

Research on the relationship between enterprise tax burden and economic development based on multiple regression calculation analysis

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ABSTRACT

Taxation, as one of the rigid expenditures of enterprises, directly affects the production and manufacturing costs of enterprises, and influences their disposable income as well as the improvement of economic level. Based on the data of Shanghai and Shenzhen A-share listed enterprises in China from 2013 to 2023, the study explores the impact of corporate tax burden on economic development based on multiple regression models, and conducts robustness tests by double-difference and reduced-sample methods. The study finds that corporate tax burden has an inverted “U”-shaped impact on economic development, which is positively correlated with economic development when the corporate tax burden is at a low level, and negatively correlated with economic development when the corporate tax burden crosses the most critical point. In addition, in the heterogeneity test of emerging and non-emerging advantageous industries, the tax burden and the high-quality development of enterprises show an inverted “U”-shaped relationship, but the inflection point of the emerging advantageous industries will appear earlier.

Keywords: multiple regression model, robustness test, heterogeneity test, tax burden of enterprises

1. Introduction

Taxation is an important part of a country's finance and one of the important means of regulating economic development. With economic globalization and increasingly fierce market competition, tax policy is particularly important for the support of local and national economies [1-2]. In particular, corporate tax payment, as an important source of tax revenue, plays an inescapable role in economic development. Taxation activity is a product of the development of social and economic activities to a certain extent, and in general, the determination of the level of tax burden should take into account both the financial needs of the government and the actual affordability of taxpayers [3-4]. Tax burden and the country's economic growth and the development of enterprises are inseparable, to which

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many scholars have paid great attention. Angelov and Nikolova [5] confirmed that the increase in the tax burden in the Balkans during the period under review had a negative impact on economic growth, while the economic growth of countries with a lower tax burden and a large share of indirect taxes on the relative share of economic growth effectively. Ozpence and Mercan [6] Using vector autoregression (VAR) analysis found that the tax burden in Turkey has a dampening effect on economic growth and the two interact with each other. However, Paramaiah [7] introduced that there is no causal relationship between tax burden and economic growth in Lesotho, but there is a unidirectional long-run relationship of economic growth on tax burden.

When the fluctuation of the level of tax burden of enterprises will affect the enterprise generation cost, competitiveness, labor cost, willingness to invest, etc. [8-11]. Especially for enterprises with a large number of labor and raw materials as production factors, as well as a large number of enterprises relying on fixed assets and technological innovation, the increase in the tax burden will make the enterprise's production costs further increase and the willingness to invest in new technologies and equipment weakened, thus affecting the development of enterprises [12-14]. In addition, the enterprise tax burden will also affect the profitability and salary level of enterprises, competitiveness has a direct impact. The more taxes an enterprise needs to pay, the greater the impact on the enterprise's net profit, which in turn reduces the profitability of the enterprise, and thus the enterprise is in a disadvantageous position in the market competition, and it is difficult to compete effectively with competitors. However, the tax burden is the economic burden borne by taxpayers to fulfill their tax obligations, which is a comprehensive reflection of the results of the implementation of the national tax policy, and the ultimate reflection of the relationship between tax revenues and economic development [15]. Therefore, it is necessary to explore the relationship between corporate tax burden and economic development.

Tax reduction is a way to reduce the tax burden, Gechert and Heimberger [16] analyzed the impact of corporate tax reduction on corporate economic growth through multiple regression method, but the results are not unique, corporate tax reduction policy may positively or negatively, or even not significantly affect economic growth. Corporate tax affects the level of corporate tax burden, Öz Yalaman [17] analyzed by using VAR model and Granger causality test that corporate tax rate significantly suppresses corporate economic growth, and there is no causal relationship between the two in financial crisis period but there is a unidirectional relationship in non-crisis period in which corporate tax rate affects the economic growth. Odintsov et al [18] analyzed by using the improved Cobb- Douglas traditional two-factor production function to explore the impact of corporate tax burden on the economic performance of agribusiness under the key influencing factors in the development process of agribusiness, and the optimization of the tax burden of agribusiness can improve the production of agricultural products and tax revenue in the agricultural industry. Currently, there are fewer studies on the relationship between enterprise tax burden and economic development, and these studies do not really explore the specific relationship between the two. And multiple regression calculation is a regression analysis method to study the relationship between multiple variables [19], which provides tool support for the study of the complex relationship between corporate tax burden and economic development.

In this paper, the relevant financial data of Shanghai and Shenzhen A-share listed enterprises from 2013 to 2023 are selected as research samples, corporate tax burden is taken as the explanatory variable, economic development is taken as the explanatory variable, and control variables are introduced to construct a multiple regression model to explore the impact of corporate tax burden on economic development. After the baseline regression, double difference method and reduced sample are introduced to conduct robustness test for fixed effects. Finally, heterogeneity analysis is made in the impact of corporate tax burden on economic development from the perspectives of market competition degree and industry type.

2. Study design

2.1. Sample selection and data processing

This paper chooses the relevant financial data of the listed enterprises in Shanghai and Shenzhen A-shares from 2013 to 2023 as the sample, mainly for two reasons: one is based on the availability and validity consideration of the relevant data of the listed enterprises.

Because the financial system of listed enterprises is more sound, the relevant enterprise financial data is more easily accessible, and at the same time, the continuity of the data is better and more credible, so this paper chooses the financial data of Shanghai and Shenzhen A-share manufacturing enterprises as the sample of the study. Secondly, it is because in 2008, the enterprise income tax policy has a large adjustment, the implementation of the new enterprise income tax law will cause the enterprises that already existed before 2008, its financial treatment before and after the difference. Therefore, based on the above two considerations, this paper finally chooses to use the financial data of listed enterprises in the manufacturing industry from 2013 to 2023 as the sample for the study of this paper.

In addition, due to the different operating conditions of each listed enterprise, there will be some enterprises with missing data in some years. Alternatively, some indicator results are obviously different from the real situation. Therefore, in order to improve the credibility of the empirical results, this paper carries out some processing on the selected sample data:

1) Firstly, the sample data of enterprises with abnormal operation are excluded. This is because these enterprises are in poor operating conditions, with great uncertainty in the future, and may face the risk of delisting, thus adversely affecting the sample as a whole, so it is necessary to exclude this part of the sample.

2) Secondly, the samples with tax rates lower than 0 and higher than 1 are excluded. And, in order to reduce the negative impact of extreme values on the overall analysis of this paper, the continuous type variables in it were subjected to the upper and lower 1% shrinking tail treatment. After screening, a total of 11,572 samples were obtained. In addition, all the data in this paper come from CSMAR database.

2.2. Variable Selection and Description

2.2.1. Explained Variables. The explanatory variable in this paper is economic development (*GDP*). It is measured by the growth rate of GDP.

2.2.2. Explanatory variables. The core explanatory variable of this paper is corporate tax burden (*Tax*). The level of tax burden of enterprises is measured by the share of each tax paid by enterprises in the current year as a percentage of their main business income.

2.2.3. Control variables. In addition, the economic structure of a country also affects the level of economic development, that is, the degree of industrialization and the degree of development of the tertiary sector in a country, which determines the sources of obtaining economic gains in a country and its economic vitality. Therefore, the industrial structure variable is selected to represent the level of development of the secondary and tertiary industries in the region (*STRU*). At the same time, the level of a country's and region's fiscal expenditure in turn has an impact on economic growth, and when a country's productivity level is low, it cannot adapt to the development needs of the economy, and it is necessary to moderately increase the fiscal expenditure for economic construction, so this paper also chose the level of fiscal expenditure to illustrate (*CZ*). Human capital stock (*HR*) and the level of fixed asset investment (*I*) are also selected as control variables. Specific variables are defined as shown in Table 1.

Table 1. Study variable

Variable type	Variable symbol	Variable name
Explained variable	<i>GDP</i>	Economic development
Interpretation variable	<i>Tax</i>	Corporate tax collection
Control variable	<i>STRU</i>	Industrial structure
	<i>CZ</i>	Financial expenditure
	<i>HR</i>	Human capital
	<i>I</i>	Fixed assets investment level

2.3. Benchmark regression modeling

2.3.1. Multiple regression models. In quantitative analysis, a regression model in which there are more than two independent variables is called a multiple regression model, and the regression analysis performed on this model is called multiple regression analysis. Generally speaking, the dependent and independent variables obey the following relationship:

$$y = b_0 + b_1x_1 + b_2x_2 + \dots + b_nx_n + u \quad (1)$$

Then, after k observations of dependent variable y and independent variable $x_1, x_2, \dots, x_n$, k sets of observation samples $(y_t, x_{1t}, x_{2t}, \dots, x_{nt})$ are obtained, of which $t = 1, 2, 3, \dots, k$. These k sets of observation samples will satisfy the following relationship:

$$y_t = b_0 + b_1x_{1t} + b_2x_{2t} + \dots + b_nx_{nt} + u_t \quad (2)$$

This relationship is the general form of a multiple linear regression model, where $(y_t, x_{1t}, x_{2t}, \dots, x_{nt}), t = 1, 2, 3, \dots, k$ is the observed sample, $b_j (j = 0, 1, 2, \dots, n)$ is the regression parameter, and u_t is the random error.

The regression coefficient $b_j (j = 0, 1, 2, \dots, n)$ in the model represents the effect of the j th independent variable on the dependent variable when the other independent variables are held constant. This regression coefficient is called the partial regression coefficient.

The expectation function of y is:

$$E(y_t) = b_0 + b_1x_{1t} + b_2x_{2t} + \dots + b_nx_{nt} \quad (3)$$

Assuming that the values of the unknown parameters can be estimated by appropriate methods, replacing them with the unknowns of the overall regression function, the multiple linear regression equation for the sample can be obtained:

$$\hat{y}_t = \hat{b}_0 + \hat{b}_1x_{1t} + \hat{b}_2x_{2t} + \dots + \hat{b}_nx_{nt} \quad (4)$$

It is an estimate of the overall regression equation, where $\hat{b}_j (j = 0, 1, 2, \dots, n)$ is an estimate of $b_j (j = 0, 1, 2, \dots, n)$.

The sample regression equation yields an estimate of the dependent variable $\hat{y}_t$ with a residual e_t usually with some error between it and the normal measurement y_t .

The multiple linear regression equation can be expressed using a matrix as:

$$\begin{pmatrix} y_1 \\ y_2 \\ \dots \\ y_n \end{pmatrix} = \begin{pmatrix} 1 & x_{11} & x_{21} & \dots & x_{n1} \\ 1 & x_{12} & x_{22} & \dots & x_{n2} \\ \dots & \dots & \dots & \dots & \dots \\ 1 & x_{1k} & x_{2k} & \dots & x_{nk} \end{pmatrix} \begin{pmatrix} b_0 \\ b_1 \\ \dots \\ b_k \end{pmatrix} + \begin{pmatrix} u_1 \\ u_2 \\ \dots \\ u_k \end{pmatrix} \quad (5)$$

where $Y = \begin{pmatrix} y_1 \\ y_2 \\ \dots \\ y_n \end{pmatrix}$ is the vector of observations of the dependent variable, $X = \begin{pmatrix} 1 & x_{11} & x_{21} & \dots & x_{n1} \\ 1 & x_{12} & x_{22} & \dots & x_{n2} \\ 1 & \dots & \dots & \dots & \dots \\ 1 & x_{1k} & x_{2k} & \dots & x_{nk} \end{pmatrix}$

is the matrix of observations of the autocovariate most, $B = \begin{pmatrix} b_0 \\ b_1 \\ \dots \\ b_k \end{pmatrix}$ is the vector of regression

parameters, and $U = \begin{pmatrix} u_1 \\ u_2 \\ \dots \\ u_k \end{pmatrix}$ is the vector of random errors.

The model can also be expressed as a matrix:

$$Y = XB + U \quad (6)$$

Similarly, the dependent variable expectation matrix can be expressed as:

$$E(Y) = XB \quad (7)$$

The matrix form of the regression equation for a multivariate linear sample can be expressed as:

$$\hat{Y} = X\hat{B} \quad (8)$$

2.3.2. Model assumptions and construction. According to the relevant research literature, the proposed hypothesis H1: enterprise tax burden on economic development has an inverted “U” type impact, when the enterprise tax burden is at a lower level, positively related to economic development, when the enterprise tax burden crosses the most critical point, the tax burden is negatively correlated with the enterprise's economic development.

This paper firstly analyzes the impact of tax burden on the high quality development of enterprises and establishes model (9):

$$GDP_{i,t} = \alpha_0 + \alpha_1 Tax_{i,t} + \alpha_2 Tax_{i,t}^2 + \alpha_3 Control_{i,t} + \delta_i + \eta_i + \varepsilon_{i,t} \quad (9)$$

where $GDP_{i,t}$, $Tax_{i,t}$ denotes the level of economic development and tax burden in the period of i business t respectively; $Control_{i,t}$ is a control variable, and time fixed effects (η) and individual fixed effects (δ) are further controlled during the empirical analysis; and $\varepsilon_{i,t}$ is the error term.

3. Empirical tests and robustness analysis

3.1. Benchmark regression analysis

3.1.1. Descriptive statistical analysis. The results of descriptive statistics analysis are shown in Table 2. The minimum value of economic development (GDP) is -0.011, which indicates that there are some listed companies with negative net profit and the economy is in loss. The mean value of corporate tax

burden (*Tax*) is 0.212, indicating that listed companies generally bear heavy tax burden. The minimum value of Industrial Structure (*STRU*) is -8.222 and the maximum value is 1.572, indicating that there are large differences among listed companies in different industries. The minimum value of human capital (*HR*) is 11.218, indicating that the personnel departments of some sample companies are better managed.

Table 2. Descriptive statistics of major variables

Variable	N	Mean	Sd	Min	P25	P50	P75	Max
<i>GDP</i>	11572	0.053	0.042	-0.011	0.022	0.042	0.072	0.202
<i>Tax</i>	11572	0.212	0.142	0.012	0.132	0.172	0.252	0.920
<i>STRU</i>	11572	-1.122	1.232	-8.222	-1.272	-0.912	-0.622	1.572
<i>CZ</i>	11572	24.175	1.272	21.765	23.160	23.032	23.96	28.111
<i>HR</i>	11572	0.052	0.052	11.218	0.022	0.032	0.062	0.322
<i>I</i>	11572	0.172	0.162	22.137	0.072	0.132	0.212	0.762

3.1.2. Correlation analysis. The results of the Pearson correlation test [20] in this paper are shown in Table 3. Enterprise tax burden and economic development are significantly negatively correlated at the 1% confidence level, reflecting that the heavier the tax burden, the stronger the rent-seeking motivation of the enterprise management, and the greater the opportunity to use surplus management for personal gain, which is not conducive to economic development to a certain extent. Industrial structure and economic development are also significantly and positively correlated at the 1% confidence level, indicating that the existence of industrial structure is favorable to the improvement of economic development. Most of the other variables are significantly correlated at the 1% confidence level, indicating that the setting of control variables in this paper is more reasonable.

Table 3. Pearson correlation analysis

	<i>GDP</i>	<i>Tax</i>	<i>STRU</i>	<i>CZ</i>	<i>HR</i>	<i>I</i>
<i>GDP</i>	1					
<i>Tax</i>	-0.029***	1				
<i>STRU</i>	0.031***	0.033***	1			
<i>CZ</i>	0.022**	0.035***	-0.055***	1		
<i>HR</i>	-0.163***	0.213***	0.0103	0.143***	1	
<i>I</i>	-0.188***	0.00312	0.0135	0.479***	-0.063***	1

3.1.3. Regression analysis. In order to explore the nonlinear effect of tax burden on economic development, regression test of model (9) is shown in Table 4, where columns (1) and (2) represent the baseline regression results without and with the introduction of control variables, respectively. The coefficient of the quadratic term of enterprise tax burden is -0.0352, and it is significant at the 1% level, and through the calculation of the coefficient value, we get the maximum value point 0.9827, which indicates that there is an optimal threshold of the tax burden on the economic development, and the two show an inverted “U” relationship that rises and then falls, which is in line with the hypothesis of this paper H1. This means that when the tax burden is low, the increase in the actual tax burden of enterprises has a stronger macro-promoting effect than micro-inhibiting effect on economic development. However, when the tax burden of enterprises exceeds the optimal critical value, in the case of limited enterprise capital, the tax burden continues to increase will aggravate the operating pressure of enterprises, the formation of crowded enterprise disposable funds, which leads to enterprises to reduce the strength of R & D investment, enhance the incentive of rent-seeking, etc., reducing the efficiency of the enterprise's utilization of funds as well as the efficiency of investment.

At this time, the macro-promotional effect of the increased tax burden on economic development is weaker than the micro-inhibitory effect, and on the whole, it is an obstacle to economic development.

Table 4. The enterprise tax burden affects the results of economic development

Variable	GDP	GDP
	(1)	(2)
<i>Tax</i>	0.0841*** (4.8145)	0.0876*** (4.8927)
<i>Tax×Tax</i>	-0.0352*** (-3.9157)	-0.0511*** (-3.5568)
<i>STRU</i>		0.0040*** (18.3647)
<i>CZ</i>		0.0005* (1.9519)
<i>HR</i>		0.0137 (1.6734)
<i>I</i>		0.0004 (0.5581)
<i>Constant</i>	0.0751*** 15.7621	0.0924*** 10.7577
<i>Firm</i>	Yes	Yes
<i>Year</i>	Yes	Yes
<i>Observations</i>	11572	11572
<i>R²</i>	0.065	0.071

3.2. Robustness Tests

3.2.1. Double Difference Methods. In this paper, we use the double-difference method and construct a natural experiment using the policy of “Reinventing the Camp” as an exogenous shock, while controlling for both individual and vintage effects in the model. This section narrows the timeframe to 2016-2023, as the policy was first piloted in Shanghai in January 2012, and the scope was not extended to the whole country until 2016. The regression results of the double difference test are shown in Table 5, which shows that in column (1), the regression coefficient of the cross-multiplier term DT is positive and significant at the 5% level without adding control variables. After adding the control variables, the coefficient of the cross-multiplier term in column (2) is 0.005, and the result is significant at the 5% level, which indicates that the economic development has been improved after the implementation of the “business transformation” policy.

Table 5. Did test regression

Variable	(1)	(2)
	<i>GDP</i>	<i>GDP</i>
<i>DT</i>	0.002** (0.003)	0.005*** (0.002)
<i>STRU</i>		0.016*** (0.001)
<i>CZ</i>		-0.004** (0.001)
<i>HR</i>		-0.084***

		(0.007)
<i>I</i>		0.015
		(0.017)
<i>Constant term</i>	0.053***	0.094***
	(0.001)	(0.034)
<i>Observed value</i>	10101	10101
<i>R²</i>	0.045	0.187
<i>Individual fixation effect</i>	YES	YES
<i>Year fixed effect</i>	YES	YES

The prerequisite for applying double differencing is to satisfy the parallel trend test i.e. there is a difference in the regression coefficients of firms before and after the policy reform. In order to avoid the problem of multicollinearity, this paper takes the point of policy reform, i.e. 2016, as the benchmark and examines four years before and after the implementation of the policy. If the sample is subject to the policy shock in the year 2016, let current=1, otherwise 0. If the sample is in the year 1, 2, 3, 4 before the shock, let d1, d2, d3, d4 take 1, otherwise 0. Similarly, if the sample is in the year 1, 2, 3, 4 after the shock, let d1, d2, d3, d4 take 1 respectively, and 0 otherwise, and the test results are shown in Figure 1. The results show that the regression coefficients are not significant in the first 4 years of the policy shock, but in the 4 years after the implementation of the policy, the regression coefficients are significant at the 1% or 5% level, so the double difference model of this paper is in line with the parallel trend test, so the regression results in the previous section are feasible and robust, and at the same time, it shows that the “camping change” tax reduction policy is effective. It also indicates that the tax reduction policy is effective.

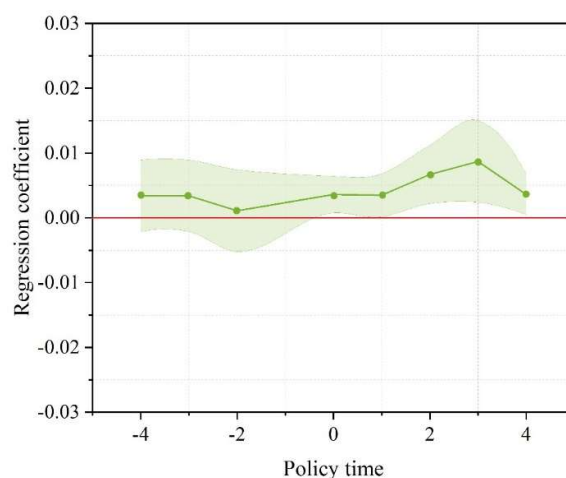


Fig. 1. Parallel trend survey diagram

3.2.2. Sample reduction method. In recent years, with the proposed supply-side structural reform, a series of “tax cuts and fee reductions” have been implemented for manufacturing enterprises, and among the many industries, the scale of tax cuts in manufacturing is the largest, and it is also the enterprise that benefits the most obviously. This paper takes A-share listed enterprises as the research sample, including all industries except the financial industry, and now narrows the sample to manufacturing enterprises to further test the robustness of the regression results. The regression results are shown in Table 6, where it can be seen that based on the two-way fixed-effects model, the regression coefficient of economic development (*GDP*) is negative but insignificant when no control variables are added in column (1); the regression coefficient of economic development (*GDP*) is still negative and significant at 1% level after adding control variables and controlling for the individual fixed-effects in column (2); and the control variables are also added in column (3), the and two-way

fixing for individual and year, the regression coefficient is significantly negative, indicating that the main regression results above are reliable and robust.

Table 6. The impact of the manufacturing enterprise tax burden on the performance of the enterprise

	(1)	(2)	(3)
<i>Tax</i>	-0.001	-0.016***	-0.018***
	(0.008)	(0.007)	(0.007)
<i>STRU</i>		0.022***	0.021***
		(0.002)	(0.002)
<i>CZ</i>		-0.105***	-0.104***
		(0.007)	(0.007)
<i>HR</i>		-0.023*	-0.023
		(0.018)	(0.018)
<i>I</i>		-0.017***	-0.012
		(0.005)	(0.011)
<i>Constant term</i>	0.056***	0.061**	0.037
	(0.004)	(0.029)	(0.039)
<i>Observed value</i>	11711	11711	11711
<i>R²</i>	0.037	0.119	0.211
<i>Individual fixation effect</i>	YES	YES	YES
<i>Year fixed effect</i>	YES	NO	YES

3.3. Heterogeneity test

3.3.1. Heterogeneity analysis based on industry. It has been shown that government subsidies and tax incentives can form effective incentives for enterprises within emerging industries, which are conducive to increasing R&D investment and enhancing core competitiveness. This paper relies on the industry classification standards of the Securities and Exchange Commission (2012) to classify enterprises into two categories: enterprises in emerging advantageous industries and enterprises in non-emerging advantageous industries, in order to examine whether there is a difference in the impact of the tax burden of different enterprises on economic development, and the results are shown in Table 7. Among them, the emerging advantageous industries include 10 industries such as pharmaceutical manufacturing, computer, communication and other electronic equipment manufacturing.

Table 7 shows that whether in the emerging advantage industry group or non-emerging advantage industry group, the quadratic coefficient of enterprise tax burden is significantly negative, supporting the inverted "U" type relationship, but the inflection point of the emerging advantage industry group is significantly earlier than that of the non-emerging advantage industry group, and the difference of coefficients between the groups is significant at the 1% confidence level. Due to the emerging advantageous industries generally higher technological requirements, knowledge, technology and other input costs are high, the application of complex technologies and the accumulation of production experience for a longer period of time, coupled with the technology blockade by developed countries, enterprises in the business activities of the risks and uncertainties faced by a large number of factors, exacerbating the micro-inhibition of the tax burden on the development of the economy. At the same time, the current emerging advantageous industries are in the exploratory period, the market recognition of the industry is relatively low, the enterprise's product structure, production technology, business strategy and so on need to be constantly adjusted. Therefore, compared with non-emerging advantageous industries with mature market mechanism, the increase of tax burden of emerging advantageous industries is more likely to send negative signals to stakeholders and produce negative impact on economic development. On the contrary, the division of labor and cooperation system of

non-emerging advantageous industries is relatively perfect, and under the pressure of the tax burden, enterprises shift to the direction of policy support through the introduction of technology, equipment renewal, etc., so that the guiding role of tax policy can be strengthened, which is beneficial to the economic development, and mitigates the micro-inhibitory effect of the increase of enterprise tax burden on the economic development.

Table 7. Industry heterogeneity test results

Variable	GDP	GDP
	Non-emerging advantage industries	Emerging dominance
<i>Tax</i>	0.0791*** (3.1458)	0.1611*** (4.7922)
<i>STRU</i>	0.0041*** (14.1128)	0.0049*** (14.2476)
<i>CZ</i>	0.0081 (0.5841)	0.0162 (1.2519)
<i>HR</i>	0.0091 (1.1977)	0.0219*** (2.1156)
<i>I</i>	0.0028 (1.8522)	0.0013 (0.5327)
Constant	0.0782*** (11.0855)	0.0743*** (10.2836)
Firm	YES	YES
Year	YES	YES
Observations	13874	11683
R-squared	0.058	0.074

3.3.2. Analysis of the degree of competition in different markets. This paper measures the degree of market competition of enterprises based on the Herfindahl Index (*HHI*) [21] and groups them with the median of the Herfindahl Index (*HHI*) as the boundary, when the index is greater than or equal to the median, it defines this type of enterprise as the enterprise with a large degree of competition in the market, and when it is less than the median it defines it as the enterprise with a small degree of competition in the market, and the results of the empirical evidence are shown in Table 8. From the regression results in columns (1) and (2) of the table, it can be seen that the regression coefficient of the economic development (*GDP*) of enterprises with a large degree of market competition is significantly negative at the 1% level, while the coefficient of the economic development (*GDP*) of the industry with a small degree of market competition is insignificant, which indicates that the tax burden has a greater negative impact on the economic development of the enterprises with a large degree of market competition, as compared to the enterprises with a small degree of market competition. The reason for this may be that for enterprises with a high degree of market competition, they have a stronger desire to improve their competitive advantage, so when the tax burden of enterprises is reduced, such enterprises will reasonably allocate the extra after-tax profits and put these resources into investment activities or research and development activities, etc., so as to realize the purpose of enhancing competitive ability and improving economic development. Based on the above analysis, it is concluded that enterprises with a higher degree of market competition are more capable of promoting the negative effect of tax burden on economic development than enterprises with a lower degree of market competition.

Table 8. Heterogeneity analysis of market competition

	Competitive degree	Less competitive
	<i>GDP</i>	<i>GDP</i>
<i>Tax</i>	-0.035***	-0.006
	(0.008)	(0.008)
<i>STRU</i>	0.015***	0.022***
	(0.001)	(0.001)
<i>CZ</i>	-0.008***	-0.006***
	(0.001)	(0.001)
<i>HR</i>	-0.128***	-0.079***
	(0.007)	(0.008)
<i>I</i>	0.006***	0.004
	(0.001)	(0.002)
<i>Constant term</i>	0.029	0.045
	(0.032)	(0.042)
<i>Observed value</i>	13625	13625
<i>R²</i>	0.241	0.187
<i>Individual fixation effect</i>	YES	YES
<i>Year fixed effect</i>	YES	YES

4. Responses and recommendations

1) Optimizing the tax structure and reducing the burden on enterprises. The heavy tax burden of enterprises is attributed to the unreasonable tax structure. Therefore, adjusting and optimizing the tax structure is the fundamental way to reduce the tax burden of enterprises. First of all, the government should focus on the structure of the existing tax types, and constantly adjust to optimize and improve, so that the tax system can be better adapted to the characteristics of the local economic development and the needs of the market development. The specific reform directions are as follows: first, gradually change the double main tax system of income tax and the single main tax system of turnover tax, increase the proportion of direct tax, reduce the proportion of indirect tax, and adjust the gap between different taxes, which is of great significance to reduce the tax burden of private enterprises; second, adjust the turnover tax system, optimize the structure of the tax system, so that the various types of taxes can be coordinated with each other. With regard to the optimization of turnover tax, the conversion of business tax to value-added tax is an important initiative of China's efforts in this regard, and Fujian Province has carried out a pilot reform at an early stage and achieved good results, with obvious tax reduction effects in the service industry and other industries. The transfer tax system has been simplified and the whole tax system has been optimized after the "camp to VAT". However, according to the statistics on the government website, it can be seen that the enterprises that originally did not pay business tax benefited less. Therefore, the "business tax reform" still needs further improvement.

2) Optimize the collection and management mechanism and improve the collection and management level. The important measures to ensure tax revenue and promote tax fairness also need to optimize the collection and management mechanism and improve the collection and management measures. Improvement of tax collection and management level is the fundamental to effectively reduce tax loss and tax collection cost, which can make the actual tax burden and nominal tax burden consistent. Effective tax collection and management is the basis for ensuring the government's ability to organize fiscal revenues, and it can also reserve some space for the structural adjustment of the tax system, making it possible to reduce the tax burden of enterprises. To improve tax collection and management, we should adhere to the tax law and tax principles, and resolutely implement the tax law, policies and

regulations. Within the scope permitted by law, tax collection and management should be strengthened, tax risks and loopholes in collection and management should be actively prevented, and tax collection and management should be carefully designed to be better scientific and specialized.

5. Conclusion

In order to study the relationship between enterprise tax burden and economic development, this paper adopts the multiple regression method to construct a regression model and put forward hypotheses. The results of the study show that the tax burden and economic development is an inverted "U" type relationship, with the increase of enterprise tax burden, the economic development is first increased and then reduced; economic development and enterprise tax burden is a significant negative correlation, which is manifested in the actual tax burden of the company, the higher the actual tax burden of the company, the more inclined to R & D expenditures expensing, the lower the economic development. Economic development is higher when the tax burden of the firm is lower and vice versa. Compared to firms with a small degree of market competition, firms with a large degree of market competition have a greater negative impact on the economy in terms of tax burden. The burden on enterprises can be reduced by optimizing the structure of the tax system and optimizing the collection and management mechanism to improve the level of collection and management.

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