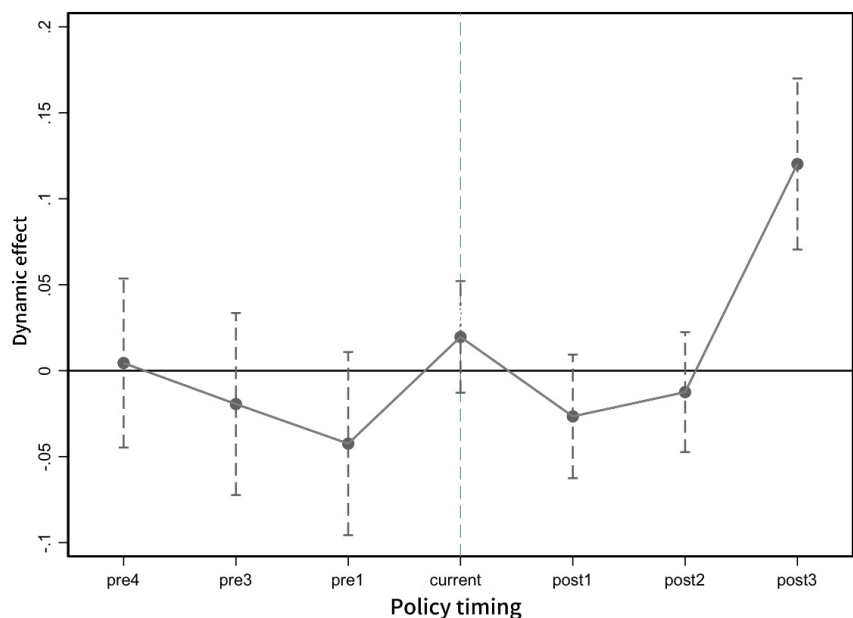
Firm fixed effects	No	Yes	Yes	Yes
Time fixed effects	No	Yes	Yes	Yes

Robust t-statistics in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

#### 4.2 Robustness Test

##### 1 Parallel trend test

Fig.1 shows the parallel trend test diagram of enterprise technological innovation level RD. current represents the implementation period of VAT policy, namely the second quarter of 2021, pre\_4, pre\_3 and pre\_1 represent the time before the implementation of the policy; post\_1-post\_3 represents the time after the policy is implemented, that is, the fourth quarter of 2021, the first quarter of 2022, and the second quarter of 2022.

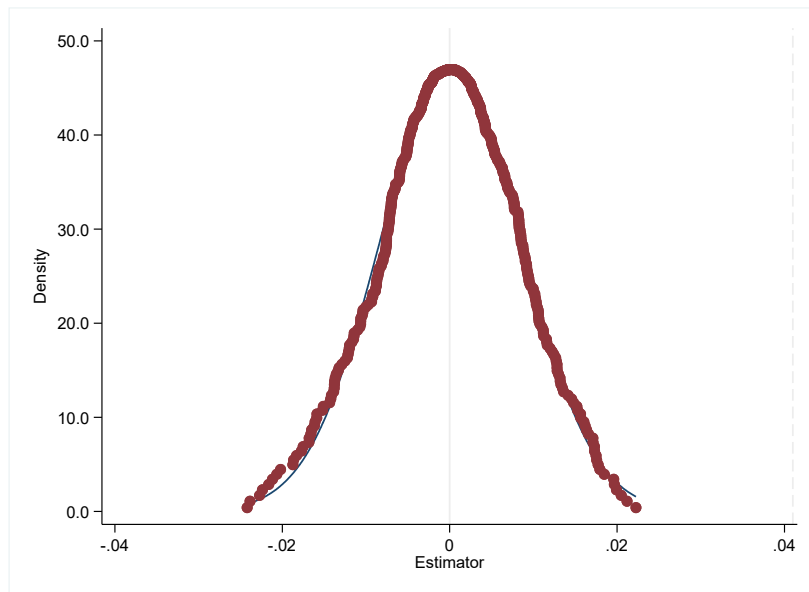


**Fig.1** Parallel trend test

It can be seen from the figure that the coefficient of the core explanatory variable is not significant before the implementation of the policy, which confirms that the change trend of the two groups of data is not significant before the implementation of the policy. The parallel trend test passes, and the DID method can accurately and effectively evaluate the policy. At the same time, the corresponding regression coefficient in the third period after the implementation of the policy is statistically significant, indicating that the VAT credit refund policy does have an impact on the experimental group. The reason for the insignificant coefficient in the current period and the last two periods may be that the policy effect has a lag effect, that is, the impact of the tax rebate policy on the level of technological innovation in the manufacturing industry has a time delay.

## 2. The placebo inspection

To confirm that the conclusion is not a random result, a placebo test is needed. Specifically, referring to the practice of Zheng Chenchen et al. (2023), this paper conducts 500 random sampling by randomly drawing the interaction term.<sup>[6]</sup> Figure 2 shows the distribution density of the estimated coefficient, and the dotted line represents the coefficient value of the interaction term in the real benchmark regression of 0.041, which is outside the two ends of the normal distribution of the coefficient of the interaction term, and is obviously an outlier. This shows that the conclusion of this paper is not random, and it is not unrelated to the fact that the tax rebate policy is retained.



**Fig.2** Coefficient distribution after random treatment

## 5 Conclusions and Implications

According to the unbalanced panel data of China's A-share manufacturing listed companies from the third quarter of 2020 to the third quarter of 2022, this paper takes the tax rebate policy introduced in April 2021 as a quasi-natural experiment to verify the impact of the VAT rebate policy on the level of manufacturing technology innovation. The results show that the VAT credit refund has a positive effect on the technological innovation level of manufacturing industry.

Based on the above research, the following policy implications can be drawn:

It is necessary to promote the innovation-driven development of manufacturing and step up efforts to implement the policy of setting aside tax rebates. Under the current international background and the impact of the epidemic, our economy is facing downward pressure. In order to support the innovative development of the manufacturing industry, we need to actively

promote and more strongly implement the tax rebate policy.<sup>[7]</sup> Enterprises face great challenges in maintaining smooth operation, and the tax rebate policy, as a key measure to reduce the burden of enterprises, has a significant capital mitigation effect, which can provide urgently needed working capital for enterprises. <sup>[8]</sup>At the same time, this policy also sends a positive signal of government support, which helps to enhance the confidence of manufacturing enterprises, encourage them to actively invest in R&D and innovation, and promote the transformation from "made in China" to "created in China."

Reasonably relax the conditions for VAT credit refund, so that enterprises can fully enjoy policy dividends. The results show that the policy of VAT set-aside for tax refund has a significant role in promoting the level of enterprise technological innovation. Firms that enjoy this policy show significant improvements in technological innovation compared to firms that do not benefit from this policy.<sup>[9]</sup> This effect is not only applicable to manufacturing, also can be applied in other industries. According to the Announcement of the State Administration of Taxation of the Ministry of Finance on Further Strengthening the Implementation of the Policy of VAT Retained Tax Rebate at the End of the Period (No.14 of Finance and Taxation [2022]), the government has extended the policy of full monthly refund of incremental VAT retained tax credit for advanced manufacturing to qualified manufacturing enterprises, which reflects the great importance the government attaches to the development of the manufacturing industry.

However, there are still many industries of enterprises have not enjoyed the benefits of this policy. This is perhaps because the widespread implementation of the policy may have adverse effects on local finance, involving the consideration of the relationship between the central and local governments. In our country are actively exploring more efficient tax left on drawback mechanism, and on the basis of constantly improve, to gradually expand the scope, policy to keep more industry benefit from greater tax rebate policy. This will further promote the level of technological innovation of enterprises and help achieve high-quality economic development. In addition, the enterprise enjoying dividend policy, improve the level of innovation at the same time, also have more chance to achieve innovation of high yield, for local governments to provide more tax revenue, reduce the financial pressure, forming a virtuous cycle.

## References

- [1] Schumpeter J A. Capitalism, Socialism and Democracy (Second Edition)[J]Political Studies, 1979, 27(4): 594-602.
- [2] Petersen H B C. R & D and Internal Finance: A Panel Study of Small Firms in High-Tech Industries[J]. Review of Economics and Stats, 1994, 76(1): 38-51.
- [3] Lederman Daniel, Maloney F W. Trade structure and growth[M].World Bank Group, 2003, 6(25).
- [4] Myers S C, Majluf N S. Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have[J]. Vol.13, 1984: pp.187-221.
- [5] Brown J R, Petersen B C. Cash holdings and R&D smoothing[J]. Journal of Corporate Finance, 2011, 17(3): 694-709.
- [6] Zheng Chenchen. Leave for VAT rebate policy impact on enterprise innovation research [D]. Zhejiang university of finance and economics, 2023. The DOI: 10.27766 /, dc nki. GZJCJ. 2023.000167.

- [7] Li Yilin. Preferential tax policy effect on enterprises productive investment research[D]. Nanjing university of finance and economics, 2023, DOI:10.27705/d.cnki.gnjcj.2023.000068.
- [8] Qin Hailin, Liu Yan. Whether tax rebates can help manufacturing industry upgrade: a quasi-natural experiment based on VAT rebates policy[J]. Tax economic studies, 2022, 27(05):1-14. DOI:10.16340/j.cnki.ssjyj.2022.05.010.
- [9] Pan Yusha. Leave for VAT refund policy impact on enterprise innovation research[D]. Shanxi university of finance and economics, 2023, DOI:10.27283/d.cnki.gsxcc.2023.001133.