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The Tax Planning of Enterprises Will Improve Their Total Factor Productivity

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Abstract

Improving total factor productivity is the key to accelerating the development of economy to high quality, and the production and operation activities of enterprises need sufficient cash flow support. In fact, when enterprises carry out independent innovation and project investment, most of them will encounter financing constraints. When the cash flow of enterprises is not sustainable or it is difficult to boost the activities of improving total factor productivity, scientific and reasonable tax planning of enterprises will provide them with better opportunities. Reasonable tax avoidance behavior of enterprises can increase capital inflows, boost technological innovation and investment activities, and thus significantly improve total factor productivity. It is found that there is a significant moderating effect of external mechanism on the effect of corporate tax avoidance on TFP. The stricter the external supervision of enterprises is, the greater the role of tax avoidance activities in promoting TFP is. The conclusion of this paper clarifies the impact of tax avoidance on the high-quality development of enterprises, and has profound policy implications.

Keywords

Corporate Tax Avoidance; Total Factor Productivity; TFP; External Mechanism of R & D and Innovation Investment Activities.

1. Introduction

The growth rate of total factor productivity is often used as an evaluation index of scientific and technological progress. Total factor productivity reflects not only the level of technology, but also the level of production efficiency. In order to improve efficiency, it is necessary to substantially increase the Solow residual value in the production function, that is, to improve the total factor productivity of enterprises. Therefore, it is of both practical significance and academic value to discuss the factors affecting the total factor productivity of micro-enterprises in depth.

At present, most of the academic research focusing on total factor productivity focuses on the impact of city size, economic agglomeration, scientific research and experimental development on regional TFP. Based on the literature at home and abroad, it is found that the research on tax avoidance at this stage is mostly carried out from two aspects: its influencing factors and negative effects. These studies do not directly focus on the impact of corporate tax avoidance behavior on improving the total factor productivity of enterprises, and there is a lack of literature on the relationship between corporate tax avoidance behavior and total factor productivity.

Based on the total factor productivity of micro-enterprises and the panel data of A-share listed companies in China, this paper empirically discusses the impact of tax avoidance on the total factor productivity of enterprises. The results show that corporate tax avoidance significantly improves the level of total factor productivity of the enterprise itself, and further explores the moderating and promoting effect of the external supervision and management mechanism on

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the relationship between corporate tax avoidance and total factor productivity. The results show that the stricter the external supervision of enterprises is, the greater the role of tax avoidance in promoting TFP of enterprises is. Therefore, there is a significant moderating effect of external mechanism on the effect of corporate tax avoidance on TFP.

Compared with the existing literature, the contributions of this paper are as follows: (1) The conclusion of this paper clarifies that the external behavior of corporate tax avoidance affects the total factor productivity of the enterprise itself; (2) Compared with the previous research results, this paper investigates the impact of tax avoidance on the business value and information environment of enterprises. Starting from the economic consequences of tax avoidance, this paper makes an in-depth study and expands to the total factor productivity level of enterprises themselves. This not only contributes to the study of the impact of tax avoidance on the business value of enterprises, but also enriches the research results of tax avoidance agency view. (3) The conclusion of this paper has rich economic policy implications. The empirical results of this paper show that the stricter the external supervision of enterprises is, the greater the role of tax avoidance in promoting TFP of enterprises is. In enterprises with heavy external supervision, tax avoidance can help enterprises improve total factor productivity.

2. Literature Review and Theoretical Hypothesis

From the realistic aspect, since the 1990s, tax planning has attracted the attention of a wide range of industrialists and investors. In terms of the driving force of corporate tax avoidance, many researchers start from the principal-agent theory, indicating that when the return of corporate tax avoidance is higher than the cost and expense paid, enterprises prefer to avoid tax (Slemrod, 2004). Scholars from all over the world have observed There is a certain relationship between the characteristics and operation mode of enterprises and the tax avoidance behavior of enterprises. The higher the ratio of state-owned assets, the higher the actual tax burden of enterprises (Wu Liansheng, 2009).

Scholars hold different views on the economic consequences of corporate tax avoidance. One view is that corporate tax avoidance reduces the tax burden on enterprises, can increase the cash flow of enterprises and the wealth income of shareholders, improve the business value of enterprises, and add positive market effects. The "taxation effect" holds that the mandatory, gratuitous and fixed characteristics of taxation force enterprises to pay taxes and fees in full and on time every year, and increasing the intensity of taxation will aggravate the reduction of cash flow and profit retention of enterprises, resulting in the reduction of capital investment in production and manufacturing links (Yu Wenchao et al., 2015). For small and medium-sized enterprises The reduction of retained earnings and cash flow of enterprises will further worsen the financing constraints of enterprises (Yu Wenchao et al., 2018), and enterprises have to take measures such as giving up favorable investment opportunities and reducing R & D investment to maintain their operations.

Systematic analysis of the literature shows that the research on tax avoidance at this stage is mainly carried out from two aspects of influencing factors and economic consequences, and the main factors affecting tax avoidance are the characteristics of enterprises themselves, the ways of external control and internal supervision, etc., but there is no final conclusion on the economic consequences of tax avoidance. In particular, the impact of tax avoidance on corporate activities has not been standardized, and should continue to be explored and studied in depth.

To sum up, this paper draws up the following core theoretical hypothesis: the tax planning of enterprises will boost the technological R & D innovation and investment activities of enterprises, thereby enhancing the total factor productivity of enterprises.

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3. Descriptive Statistics and Empirical Model Setting

3.1. Sample Selection and Data Sources

In this paper, the panel of all A-share listed companies in Shanghai and Shenzhen Stock Exchanges from 2008 to 2020 is selected as the original sample, and the sample data of the original listed companies are from the CSMAR database of Guotai'an and are merged. The further screening process of the sample is as follows: First, in order to prevent the interference of the different financial indicators of the financial industry on the empirical results of the article, this paper screens the financial industry and the real estate industry according to the six categories of industry codes of CSMAR. In order to get more accurate financial indicators and avoid the disturbance of various main financial indicators due to the poor operation of enterprises, the sampling of ST companies during the study period is excluded. In order to avoid the interference of extreme values on empirical research, winsorize of up and down 1% is applied to all continuous variables in this paper. Finally, after deleting the sample of enterprises with missing variables, this paper obtains a total of 27358 observations of 3542 enterprises.

3.2. Total Factor Productivity Structure

At present, the accounting of total factor productivity is gradually shifting from the macro level to the micro enterprise level, which has a completely different theoretical mechanism. The traditional accounting of total factor productivity is to estimate the production function, referring to the methods of Olley and Pakes (1996) and Lu Xiaodong and Lian Yujun (2012), this paper uses the op method to calculate the total factor productivity of listed companies in each year. This method can well solve the key problems of endogeneity and sample selection in traditional measurement methods. In addition, in order to ensure the robustness of the results of this paper, because the op method assumes that enterprises can adjust their inputs immediately without cost in the face of productivity shocks, and further to test the robustness of the total factor productivity structure, this paper also constructs the total factor productivity estimation results of LP, OP and LP corrected by ACF respectively. Finally, refer to the algorithm of Wooldridge (2009). As mentioned above, the one-step estimation method of GMM optimizes the op and LP estimation methods, that is, it solves the potential discrimination problem in the first step estimation proposed by ACF, and can obtain a robust standard error while taking into account the sequence correlation and heteroscedasticity.

3.3. Tax Avoidance of Enterprises

Referring to Ye Kangtao and Liu Xing (2014), this paper uses four methods to measure the degree of tax avoidance of listed companies to ensure the robustness of the results. Tax avoidance indicators are usually divided into two categories: one is the actual income tax rate of enterprises, and the other is the accounting-tax difference indicators of enterprises.

For the first category of indicators, we first need to calculate the difference between the nominal income tax rate and the actual income tax rate (RATE _ diff) to reflect the degree of tax avoidance of enterprises. In addition, the Dyreng et al. (2008) pointed out that in view of the existence of tax returns and long-term tax disputes between enterprises and local tax bureaus, it is not appropriate to use the current effective tax rate to measure the degree of corporate tax avoidance. In view of this, this paper uses the five-year average of the difference between the nominal income tax rate and the effective tax rate of listed companies (LRATE _ diff) to measure the degree of tax avoidance of enterprises.

For the second category of indicators, the accounting-tax difference index is often used to interpret the degree of tax avoidance of enterprises. First, we need to construct Accounting-Tax Variance (BTD) = (Accounting Profit Before Tax-Taxable Income)/Total Assets at the End of the Period. Of which, taxable income = current income tax expense/nominal income tax rate. The

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bigger the difference between accounting and tax is, the bigger the difference between accounting profit and taxable income is, which indicates that enterprises are more likely to get involved in tax avoidance activities. Furthermore, this paper also constructs the accounting-tax difference DDBTD after deducting the impact of accruals, which is calculated by formula (1):

$$BTD_{it} = \alpha TACC_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

The accounting-tax difference DDBTD after eliminating the effect of accruals is:

$$DDBTD_{it} = \mu_i + \varepsilon_{it} \quad (2)$$

It represents the portion of the BTD that cannot be accounted for by accruals.

3.4. Setting of Empirical Model

In order to test the above theoretical assumptions, this paper will use the panel data of listed companies to construct a two-way fixed effect model to empirically test the impact of the allocation of real estate financial assets on enterprises, as shown in formula (3):

$$TFP_{it} = \beta_0 + \beta_1 TA_{it} + \beta_2 X_{it} + Year\_FE + Industry\_FE + \varepsilon_{it} \quad (3)$$

In formula (3), subscripts I and t represent the listed company and the fiscal year, respectively. Core explained variableTFP_{it}It refers to the total factor productivity of listed company I in year t, which is used to measure the production efficiency and high quality development level of enterprises. In the benchmark regression, this paper uses the classical OP method to construct the total factor productivity of enterprises (Olley and Pakes, 1996), and then uses different construction methods to test the robustness.TA_{it}It is the core explanatory variable of this paper, that is, the degree of corporate tax avoidance constructed in different ways. Therefore, according to the above theoretical assumptions, the core parameters to be estimated are expectedβ_1Significantly positive.

In addition,X_{it}It is a series of control variables used to control the financial and governance characteristics at various enterprise levels. In order to prevent the heteroscedasticity problem from affecting the reliability of the empirical results, all statistical inferences in this paper are discussed based on the heteroscedasticity robust standard error. To sum up, this paper will use the two-way fixed effects model to make an empirical analysis of the theoretical assumptions proposed above.

3.5. Selection of Control Variables

In terms of control variables, referring to the classic practices in the existing literature, this paperX_{it}Specifically, it includes enterprise size (Size, measured by the natural logarithm of the total assets of listed companies at the end of this year), asset-liability ratio (Leverage, measured by the proportion of total liabilities to total assets of listed companies in this year), enterprise age (Age, measured by the company's listing years), and enterprise performance (ROA). Measured by the rate of return on assets of listed companies this year), fixed assets scale (Fix, measured by the proportion of fixed assets of listed companies this year), cash ratio (Cash, measured by the ratio of cash held by listed companies this year), board independence (Indratio, measured by the proportion of independent directors of listed companies this year), board size (Boardsize, measured by the proportion of independent directors of listed companies this year). Measured by the shareholding ratio of the board of directors of listed companies in the current year), the shareholding ratio of management (Mshare, measured by the shareholding ratio of

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the management of listed companies in the current year), the ownership concentration (Top1, measured by the shareholding ratio of the largest shareholder of listed companies in the current year) and the ownership of enterprises (SOE, if listed companies belong to state-owned enterprises). Otherwise, 0) See Table 1 for the type, name and definition of each variable. Table 2 is the descriptive statistics of the variables.

Table 1. Variable Type, Name and Definition

Variable type	Variable name and letter representation	Variable definition description
Explained variable	Total factor productivity of listed companies TFP _ op	Total Factor Productivity of Listed Companies Calculated by OP Method
Core explanatory variable	Degree of tax avoidance RATE diff	The difference between the nominal income tax rate of the listed company in the current year and the actual income tax rate
Enterprise Control Variables	Enterprise Size	Ln (total assets of the listed company at the end of the year)
	Asset-liability ratio Leverage	Proportion of total liabilities to total assets of the listed company in the current year
	Enterprise Age	Listing period of listed companies
	Business Performance ROA	Return on assets of listed companies in the current year
	Fixed Assets Scale Fix	Proportion of fixed assets to total assets of listed companies in the current year
	Cash ratio	Cash holding ratio of listed companies in the current year
	Board Independence Indratio	Proportion of independent directors of listed companies in that year
	Board size	Shareholding ratio of the board of directors of listed companies
	Management shareholding ratio Mshare	Management shareholding ratio of listed companies
	Equity concentration Top1	Shareholding ratio of the largest shareholder of the listed company in that year
	SOE of state-owned enterprises	If the listed company is a state-owned enterprise, it is 1, otherwise it is 0.

Table 2. Descriptive statistics of variables

	Sample size	Mean value	Standard Deviation	Minimum Value	Median	Max.
TFP op	27358	4.424	0.730	2.72	4.338	6.523
RATE diff	27358	-.003	0.106	-.537	.006	.245
Size	27358	22.119	1.298	19.35	21.924	26.43
Leverage	27358	.411	0.203	.027	.403	.936
Age	27358	9.277	7.241	0	8	27
ROA	27358	.463	0.456	0	.377	3.037
Fix	27358	.211	0.160	.002	.178	.769
Cash	27358	1.296	2.261	.036	.601	30.123
Indratio	27358	39.031	9.965	0	37.5	66.667
Boardsize	27358	11.389	18.770	0	.093	68.606
Mshare	27358	12.181	19.773	0	.134	70.869
Top1	27358	.354	0.149	.082	.335	.758
SOE	27358	.357	0.479	0	0	1

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Furthermore, before carrying out empirical regression analysis, it is necessary to analyze the correlation between the main research variables in order to prevent the model from being unidentifiable due to the complete collinearity between the control variables. The results of the correlation test between the control variables are shown in Table 3. It can be seen from Table 3 that there is no complete linear relationship between the core explanatory variables and the control variables, so there is no systematic bias caused by the highly collinear problem in the statistical inference of this paper.

Table 3. Correlation coefficient matrix of each variable

	RATE_diff	Size	Leverage	Age	ROA	Fix	Cash	Indratio	Boardsize	Mshare	Top1	SOE
RATE_diff	1.00											
Size	-0.02***	1.00										
Leverage	-0.16***	0.55***	1.00									
Age	-0.06***	0.43***	0.37***	1.00								
ROA	-0.04***	-0.06***	0.12***	-0.03***	1.00							
Fix	0.00	0.10***	0.07***	0.08***	0.06***	1.00						
Cash	0.06***	-0.28***	-0.53***	-0.25***	-0.09***	-0.17***	1.00					
Indratio	-0.01	-0.05***	-0.02***	-0.06***	0.10***	-0.02***	0.06***	1.00				
Boardsize	0.04***	-0.34***	-0.32***	-0.49***	-0.00	-0.16***	0.23***	0.07***	1.00			
Mshare	0.04***	-0.34***	-0.33***	-0.50***	-0.01	-0.16***	0.24***	0.07***	0.99***	1.00		
Top1	0.02***	0.18***	0.08***	-0.05***	0.09***	0.09***	-0.01	0.04***	-0.09***	-0.10***	1.00	
SOE	-0.04***	0.36***	0.32***	0.44***	0.11***	0.21***	-0.16***	-0.05***	-0.43***	-0.44***	0.22***	1.00

4. Empirical Results

4.1. Basic Empirical Results

Table 4. Benchmark Stepwise Regression

	(1)	(2)
VARIABLES	TFP_op	TFP_op
RATE_diff	0.085**	0.133***
	(0.041)	(0.028)
Size		0.297***
		(0.003)
Leverage		0.471***
		(0.021)
Age		0.001**
		(0.001)
ROA		0.739***
		(0.009)
Fix		-0.365***
		(0.022)
Cash		-0.002
		(0.002)
Indratio		0.000
		(0.000)
Boardsize		0.005***
		(0.001)
Mshare		-0.004***
		(0.001)

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Top1		0.027
		(0.021)
SOE		-0.119***
		(0.008)
Year FE	YES	YES
Industry FE	YES	YES
Observations	27,358	27,358
R-squared	0.178	0.608

The core explanatory variable is the difference between the nominal income tax rate and the actual income tax rate of listed companies in the current year, which is used to measure the degree of tax avoidance of enterprises. Among them, column (1) does not control the enterprise control variable, but only controls the fixed effects of industry and year, and column (2) further controls the enterprise control variable. From the results of stepwise regression, we can see that the estimated coefficients of all the core explanatory variables of the model are significantly positive, which indicates that corporate tax avoidance improves the level of total factor productivity of enterprises to a certain extent.

4.2. Mechanism Analysis

Table 5. Mechanism Analysis I: Corporate Tax Avoidance and Investment

	(1)	(2)
VARIABLES	Investment	Investment
RATE_diff	0.019***	
	(0.002)	
BTD		0.029***
		(0.011)
Size	0.003***	0.003***
	(0.000)	(0.000)
Leverage	0.001	-0.001
	(0.002)	(0.002)
Age	-0.001***	-0.001***
	(0.000)	(0.000)
ROA	-0.003***	-0.003***
	(0.001)	(0.001)
Fix	0.089***	0.089***
	(0.002)	(0.002)
Cash	-0.001***	-0.001***
	(0.000)	(0.000)
Indratio	0.000	0.000
	(0.000)	(0.000)
Boardsize	0.000	0.000
	(0.000)	(0.000)
Mshare	0.000	0.000
	(0.000)	(0.000)
Top1	-0.001	-0.001
	(0.002)	(0.002)
SOE	-0.006***	-0.007***
	(0.001)	(0.001)
Year FE	YES	YES
Industry FE	YES	YES
Observations	27,347	27,347
R-squared	0.220	0.219

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Tax avoidance will reduce the cash and tax expenditure of enterprises and enhance the financial strength of enterprises, so it can improve the total factor productivity of enterprises. Based on the hypothesis of financial strength, this paper examines the positive role of corporate tax avoidance from two aspects of corporate investment behavior and innovation activities.

Firstly, the mechanism analysis of corporate tax avoidance and investment is shown in Table 5. Among them, the core explanatory variable of column (1) is the index related to the actual income tax rate of the enterprise; column (2) The core explanatory variable is measured by the BTD index of enterprise accounting-tax difference. It can be seen that the estimated coefficients of both are significantly positive at the statistical level of 1%, so the tax avoidance behavior of enterprises improves the investment level of enterprises.

Secondly, in order to consider the innovation activities of enterprises more fully and comprehensively, this paper measures the capital input and output of innovation activities of listed companies. Among them, the natural logarithm of the number of inventions obtained by listed companies in that year is used to measure the output scale of innovation activities of listed companies, and the natural logarithm of R & D investment of listed companies in that year is used to measure the innovation investment of enterprises. RDexp.

Table 6. Mechanism Analysis II: Corporate Tax Avoidance and Innovation

	(1)	(2)	(3)	(4)
VARIABLES	RDexp	lnpatent	RDexp	lnpatent
RATE_diff	0.797***	0.391***		
	(0.086)	(0.057)		
BTD			2.094***	0.581**
			(0.299)	(0.247)
Size	0.867***	0.423***	0.869***	0.426***
	(0.009)	(0.008)	(0.009)	(0.008)
Leverage	-0.622***	-0.233***	-0.646***	-0.261***
	(0.058)	(0.044)	(0.058)	(0.044)
Age	-0.023***	-0.009***	-0.024***	-0.010***
	(0.002)	(0.001)	(0.002)	(0.001)
ROA	0.486***	0.054***	0.491***	0.056***
	(0.031)	(0.017)	(0.031)	(0.017)
Fix	-0.714***	-0.930***	-0.740***	-0.939***
	(0.065)	(0.046)	(0.065)	(0.046)
Cash	-0.014***	-0.015***	-0.015***	-0.016***
	(0.003)	(0.003)	(0.003)	(0.003)
Indratio	0.001**	0.002**	0.001**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
Boardsize	-0.008***	-0.004	-0.008***	-0.004*
	(0.002)	(0.003)	(0.002)	(0.003)
Mshare	0.009***	0.004*	0.009***	0.004*
	(0.002)	(0.002)	(0.002)	(0.002)
Top1	-0.307***	-0.301***	-0.300***	-0.293***
	(0.055)	(0.046)	(0.055)	(0.046)
SOE	-0.009	0.145***	-0.008	0.144***
	(0.023)	(0.017)	(0.023)	(0.017)
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Observations	21,618	27,358	21,618	27,358
R-squared	0.536	0.326	0.534	0.325

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Table 6 is the mechanism analysis of corporate tax avoidance and innovation activities. The explained variables in columns (1) and (3) are the R & D investment of listed companies in the current year, and the explained variables in columns (2) and (4) are the number of inventions obtained by listed companies in the current year. The core explanatory variable for columns (1) and (2) is RATE _ diff, and for the latter two columns is BTD. From the results, we can see that corporate tax avoidance behavior not only increases the investment of enterprises in innovation, but also increases the output of enterprise innovation.

4.3. Regulation Mechanism Inspection

Table 7. Analysis of the moderating effect of external mechanisms

	(1)	(2)
VARIABLES	TFP_op	TFP_op
RATE_diff	0.018	
	(0.059)	
BTD		-0.285
		(0.232)
RATE_diff*Inst_Share	0.348***	
	(0.131)	
BTD*Inst_Share		2.157***
		(0.502)
Inst_Share	-0.151***	-0.149***
	(0.015)	(0.015)
Size	0.308***	0.309***
	(0.003)	(0.003)
Leverage	0.438***	0.435***
	(0.022)	(0.022)
Age	0.001*	0.001
	(0.001)	(0.001)
ROA	0.760***	0.761***
	(0.009)	(0.009)
Fix	-0.377***	-0.382***
	(0.023)	(0.023)
Cash	-0.000	-0.001
	(0.001)	(0.001)
Indratio	0.000	0.000
	(0.000)	(0.000)
Boardsize	0.005***	0.005***
	(0.001)	(0.001)
Mshare	-0.005***	-0.005***
	(0.001)	(0.001)
Top1	0.059***	0.061***
	(0.022)	(0.022)
SOE	-0.117***	-0.117***
	(0.008)	(0.008)
Year FE	YES	YES
Industry FE	YES	YES
Observations	23,803	23,803
R-squared	0.622	0.622

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Are there other important factors that play a role in regulating the path of corporate tax avoidance activities to promote corporate TFP? Based on this, this paper first discusses the regulatory role of external mechanisms. Generally speaking, in view of the possible conflicts of interest between controlling shareholders and minority shareholders of enterprises, there are appropriate external mechanisms to regulate them (Bai Chongen et al., 2005). Referring to the existing literature, this paper uses Inst _ Share to measure the level of external supervision faced by enterprises. The larger Inst _ Share is, the greater the degree of external supervision faced by enterprises is.

The results of external governance regulation are shown in Table 7: it can be seen from the interaction results RATE _ diff * Inst _ Share and BTD * Inst _ Share that the two interaction results are significantly positive, indicating that the stricter the external supervision of enterprises, the greater the role of tax avoidance activities in promoting TFP of enterprises. Therefore, there is a significant moderating effect of external mechanism on the effect of corporate tax avoidance on TFP.

5. Conclusion and Policy Implications

This paper uses the panel data of Chinese listed companies from 2008 to 2020 to study the impact of tax avoidance activities on the total factor productivity of enterprises. The tax avoidance activities of enterprises have obviously improved the total factor productivity of enterprises. In addition, the more stringent the external supervision of enterprises, the greater the role of tax avoidance activities in promoting TFP of enterprises. Therefore, there is a significant moderating effect of external mechanism on the effect of corporate tax avoidance on TFP.

In the literature, there are two completely different theoretical views on the impact of tax avoidance on enterprises. In order to clarify the current research results, this paper explores the impact of tax avoidance on total factor productivity of enterprises. On the one hand, the conclusion of this paper enriches the academic literature in the field of taxation, on the other hand, it also has a very high practical significance, which has guiding significance for government departments, tax agencies and enterprises themselves. After clarifying the impact of corporate tax on R & D and innovation activities, tax authorities can formulate tax-related policies well. We should build a more sound internal control system to make enterprise behavior more standardized, project investment more accurate and efficient, and reduce government intervention in the market. Promote the improvement of market standards more efficiently and improve the fairness and rationality of the market. In the future exploration, the impact path of corporate tax avoidance and total factor productivity can be further explored and studied, making the conclusion more substantial and credible.

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