

Can Tax Incentives Enhance Enterprise Value?— Mediating Effect Based on Research and Development Investment

Zhiwen Song^{1,a,*}, Xiangying Song^{2,b}

¹College of Economics and Management, Foshan University, Foshan, Guangdong, China

²Faculty of Business, Economics & Law, The University of Queensland, Brisbane, Australia

^azwsong@fosu.edu.cn, ^bxiangying.song@uqconnect.edu.au

*Corresponding author

Abstract: Tax incentives is an important policy tool to help to enhance enterprise value. Taking the listed companies in China GEM as samples, this paper empirically examines the impact of tax incentives on enterprise value and the mechanism based on the mediating effect model. The results shows that tax incentives significantly and positively affect the value of GEM listed companies. The greater the intensity of the preferential tax, the greater the promotion effect on the enterprise value. The preferential tax policy promotes the enterprise value by encouraging the GEM enterprises to increase their research and development investment, which plays a part of mediating effect role. This study provides empirical evidence and policy implications for the implementation of tax incentives to enhance enterprise value.

Keywords: Tax incentives; Enterprise value; Mechanism analysis; Mediating effect

1. Introduction

The promotion of enterprise value is the goal pursued by enterprises, and is also a concrete manifestation of the transformation and upgrading of the national industrial structure and steady economic growth (Xiao Chunming and Zhang Wenchun, 2022)^[1]. In recent years, China's economic growth has slowed down significantly and the international economic environment it faces has changed significantly. Influenced by factors such as the US and the West seeking to decouple and break the supply chain, the resurgence of anti-globalization trend of thought and the rise of trade protectionism, China's economic development is facing unprecedented pressure and challenges. Under the severe economic downward pressure, China has implemented a series of preferential tax policies in order to reduce the tax burden of enterprises, encourage enterprises to innovate independently, enhance the value of enterprises and promote high-quality economic development. In-depth study on whether the implementation of preferential tax policies enhances the enterprise value and its mechanism is of great theoretical and practical significance for objectively evaluating the actual effectiveness of preferential tax policies.

Academic circles have paid continuous attention to and evaluated the policy effect of tax incentives on enterprise value. Scholars have studied the impact of tax incentives on corporate value from the perspectives of replacing the business tax with a value-added tax (Cao Ping and Wang Guijun, 2019; Xiao Chunming and Zhang Wenchun, 2022)^[1-2], value-added tax (VAT) credit refund (He Yang et al., 2019; Wu Yili et al., 2021)^[3-4], VAT reduction policy (Tang Zetao and Tang Yugang, 2020)^[5], tax cuts and fee reductions (Janssen Ping and Liu Xiaoying, 2020)^[6], input credit additional deduction (Rao Qian et al., 2020)^[7], research and development expense deduction policy (Da Tanfeng and Liu Deyu, 2023)^[8], accelerated depreciation policy for fixed assets (Liu Xiang and Qiao Yike, 2023)^[9]. The research conclusion generally believes that tax incentives will bring a certain degree of positive impact on enterprise value, but at the same time it will have some negative effects, for example, tax incentives will make some enterprises dependent on government subsidies (He Yang et al., 2019)^[3]. The research on the theoretical logic and mechanism of the impact of tax incentives on corporate value is still insufficient. The GEM enterprise is a market subject with high growth, which promotes independent innovation, realizes intelligent strategy. In-depth discussion on how to use tax incentives to enhance the value of the GEM enterprise is of great significance to the implementation of high-quality economic development strategy in China. Therefore, this paper takes China GEM listed companies as a sample, based on the mediating effect model to analyze the impact of tax incentives on corporate value and the mechanism. The possible marginal contributions of this paper are as follows: First, taking research and development

investment as a mediator variable, this paper investigates the transmission path of tax incentives to enhance corporate value, and reveals the mechanism of tax incentives to enhance corporate value. Secondly, it empirically tests the impact of tax incentives on the promotion of the value of GEM enterprises, provides a reference for exploring the appropriate tax incentives to enhance the value of GEM enterprises, and enriches the research on the promotion of the value of GEM enterprises by government tax incentives.

2. Theoretical Analysis and Research Hypothesis

2.1. The Impact of Preferential Tax Policies on Enterprises Value

Enterprise value is the present value of the earnings generated by an enterprise at various points in the future, which is mainly influenced by the investors and the market's expectation on the future profitability and growth ability of the enterprise (Ohlson, 1995)^[10]. The value of an enterprise depends on its existing profitability and future investment decisions. Therefore, corporate value includes the present value of current earnings and future investment opportunities. The present value of future investment opportunities depends on the degree of realization of future investment opportunities, which is the embodiment of future growth and profitability of an enterprise. Tax incentives can improve the value of an enterprise by affecting its current and future profitability and growth. First of all, tax incentives have a signaling effect. According to the signalling theory, the preferential tax policy has a certain orientation, which will send a favorable signal to the market investors that the enterprises supported by the policy have the growth potential and profitability, thus having a positive impact on the share price of the enterprises enjoying the preferential tax policy. Secondly, preferential tax policies have cost-effectiveness. Enterprise tax payment is essentially operating cost. The preferential tax policy improves the profitability of the enterprise and the value of the enterprise by reducing the tax expense. Third, tax incentives have cash flow effect. The preferential tax policy directly reduces various taxes and fees actually paid by the enterprise, saves the cash outflow of taxes and fees and improves the free cash flow of the enterprise. More cash flows enable enterprises to grasp those investment opportunities with positive net present value, and enhance the profitability and value of enterprises. Based on the above analysis, this paper proposes the research hypothesis:

H1: Tax incentives can significantly enhance enterprises value.

2.2. Tax Incentives and Enterprises Value: the Mediating Effect of Research and Development Investment

The value of an enterprise depends on its present and future profitability, which comes from its core competitiveness, among which the most important core competitiveness is its innovation capability. The preferential tax policy encourages enterprises to increase their investment in research and development to form innovative capabilities, thus enhancing the growth and profitability of enterprises and further enhancing the value of enterprises.

There are the following incentive mechanisms for enterprises to increase R&D investment due to tax incentives: First, tax incentives can correct the market failure of research and development investment. Technical knowledge has the nature of public goods and external characteristics. As the private research and development returns are lower than the social returns, the research and development level is lower than the social optimal level. The preferential tax policy is equivalent to subsidizing the research and development investment of enterprises, increasing the enthusiasm of enterprises for research and development innovation as well as correcting the market failure phenomenon of inefficient allocation of research and development resources (Dechezlepretre et al., 2016)^[11]. Secondly, tax incentives can increase free cash flow within the enterprise and reduce the financial constraints of research and development. The high tax burden will reduce the free cash flow within the enterprise, which will restrict the internal financing and reduce the intensity of research and development investment (Brown et al., 2009)^[12]. Tax incentives are equivalent to injecting a free cash flow to the enterprise, greatly reducing the financial constraints of the enterprise, and thus providing support for the enterprise to carry out more research and development activities. Finally, tax incentives can reduce corporate costs and attract high-end research and development talent. To carry out research and development activities, in addition to investment in research and development funds, a large number of high-end research and development personnel are also required. Research based on enterprises in China shows that every 10% decrease in research and development user cost will lead to a 3.97% increase in research and development

expenditure in the short term (Jia and Ma, 2017)^[13]. A study based on German companies found that companies would pass on more than half of the tax costs to their employees, resulting in lower salaries (Fuest et al., 2018)^[14]. Tax incentives can reduce the tax burden of enterprises, thus reducing costs and improving profitability, so that enterprises have more salary space to provide attractive offers for talents, attract them to improve the level of enterprise research and development.

Based on this, this paper puts forward the research hypothesis:

H2: The preferential tax policy enhances enterprises value by encouraging enterprises to increase their investment in research and development.

The relationship between variables is shown in the following figure:

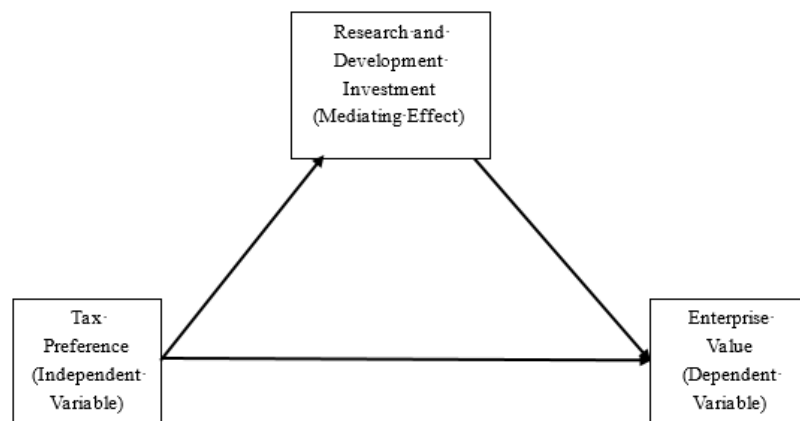


Figure 1: Mediating Effect of R&D Investment between Tax Incentives and Enterprise Value.

3. Research Design

3.1. Sample Selection and Data Sources

This paper takes the listed companies in China Growth Enterprise Market as samples, with a time span of 2018-2022, and carries out the following processing on the samples: (1) Removing the samples for which complete data cannot be obtained; (2) Eliminating the enterprises with missing required indicators; (3) Excluding the abnormal operating companies of ST. In order to avoid the impact of the extreme values in the analysis process on the empirical results, all continuous variables are tailed off at 1% and 99% quantiles to eliminate the extreme values. After the above treatment, 707 companies listed on GEM were selected as the research sample. The relevant data in this paper are derived from the CSMAR database, and the sample data are empirically analyzed using Stata17.0.

3.2. The Selection and Definition of Variables

3.2.1. Independent Variables

Tax incentives(TAX) are used as independent variables. Tax preference refers to the way that the government reduces the tax rate or taxes through the secondary distribution of income. Indirect subsidies has defined the specific tax area, the tax target and its operation behavior. This paper uses "0.25 minus total income tax expense divided by the profit" to measure the tax incentives.

3.2.2. Dependent Variables

The value of enterprise (TOBINQ) is taken as the dependent variable. Some scholars regard financial indicators such as return on total assets (ROA), return on equity (ROE) and corporate market value as proxy variables to measure enterprise value. When using financial indicators to measure the value of an enterprise, there may be factors such as accounting packaging, earnings management and immature stock market. The accounting of financial indicators is based on historical data and cannot reflect the future value of the enterprise, so it is not comprehensive enough as a measurement indicator. TOBINQ value can not only reflect the growth ability of the enterprise, but also reflect the enterprise value from both market value and profitability. In view of this, this paper takes TOBINQ value as the proxy variable of enterprise value.

3.2.3. Mediator Variable

Research and development investment (RD) is used as a mediator variable. There are two kinds of measurement of research and development investment in the existing literature, one is to take the logarithm of the total research and development investment, and the other is to take "(research and development investment divided by sales revenue) $\times 100$ ". This paper measures the intensity of R&D investment by the ratio of R&D expenses to sales revenue.

3.2.4. Control Variables

In addition to the above independent variables and mediator variables, enterprise value is also affected by various factors. In order to mitigate the interference caused by omitted variables, this paper selects fixed asset ratio, cash ratio, debt asset ratio, the scale of enterprises and concentration ratio of shares as control variables, which are represented by PPE, CASH, LEV, SIZE and CR respectively.

The definitions of each variable are shown in Table 1.

Table 1: Definition of Each Variable.

Variable	Name	Symbol	Variable Definition Description
Dependent variable	Enterprise value	TOBINQ	Tobin's q
Independent variable	Tax preference	TAX	0.25 minus total income tax expense divided by the profit
Mediator variable	Research and development investment	RD	Research and development expenses divided by sales revenue
Control variable	Cash ratio	CASH	Cash plus cash equivalents divided by current liabilities
	Debt asset ratio	LEV	Total liabilities divided by total assets
	Fixed asset ratio	PPE	Fixed assets divided by total assets
	Concentration ratio of shares	CR	The shareholding ratio of the largest shareholder
	The scale of enterprises	SIZE	Natural logarithm of total assets at the end of the period

3.3. The Choice of Empirical Model

In order to test the impact of tax incentives on enterprise value and the mediating effect of research and development investment in both, i.e. whether H1 and H2 are tenable, the following model is constructed based on the discussion of mediating effect by Wen Zhonglin and Ye Baojuan (2014)^[15]:

$$TOBINQ_{it} = \alpha_0 + \alpha_1 TAX_{it} + \alpha_2 \sum_{k=1}^5 Controls_{it} + \varepsilon_{it} \quad (1)$$

$$RD_{it} = \beta_0 + \beta_1 TAX_{it} + \beta_2 \sum_{k=1}^5 Controls_{it} + \varepsilon_{it} \quad (2)$$

$$TOBINQ_{it} = \gamma_0 + \gamma_1 TAX_{it} + \gamma_2 RD + \gamma_3 \sum_{k=1}^5 Controls_{it} + \varepsilon_{it} \quad (3)$$

Among them, $TOBINQ_{it}$, TAX_{it} and RD_{it} respectively represent the enterprise value, tax incentives and R&D investment intensity of the I-th sample in the T-th period, $Controls_{it}$ represents the control variables shown in Table 1, and ε_{it} represents the error term. The specific methods to test the mediating effect by distribution test are: firstly, the coefficient α_1 in model (1) is verified. If the result is significantly positive, it indicates that the greater the tax incentives, the higher the enterprise value. Secondly, the coefficient β_1 in model (2) is verified. If the result is significantly positive, it indicates that increasing the intensity of tax incentives will motivate enterprises to increase research and development investment. Finally, the coefficient γ_2 in model (3) is verified. If the coefficient is significant and regular, the existence of mediating effect is proved, which indicates that tax incentives have a positive impact on corporate value through mediator variable research and development investment.

4. Empirical Results and Analysis

4.1. Descriptive Statistics

Table 2 is a descriptive statistical analysis results of all variables. Judging from the whole sample, there is no case where the standard deviation of each variable is far greater than the average value, indicating that there is no extreme sample value. The average value of tax incentives is 0.14, indicating that the vast majority of enterprises have enjoyed the tax incentives, with the minimum value of -0.369 and the maximum value of 0.765. Positive and negative values may be affected by deferred income tax. The average value of TOBINQ is 2.20, the minimum value is 1.03, and the maximum value is 8.371. They indicate that the selected samples of the enterprises are quite different and can fully test the effectiveness of the policy. The maximum value of research and development investment is 58.5% and the minimum value is 0.01%, indicating that there is a great difference in the level of research and development investment among different enterprises. According to the reference standards in most paper, enterprises with more than 5% R&D intensity are usually competitive. The average and median R&D investment of enterprises in the samples are 8% and 5.5% respectively, higher than 5%, indicating that most GEM enterprises value innovation investment and have strong competitiveness. The results of the control variables are basically consistent with the existing paper and will not be described again.

Table 2: Descriptive Statistical Results.

VarName	Obs	Mean	SD	Median	Min	Max
TOBINQ	2068	2.20	1.07	1.891	1.026	8.371
TAX	2068	0.14	0.11	0.123	-0.369	0.765
RD	2068	0.08	0.08	0.055	0.001	0.585
CASH	2068	0.82	1.05	0.447	0.025	8.742
LEV	2068	0.36	0.17	0.352	0.055	0.823
PPE	2068	0.15	0.10	0.140	0.003	0.500
CR	2068	27.65	11.65	26.125	7.600	66.330
SIZE	2068	21.59	0.76	21.547	19.868	23.890

4.2. Baseline regression analysis

Table 3: Baseline Regression Analysis.

	Regression results without control variables	Mixed effect regression results	Fixed effect regression results
	(1)	(2)	(3)
	TOBINQ	TOBINQ	TOBINQ
TAX	0.765*** (4.180)	0.909*** (4.978)	0.676*** (4.015)
CASH		0.173*** (4.699)	0.143*** (4.031)
LEV		-0.232 (-1.221)	-0.366** (-1.988)
PPE		-0.178 (-0.804)	-0.297 (-1.382)
CR		-0.006*** (-2.881)	-0.004** (-2.080)
SIZE		-0.146*** (-3.889)	-0.183*** (-5.055)
Constant	2.098*** (66.821)	5.367*** (6.735)	6.228*** (8.132)
Observations	2028.000	2029.000	2028.000
R ²	0.078	0.069	0.140

Note: ***, **, and * represent significant (double-tailed) at 1%, 5%, and 10% levels respectively, with t values in brackets. The rest table is the same.

In order to investigate the impact of tax incentives on enterprise value, the fixed effect is used to perform regression analysis on model (1) and the baseline regression results in Table 3 are obtained. Column (3) is the regression result using fixed effect estimation, the tax preference coefficient is 0.765, and it is significantly positive at the level of 1%, indicating that tax preference has a positive impact on corporate value and has a significant promotion effect on the value enhancement of GEM enterprises. For comparison, column (1) and column (2) are regression results without control variables and

regression results with mixed effects, respectively. The tax preference coefficient is significantly positive at the level of 1%, which is consistent with the regression results of fixed effect estimation.

4.3. Robust Test

4.3.1. Replace Variables

After changing the measurement index of tax incentives to "tax refund divided by the sum of tax refund plus various taxes paid", the regression analysis of the baseline regression model is performed again. The results are shown in column (2) of Table 4, and the regression coefficient of tax incentives is still positive and significant at 5%, indicating that the results of the baseline regression are robust.

4.3.2. Adjust the Sample Period

In view of the adjustment of tax incentives over time, this paper shortens the sample period to 2020-2022 and regresses the sample again. The results are shown in column (3) of Table 4. The sign and significance of the regression coefficient of tax incentives are the same as those of the original baseline regression model, and the sign and significance of the control variables are basically the same as those of the original model, indicating that the baseline regression result is robust.

4.3.3. Quantile Regression

The above regression estimation is performed using the fixed effect method, and the results may be affected if there is abnormal extreme value in the sample. Therefore, Koenker and Bassett put forward quantile regression method, which uses methods for multiple quantile regression. The test results are more robust and can effectively reduce the interference of extremum. In order to describe the complete picture of the conditional distribution of the dependent variables more comprehensively, this paper further uses the quantile regression method. Column (4), column (5) and column (6) of Table 4 are estimated results of 0.25, 0.5 and 0.75 percentiles respectively. It can be seen that the tax preference coefficients are all significantly positive at the level of 1%, but with the increase of quantiles, they show a gradual upward trend, indicating that the baseline regression results are stable. The degree of tax preference has a positive impact on corporate value. The greater the intensity of tax preference policies, the greater the effect on corporate value enhancement.

Table 4: Robust Test.

	(1) the original model	(2) substitution variables	(3) adjust the sample period	(4) q25	(5) q50	(6) q75
	TOBINQ	TOBINQ	TOBINQ	TOBINQ	TOBINQ	TOBINQ
TAX	0.676*** (4.015)		0.347** (2.539)	0.358*** (4.21)	0.667*** (4.68)	1.301*** (5.06)
TAX1		0.347** (2.424)				
CVs	Yes	Yes	Yes	Yes	Yes	Yes
Year/Code	Yes	Yes	Yes	Yes	Yes	Yes
Constant	6.228*** (8.132)	3.980*** (3.675)	0.354 (0.113)	5.927*** (16.57)	6.033*** (11.58)	5.400*** (4.76)
Observations	2028	2028	1576	2028	2028	2028
R ²	0.140	0.131	0.039			

4.4. Mechanism Validation

The above analysis shows that tax incentives can promote the value of enterprises. The question that will be answered by the mechanism test is whether the preferential tax policy will improve the enterprise value through the mediating path of encouraging enterprises to increase research and development investment. The following text will further analyze the internal relation between the preferential tax policy and the enterprise value.

First of all, model (1), model (2) and model (3) are empirically tested by stepwise regression using the mediating effect test method of Wen Zhonglin et al. (2014). The regression results are shown in Panel A in Table 5. Column (1) represents the effect of tax incentives on corporate value, which is consistent with the baseline regression section and reflects the total effect of tax incentives on corporate value. Column (2) shows the impact of tax incentives on R&D investment, with a coefficient of 0.065 and significant at 1%, indicating that tax incentives can motivate enterprises to increase R&D investment.

Column (3) shows the impact of tax incentives and R&D investment on corporate value. The R&D investment coefficient is 2.151 and significant at 1%, indicating that R&D investment significantly positively affects corporate value. Column (2) the coefficient of tax incentives affecting research and development investment and column (3) the coefficient of research and development investment affecting enterprise value are both significant and positive, indicating that research and development investment plays a mediating role between tax incentives and enterprise value. Tax incentives positively affect enterprise value by encouraging enterprises to increase research and development investment. Column (3) the coefficient of tax incentives affecting corporate value is still significant and positive, indicating that R&D investment plays a part of mediating role and there are other mediating paths. For the companies listed on GEM, corporate value mainly comes from their growth and future profitability. Tax incentives can encourage listed companies to increase investment in research and development, form innovative outputs, and improve their long-term profitability, thus enhancing their corporate value.

In order to test the robustness of the mediating effect, the substitution variable method is adopted, in which the mediator variable is replaced by the natural logarithm of the research and development investment amount. The stepwise regression results are shown in columns (4) and (5), which are consistent with the results in columns (2) and (3), indicating that the mediating effect test results are robust.

Table 5: Mechanism Validation of Tax Incentives Affecting Enterprise Value.

Panel A: stepwise regression test					
	(1)	(2)	(3)	(4)	(5)
	TOBINQ	RD	TOBINQ	lnRD	TOBINQ
TAX	0.676*** (4.015)	0.065*** (4.534)	0.537*** (3.365)	0.750*** (4.725)	0.353** (2.196)
RD			2.151*** (5.946)		
lnRD					0.431*** (12.186)
CVs	Yes	Yes	Yes	Yes	Yes
Year/Code	Yes	Yes	Yes	Yes	Yes
Constant	6.228*** (8.132)	0.036 (0.796)	6.150*** (7.997)	1.110** (2.493)	5.750*** (7.526)
Observations	2028.000	2028.000	2028.000	2028.000	2028.000
R ²	0.140	0.042	0.164	0.474	0.204
Panel B: structural equation mediating effect test					
project	coefficient		Bootstrap Std. Err	BC interval 95%	
Direct effect	0.738		0.204	0.338	1.138
Mediating Effect: R&D Investment	0.171		0.043	0.087	0.255
Total effect	0.909		0.207	0.504	1.314

In order to more strictly verify the mediating path of tax incentives affecting enterprise value, this paper uses the structural equation model of mediating effect to further test. Due to the non-linear distribution of mediating effects, nonparametric bootstrapping method is used to adjust the estimation bias (MacKinnon et al., 2004)^[16], Panel B in table 5 gives the corresponding empirical results. The results show that: (1) the direct effect coefficient is 0.738, and the confidence interval (BC interval 95%) is [0.338, 1.138], excluding 0, indicating that the direct effect of preferential tax policies on enterprise value is significant, which is consistent with the results of stepwise regression test above; (2) The mediating effect coefficient of R&D investment is 0.171, and the confidence interval (BC interval 95%) is [0.087, 0.255], excluding 0, indicating that R&D investment is the mediating effect mechanism that tax incentives positively affect the enterprise value. The above analysis further shows that research and development investment is an mediating path for tax incentives to promote the value enhancement of enterprises. At this point, the mechanism of tax incentives on corporate value has been comprehensively analyzed, that is, hypothesis H2 has been verified: tax incentives do boost corporate value by stimulating enterprises to increase investment in research and development.

5. Conclusions and policy implications

5.1. Conclusion

The enterprises listed on GEM are the market entities with high growth and active independent innovation. It is of great theoretical and practical significance for China to explore how to use the

preferential tax policies to effectively enhance its corporate value for the implementation of high-quality economic development strategy. Therefore, this paper takes the listed companies in China GEM as a sample, and analyzes the impact of tax incentives on corporate value and the mechanism based on the mediating effect of research and development investment. The research results show that: First, tax incentives have a positive impact on corporate value and significantly promote the value of GEM enterprises. The greater the intensity of the preferential tax policies, the greater the promotion effect on the enterprise value. Second, the preferential tax policy promotes the enterprise value by encouraging the GEM enterprises to increase research and development investment, which plays a part of mediating role.

5.2. Policy Implications

This paper has the following policy implications: First, strengthen and improve the preferential tax policies to help enhance the value of enterprises. The research results show that tax incentives can effectively improve the value of GEM listed companies, and the greater the tax incentives, the greater the promotion effect. Therefore, we should build a long-term tax incentive mechanism to enhance the value of enterprises, strengthen and improve the tax incentive system to enhance the value of enterprises listed on the GEM, thus promoting the high-quality economic development of China. Second, the implementation of tax incentives focusing on research and development investment. The research shows that tax incentives can effectively improve the value of enterprises through the mediating path of encouraging enterprises listed on the GEM to increase their R&D investment. Therefore, the preferential tax policy should focus on encouraging enterprises to increase investment in research and development, in order to more effectively enhance the value of enterprises.

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