Analysis of the Incentive Effects of Tax Policies on the High-Quality Development of Manufacturing Industry in the Three Northeastern Provinces

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Abstract: Manufacturing industry is the main body of the national economy, the foundation for establishing a nation, the instrument for strengthening it, and the basis for making it powerful. It is an important manifestation of a country's creativity, competitiveness and comprehensive national strength.The "Made in China 2025" strategic plan places innovation at the core of manufacturing development.The Northeast is the old industrial base of the Republic, and the "14th Five-Year Plan for the Comprehensive Revitalization of the Northeast" fully assist the transformation and upgrading of the manufacturing industry in the old industrial base of the Northeast, which urgently needs to be given new tax incentives to help the development of productive forces.

Key words: High-Quality Development; Tax Policy; Incentive Effect

1. Introduction

The report of the 19th National Congress of the Communist Party of China (CPC) first put forward the concept of "high-quality development Development is the foundation and key to solving all problems in our country. Development must be scientific development. We must unswervingly implement the development philosophy of innovation,, green, openness and sharing.The report of the 20th National Congress of the Communist Party of China proposes to promote the high-end, intelligent and green development of manufacturing industry.The report of the Third Plenary Session of the 20th CPC Central Committee proposed to improve and upgrade traditional industries with national standards, and support in transforming and upgrading traditional industries with digital and green technologies.The 14th Five-Year Plan proposes to accelerate the construction of a strong manufacturing country and a strong quality country, enhance the competitive advantage of the industry, and promote the high-quality development of the manufacturing industry.To this end, Heilongjiang, Jilin, and Liaoning provinces have put forward the construction goals of "industrializing the province "Jilin equipment", and "smart manufacturing to strengthen the province", aiming to give full play to the leading role of "data, digitalization, and digital" and help the high-quality development of manufacturing industry.

2. Research Design

2.1 Data Sources.

The empirical data in this article mainly come from the Guotai An database, Wind and CNRDS databases, and the panel data of listed companies the three northeastern provinces from 2013 to 2023 are selected as the research sample.In order to make the research results more authentic and objective, this article refers to the existing research processing when screening samples. One is to eliminate the that have been delisted, marked as *ST and ST. Since the companies have been in a loss state for two consecutive years, the reference value of the financial is small, and if it is adopted, it will affect the reliability of the results.Second, financial and insurance companies are removed; third, observations with missing data and zero values of the core variables are removed; fourth, all continuous variables treated by winsorization, and the quantile standard is set at 1% and 99%.To eliminate the influence of heteroscedasticity, this paper takes the logarithm of the index data that are

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absolute quantities in the empirical analysis.

2.2 Variable Setting.

(1) Dependent variable. This paper uses total factor productivity (TFP) as a proxy variable to measure the degree of high-quality development of industry (Huang et al., 2023[1]; Zhu et al., 2020[2]).Previous studies usually use OP and LP methods to calculate the total factor productivity of Chinese enterprises. In this paper, we use the research of Lu and L (2012) [3] on the calculation of LP method to select the total factor productivity (TFP_LP) as the variable basis for measuring transformation and upgrading of enterprises.

(2) Core explanatory variables. Tax preference: Following the practice of Xu et al. (2023) [4], tax preferenceTAX) is measured by "Received various tax refunds/ (Received various tax refunds Paid various taxes and fees)".

(3) Control variables. It mainly includes: firm size (Size), which is measured by the natural logarithm of the total assets of the at the end of the period; financial leverage (Lev), which is measured by the debt-to-asset ratio of the firm; profitability (Roa), which measured by the return on total assets of the firm; cash flow ratio (Cashflow), which is measured by the ratio of net cash flow from operating activities to total; equity concentration (Top1), which is measured by the proportion of shares held by the largest shareholder. See Table 1.

Table 1. Variable Explanation

Variable category	Variable name	Measurement method
Dependent variable	TFP_LP	Total factor productivity calculated based on the LP method by Lu Xiaodong and Lian Yujun (2012)
Independent variable	TAX	The ratio of the tax refunds received / (the tax refunds received the taxes paid) to the operating income of the year (%)
Mediating variable	FC	The calculation of the FC index
	RD	R&D investment/percentage of the previous period's main business income (%)
Control variable	Size	Natural logarithm of total assets at the end of the period
	Roa	Measured by the return on total assets, i.e., the percentage (%) of the company's net profit to the company's total assets.
	Lev	Measured by the asset-liability ratio, i.e., the percentage (%) of total liabilities/total assets.
	Cashflow	Net cash flow from operating activities/total assets percentage (%)
	Top1	The total number of shares held by the largest shareholder of the enterprise/total number of shares
	Year	The observation is in the year, Year takes 1, otherwise takes 0, with 2012 as the base period.

2.3 Model Construction

In order to study the impact of fiscal and taxation incentive policies on the high-quality development of manufacturing industry in the three northeastern provinces, the benchmark regression model1) is constructed for testing.

$$TFP\_LP_{i,t} = \alpha_0 + \alpha_1 FT_{i,t} + \sum \alpha_x Controls_{i,t} + Year + Code + \varepsilon_{i,t} \quad (1)$$

Wherein, $FT_{i,t}$ Refers to tax preferences (TAX), TFP_LP Represent total factor productivity; $Controls$ Represent the collection of control variables; $\varepsilon_{i,t}$ The residual term is independent of the side variable and satisfies the normal distribution. $Year$ Dummy variable for the year (1 if the firm is in that year, 0 otherwise); $Code$ Individual virtual variable.In the process of research, this article controls the year fixed effect and individual fixed effect to improve the reliability of the conclusion.

To test the mediating role of financing constraints (FC) and R&D investment (RD) in the relationship between tax incentives and total factor productivity, construct the mediating regression models (2) and (3) for testing.

$$Media_{i,t} = \beta_0 + \beta_1 FT_{i,t} + \sum \beta_x Controls_{i,t} + Year + Code + \varepsilon_{i,t} \quad (2)$$

$$TFP\_LP_{i,t} = \delta_0 + \delta_1 FT_{i,t} + \delta_2 Media_{i,t} + \sum \delta_x controls_{i,t} + Year + Code + \varepsilon_{i,t} \quad (3)$$

$Media$ Representing intermediary variables,The model is regressed twice with

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financing constraints (FC) and R&D investment (RD) as mediating variables, respectively.If the coefficients β_1 and ∂_2 in models (2) and (3) are both significant,That is, the mediating variable played a mediating role.

3 Empirical Analysis

3.1 Descriptive Statistics

The descriptive statistical analysis presented in Table 2 reveals that manufacturing enterprises in the three northeastern provinces exhibit relative stability in terms of total factor productivity (TFP), with a mean of 0.799;The mean of tax preference (TAX) is 0.056, indicating that the policy support obtained by enterprises is limited, and the of tax preference is more concentrated;The mean of R&D is 4.056, which reflects the degree of emphasis on technological innovation, but there is a large difference in&D investment.

Table 2. Descriptive Statistics (TAX and RD)

Variable	N	Mean	SD	Min	p25	p50	p75	Max
TFP LP	1401	0.799	0.103	0.568	0.741	0.796	0.857	1.063
TAX	1401	0.056	0.0250	0	0.0420	0.062	0.076	0.090
RD	1401	4.056	2.725	0.040	2.950	4.124	4.130	15.98

3.2 Correlation Analysis

The results of the correlation analysis show that the total factor productivity (TFP_LP) is significantly positively correlated with tax preferences (TAX), with coefficient of 0.326, indicating that tax incentive policies can effectively promote the production efficiency of enterprises; R&D investment (RD) is negatively correlated with factor productivity (TFP_LP) and tax preference policies (correlation coefficients are -0.299 and -0.178, respectively).

3.3 Analysis of Benchmark Regression Results

Benchmark regression results: The coefficient of tax preference (TAX) is 0.829, indicating that it is significant at the 1 significance level ($p<0.01$), which means that for every one unit increase in tax preference, the total factor productivity increases by an average of .829 units, showing that tax preference has a positive impact on the production efficiency of enterprises.

3.4 Analysis of Mediating Effects

The results of the analysis show that tax incentives (TAX) also have a significant promoting effect on R&D investment (RD).Specifically, the coefficient of tax preference is 6.473, which means that for every additional unit of tax preference, the average R investment of enterprises increases by 6.473 units, and this effect is significant at the 1% significance level;The coefficient of R&D investment on total factor productivity is 0.004, indicating that for every unit increase in R&D investment, total productivity increases by 0.004 units, further confirming the crucial role of R&D investment in enhancing production efficiency.

3.5 Robustness Test

The substitution variable method is used to estimate total factor productivity (TFP), which involves replacing the original measure of TFP (such as the LP method with another method (such as the OP method) to test the robustness of the research results.After substituting the variables, the coefficient of tax preference (TAX) remains significant at 0.836, indicating that the positive impact these policies on total factor productivity is consistent across different estimation methods. This enhances the credibility of the findings as it demonstrates the robustness of the policy effects.

4. Conclusion

This paper takes the fixed effect model as the empirical analysis model, selects the data of listed companies in the three northeastern provinces as the sample analysis, analyzes the impact of fiscal subsidies and tax preferences on the high-quality development of manufacturing industry, which provides empirical research support for the fiscal and taxation incentive policies for the high development of manufacturing industry.

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