



# Research on the Influence of Tax Burden on the Research and Development Level of Logistics Enterprises

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**Abstract.** With the implementation of China's structural tax reduction policy, the taxation environment and mode of the logistics industry have changed. China is also actively responding to a series of problems arising from the rapid economic development. As the logistics industry is a strategic emerging industry in China, its potential development force is very strong. Improving its R&D and innovation level is conducive to occupying the market opportunity. In terms of logistics industry, China has issued a series of preferential tax policies to encourage R&D innovation, which can bring considerable benefits to China's economic development by improving the level of R&D. This paper starts with the definition of logistics industry, R&D level and tax burden, determines the data source as the panel data of listed companies in the logistics industry, discusses the relationship between tax burden and enterprise R&D level, and obtains the empirical results that tax burden is positively related to enterprise R&D level and the relationship is significant, and gives policy recommendations based on this conclusion.

**Keywords:** Tax burden · Logistics enterprises · Research and development level

## 1 Introduction

As a productive service industry, logistics industry is one of the important components of the national economy. It runs through production, circulation, consumption and other social reproduction links. Its development plays an important role in promoting regional economic growth and competitiveness. Logistics can be divided into traditional logistics and modern logistics. Now China has put the focus of logistics development on modern logistics, gradually realizing the standardization, intelligence and greening of logistics. In recent years, China's logistics industry has developed rapidly. In 2020, despite the impact of the New Coronary Pneumonia epidemic, the total amount of social logistics in China will still reach 300.1 trillion yuan, an increase of 3.5% year on year. This paper takes the R&D capability of logistics enterprises as a measurement index, and uses the data of listed companies in the logistics industry to analyze the impact of tax burden on the R&D capability of enterprises. It has important practical significance for the government to allocate resources and the development of national economic innovation and

environmental protection. The research of this paper is specific to the listed enterprises in the logistics industry, which provides an important research content for improving the tax burden of promoting the R&D and innovation development of the logistics industry. Through the analysis of this paper, we can see the direction and magnitude of the impact of tax burden on the R&D level of logistics enterprises through data, and provide data support for the subsequent formulation of relevant tax policies in the logistics industry; At the same time, according to the analysis results, the corresponding tax policy reference suggestions are put forward, which can not only promote the economic development, but also enhance the logistics industry's ability to cope with risk challenges.

## 2 Literature Review

Wang Dongmei and Ju Songdong (2009) [1]; Xi Weiqun (2010) [2] believes that the country's implementation of certain preferential tax policies for logistics enterprises is to help logistics enterprises reduce their comprehensive costs and improve efficiency, while reducing the gap between regions; Meng Xiaobing (2010) [3], based on the practices of other foreign countries, believes that it is necessary for China to reform the tax policy for logistics enterprises and proposes further measures; Li Chunlong and Ma Jieshu (2019) [4] started from the existing tax policies of the government and logistics enterprises, inspected the current situation of China's logistics enterprises, found problems, and proposed corresponding solutions. In a word, different scholars have studied the impact of tax burden on the R&D level of logistics enterprises to varying degrees, but there are still shortcomings, especially qualitative analysis, but lack of quantitative analysis, and more from the overall operation of logistics enterprises, lack of the impact of tax burden on logistics enterprises. In view of this, this paper establishes a model and puts forward assumptions, and finally judges the impact of tax burden on the R&D level of logistics enterprises.

## 3 An Empirical Study on the Impact of Tax Burden on the R&D Level of Logistics Enterprises

### 3.1 Data Source and Research Design

**Research Hypothesis.** At present, there are literatures on tax burden and R&D innovation of enterprises, but the final research results are still different. The existing literature mainly explains how the tax burden affects enterprise innovation through innovation R&D input and innovation R&D output, and draws three conclusions through empirical analysis: positive correlation, negative correlation, and insignificant relationship. Therefore, this paper proposes the following hypothesis: tax burden has a negative impact on the R&D capability of enterprises, that is, the two are negatively correlated.

**Source of Samples.** This study selects the panel data of listed enterprises in the logistics industry from 2015 to 2020, which approximately represents the development of the entire industry. According to the research experience of previous scholars and the restrictions of the formula used in this paper, and in order to ensure the accuracy and

completeness of the data, this paper excludes ST and \* ST listed companies, samples with total profits less than 0, samples without R&D personnel and samples with abnormal tax rate. According to the above conditions, a total of 53 samples were finally screened. CSMAR database is the main source of all kinds of data.

**Selection of Variables.** Enterprise research and innovation level (Rd) is taken as the explanatory variable, the core explanatory variable is tax burden (Tax), and the control variable is enterprise size (Size), asset liability ratio (Lev), and R&D personnel ratio (Rdrp).

*Interpreted variable.* Research innovation level, through the enterprise research and development innovation investment amount is measured, when to select r&d spending amount through earnings note of r&d, the data is relatively than accounting subjects within the development expenses and other related projects, more can a comprehensive expression of the enterprise in terms of innovation in all input, Will not be affected by depreciation or amortization and other factors, the performance of more real and objective total input.

*Core explanatory variables.* Tax burden. This paper compares the sum of taxes and surcharges and income taxes in the financial report with the total profit. The larger the value, the heavier the tax burden borne by enterprises.

*Control variable.* The enterprise scale is evaluated by the natural logarithm of the enterprise's revenue. Scale is generally a key factor that has a greater impact on enterprise innovation, because the use of total assets may bring about collinearity related problems. Therefore, this paper selects the operating revenue as the index to evaluate the enterprise scale. The asset liability ratio reflects the financial structure of the enterprise to a certain extent. It is obtained by comparing the total liabilities and total assets in the balance sheet and reflects the long-term debt capacity of the enterprise. The proportion of R&D personnel is expressed by dividing the total number of R&D personnel by the total number of employees. This proportion can compare the company's emphasis on innovative R&D and measure the innovation strength of the enterprise.

**Model Design.** This paper selects the panel data of 53 listed enterprises in China's logistics industry from 2015 to 2020, sets the explanatory variable as the tax burden of enterprises, and then sets the explanatory variable as the amount of R&D investment. For the panel data of listed logistics enterprises, a multiple regression analysis is carried out. Drawing on previous scholars' research ideas, this paper has established the following model to test the specific relationship between explanatory variables and explained variables:

$$RD = a + bTax + cSIZE + dLev + eRDRP + \varepsilon$$

### 3.2 The Empirical Analysis

**Descriptive Statistics of Variables.** Table 1 describes several variables in terms of minimum value, maximum value, mean value, etc. to show the performance of each variable. According to the panel data descriptive statistical analysis results of 53 samples

of listed enterprises in the logistics industry, in terms of the explained variables, the minimum value of enterprises' innovation R&D investment is 8.453 and the maximum value is 23.491, with a large difference, indicating that there is a gap in the investment of listed enterprises in R&D activities. A considerable number of logistics enterprises need to continuously improve their investment in innovation and further improve the overall R&D level. In terms of explanatory variables, the minimum value of tax burden is 0.012, the maximum value is 0.9791, the average value is 0.0485303, and the standard deviation is 0.048702. These values indicate that tax burden has a greater impact on logistics listed enterprises, reflecting to some extent that tax burden affects the R&D investment of logistics listed enterprises. At the same time, there is a very significant individual difference among the sample enterprises, perhaps because of the existence of deferred income tax. In terms of control variables, the average proportion of corresponding R&D personnel is 12.210%, the minimum value is 0.500, and the maximum value is 36.190. This shows that listed enterprises in the logistics industry do not invest too much in R&D innovation. The difference between the maximum and minimum relative values is very obvious, indicating that there is a large gap in the proportion of R&D personnel among listed enterprises. The average value of the corresponding asset liability ratio is 0.516, the standard deviation is 0.536, the minimum value is 0.113, and the maximum value is 0.936. This shows that the overall asset liability ratio of the sample listed enterprises in the logistics industry is within a reasonable range, the gap between different sample listed enterprises is not very obvious, and it is reasonable to have a small number of large differences. The average size of the corresponding enterprises is 22.598, the standard deviation is 1.599, the minimum value is 19.105, and the maximum value is 27.512, which indicates that the size of the sample enterprises is at a level with little difference.

**Table 1.** Descriptive analysis.

Variable	Observed	Mean	Sd	Min	Max
RD	226	18.85	1.923	8.453	23.491
Tax	226	0.356	0.233	0.012	0.9791
SIZE	226	22.598	1.599	19.105	27.512
Lev	226	0.516	0.536	0.113	0.936
RDRP	226	12.210	8.047	0.500	36.190

**Correlation analysis.** According to the above correlation analysis, it can be found that the absolute values of coefficients of all variables are between 0 and 0.7, which basically proves that there is no significant multicollinearity problem among these variables, proving that the regression model is effective, and the relationship between variables can be explained by using multiple linear regression. After the specific analysis, it can be seen that the tax burden is inversely proportional to the R&D and innovation investment of enterprises, and the significant level reaches 1%. From the above data, it can be judged that the hypothesis is preliminarily established. There is a positive correlation between R&D investment and the proportion of R&D personnel, indicating that the higher the

R&D investment, the higher the proportion of R&D personnel in the total number of employees. The correlation coefficient between enterprise scale and enterprise R&D investment is positive. It can be concluded that the more R&D funds invested by enterprises, the larger the enterprise scale. The asset liability ratio is significantly negatively related to the R&D investment of enterprises. It is consistent with the business rules of enterprises in the actual market. If the enterprise liabilities increase, the funds invested in R&D will inevitably decrease (Table 2).

**Table 2.** Correlation Analysis of Variables.

	RD	Tax	Lev	RDRP	SIZE
RD	1.000				
Tax	-0.604***	1.000			
Lev	-0.409***	0.227***	1.000		
RDRP	0.305***	-0.149**	-0.004	1.000	
SIZE	0.687***	0.129*	-0.501***	0.153**	1.000

Note: \*, \*\* and \*\*\* are significant at 10%, 5% and 1% levels respectively.

**Regression Result Analysis.** The overall  $R^2$  is 0.6893, and the P value is 0.0000, which indicates that the selection of the model parameters is very significant. The correlation coefficient of the explanatory variable Tax is negative, which indicates that the tax burden is inversely related to the enterprise's R&D level. By observing the p value, we can find that the tax burden p value is 0.000, which indicates that the tax burden has a significant impact on the R&D level, and the validation hypothesis is valid. At the same time, it is observed that the coefficient of enterprise scale is positive and p value is 0, and the coefficient of R&D personnel proportion is positive and p value is less than 0.05, indicating that these variables have significant and positive correlation with R&D investment. The correlation coefficient of asset liability ratio is negative, indicating that there is a negative correlation between the asset liability ratio and the enterprise's R&D level (Table 3).

**Table 3.** Multiple linear regression results of tax burden on enterprise R&D level

RD	Coef	t	P >  t
Tax	-1.2376	-3.85	0.000
Lev	-0.7518	-1.39	0.165
RDRP	0.0395	4.29	0.000
SIZE	0.9099	17.18	0.000
R-squared	0.6893	AdjR-squared	0.6837
F(4,220)	122.02	Prob > F	0.0000

## 4 Conclusions and Recommendations

According to the empirical research results, this paper mainly draws the following conclusions: There is an inverse relationship between the level of logistics industry R&D and the tax burden. In short, the value-added tax, enterprise income tax, vehicle purchase tax and other taxes involved in the logistics industry occupy the space of R&D funds to a certain extent, which has a reverse effect on the employment of R&D personnel and the purchase of R&D equipment. Although in the context of structural tax reduction, the tax burden of the logistics industry is still not optimistic.

Based on the above conclusions and the actual situation of the logistics industry, the following suggestions are put forward: First, further increase the scope of deductible projects, include labor, labor and other costs into the deductible scope, and increase the input tax of the logistics industry; Second, we should increase the preferential tax policies, increase the proportion of additional deductions for R&D projects, and solve the improper competition through government regulation to offset the losses of innovation activities under the effects of externalities and market failures; Third, simplify the tax items of the logistics industry, unify the tax rates, unify the tax items and tax rates of all links of the logistics operation, and properly introduce the tax support policies of the logistics industry to help enterprises speed up the equipment update.

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