

Fixed Asset Investment and Enterprise Performance Based on the Moderating Effects of the Nature of Equity

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Abstract. Decisions on fixed asset investment have always been the top priority of enterprise production, operation and management. The success or failure of major investment decisions will be directly related to the performance, survival and development of enterprises. How fixed asset investment affects enterprise performance is still inconclusive, indicating practical significance of continuous in-depth research. In addition, the influence of fixed asset investment and enterprise performance might vary between SOEs and non-SOEs. Therefore, this paper attempts to integrate the nature of equity, fixed asset investment and enterprise performance into an analysis system, combined with the institutional environment with Chinese characteristics, to examine the heterogeneity of fixed asset investment-enterprise performance relationship between SOEs and non-SOEs. Results showed that fixed asset investment of A-share listed companies from 2015 to 2019 was significantly negatively related to enterprise performance. Compared with non-SOEs, the scale of fixed asset investment of SOEs was more dispersed, and the increase in fixed asset investment of SOEs had a more significant negative impact on enterprise performance.

Keywords: Fixed asset investment; Enterprise performance; Nature of equity; Moderating effect.

1. Introduction

As one of the three major financial decisions of enterprises, investment is considered as a key factor affecting enterprise value and an important way of allocating enterprise resources. However, in the actual operation, inefficient investment remains an important factor that affects the market competitiveness and hinders the development of enterprises. As an important constituent part of enterprise assets, fixed assets act as the material basis for effective production and operation of enterprises. However, at present, the substantial shrinkage of fixed asset investment is a typical feature of Chinese real economy. In 2009, the total social fixed asset investment increased by 30.1% year on year, but since then it has shown a declining trend. Ten years later, in 2019, the growth rate of fixed asset investment was just 5.4%. On the contrary, the financial investment market has been excessively prosperous in recent years, and enterprises have become increasingly dependent on financial channels for profits. Therefore, to enhance corporate governance in China how to improve fixed assets investment efficiency and further enterprise performance has become an urgent problem to be solved. As a developing country highly dependent on material capital accumulation, in recent years, China has been trying to maintain fixed asset investment and reverse the “shifting from real to virtual” trend of entity enterprises by adjusting macroeconomic policies. In December 2015, the Central Economic Work Conference put forward the five tasks of cutting overcapacity, destocking, deleveraging, reducing costs and shoring up weak links. Among them, “cutting overcapacity” was listed as the top of the five structural reform tasks in 2016. The serious overcapacity in the steel, cement and other industries was mainly the consequence of blindly increasing and accelerating fixed asset investment a few years ago. In 2019, the State Council issued The Notice on Strengthening Fixed Asset Investment Project Capital Management, further improving the system of investment project capital, adjusting infrastructure project minimum capital ratio, encouraging raising major investment project capital in accordance with the laws and regulations, so as to promote effective investment and risk prevention and improve investment efficiency. In March 2021, Premier Li Keqiang once again emphasized in the 2021 State Council Government Work Report that we should continue to accomplish the five important tasks.

The nature of equity not only has a great impact on enterprise production and operation decisions, but also plays an indispensable role in the determination of corporate goals, responsibilities and missions. From the perspective of economic goals, the particularity of state-owned enterprises (SOEs) lies in that they need to shoulder political and social responsibilities to achieve the goal of adjusting the national economy in the first place, [2,3] and then undertake the task of improving economic interests. In contrast, non-state-owned enterprises (non-SOEs) take maximizing the interests of stakeholders as their main goal. Therefore, SOEs take both profits and social responsibilities into account, instead of blindly pursuing investment projects with high net present value and reducing investment efficiency. From the perspective of management, due to government guarantee and biased policies, the management of state-owned enterprises lacks competition consciousness and innovation spirit, which affects the efficiency of resource allocation. Meanwhile, government intervention can also result in lower investment efficiency of state-owned listed companies than non-state-owned listed companies. In addition, compared with non-state-owned enterprises, state-owned enterprises have a more obvious phenomenon of overinvestment, resulting in low investment efficiency. [6,7]

The possible contribution of this paper lies in the following three aspects. First, SOEs and non-SOEs vary in issues including financing constraints, agency costs, etc., which affect enterprise performance to different degrees. Thus, exploring the moderating effect of the nature of equity nature can help enterprises improve fixed asset investment decisions and adjust fixed asset management mode according to their own equity nature and financial status, so as to improve enterprise performance. Second, there are few studies on the relationship between fixed asset investment and enterprise performance in existing literature, and the research conclusions have not reached a consensus. This paper has positive theoretical significance for further expanding research on fixed asset investment and enterprise performance. Thirdly, the research methods and conclusions of this paper provide reference for solving the practical problems of fixed asset investment management of listed companies in China.

2. Literature Review and Research Hypotheses

2.1 Fixed Asset Investment and Enterprise Performance

Compared with directly exploring the correlation between fixed asset investment and enterprise performance, previous studies focused more on the relationship between asset structure and enterprise performance. Throughout the relevant studies at home and abroad, previous literature has not reached a consensus on the relationship between fixed asset investment and enterprise performance, which may be related to differences in research samples, time periods and perspectives.

2.1.1 Negative Relationship

Some studies examined the negative effect of fixed asset investment on enterprise performance. Czyzewski and Hicks (1992) found that the proportion of fixed assets in total assets is negatively related to enterprise performance. In enterprise production and business operation, fixed assets go through a series of process of purchase, depreciation, repair, scrap, cleaning, which may have adverse impact on enterprise performance due to the characteristics of low turnover, high management risk and earnings deduction, and low liquidity and elasticity (Yu, 1998). Zhao et al. (2005) believed that fixed asset investment may have a negative impact on enterprise performance when the asset scale is relatively fixed. Qin et al. (2009) empirically tested the relationship between fixed asset investment and corporate performance of listed companies in Guangxi, and also concluded that fixed asset investment would reduce corporate performance, since when the proportion of fixed assets is large, the specificity of assets becomes stronger correspondingly. Williamson (1991), Heide et al. (2003), Vita et al. (2010) believed that asset specificity will increase the difficulties and costs of supervision. The reconfiguration of required specific assets increases the “locking effect”, which can lead high risks and probability of being ripped off by contracting parties. As a result, the value created by asset specificity be offset by the rapid rise in transaction costs. Yu and Sun (2014) empirically tested the

relationship between specific asset investment, governance mechanism and enterprise performance based on the data of listed manufacturing companies from 2007 to 2009, and found that specific asset investment would bring adverse effects to enterprise performance when lack of the protection of governance mechanism.

2.1.2 Other Relationship

Other studies found positive, insignificant or non-linear relationship between fixed asset investment and enterprise performance. Kaplan et al. (1997) empirically examined the relationship between investment behavior and enterprise performance based on Tobin's Q and found that the increase of fixed asset investment can significantly improve enterprise performance. Alchian et al. (1999) found that fixed asset investment is conducive to realizing economies of scale and thus improving enterprise performance. Wan et al. (2006) found that investment in fixed assets and other tangible assets will promote accounting performance of enterprises. In addition, Dou (2006), Bai (2007), Wang et al. (2007), Lei (2010), Kang (2012) concluded that there was no significant correlation between fixed asset investment and enterprise performance based on their empirical tests. Yu et al. found that there was an inverted U-shaped relationship between specific investment and enterprise performance based on the empirical data of Shanghai and Shenzhen A-share manufacturing listed companies from 2010 to 2011.

Therefore, the relationship between fixed asset investment and enterprise performance depends on the macro environment and the specific situation of enterprises. Since the 2008 financial crisis, in order to accelerate the recovery of Chinese market economy, the government has adopted proactive fiscal and monetary policies and encouraged enterprises to invest. As a result, fixed asset investment enterprises kept large-scale growth trend in the subsequent few years. Reasonable fixed asset investment is an important means to yield profits and increase enterprise value. However, if enterprises fail to reasonably predict future market demand, there will be great cost burden to future operation, which makes the marginal contribution not enough to cover the fixed cost, thus having a negative impact on the enterprise performance.

At the same time, social resource idle and enterprise overcapacity has become the general phenomenon of economic development. Since fixed assets feature low turnover, liquidity, elasticity and high management risk, excessive fixed asset investment will occupy a large amount of enterprise working capital, increase operational risk and liquidity risk, and adversely affect enterprise performance. In addition, blind investment brings various problems, such as excessive growth rate of fixed assets, unreasonable internal structure of fixed assets, low quality and efficiency of fixed assets, which also hinder the development and performance of enterprises. Thus, we propose the following hypothesis:

H1: After 2008, fixed asset investment of listed companies in China is negatively related to corporate performance.

2.2 The Nature of Equity, Fixed Asset Investment and Enterprise Performance

The nature of equity is an important factor that cannot be ignored to study the behavior decision and output of enterprises in China. More than half of Chinese A-share listed companies are state-owned enterprises. As the agent shareholder of state-owned enterprises, the government intervenes in the business decisions of enterprises. Although with the deepening of the reform of state-owned enterprises, the agency cost and market monopoly power keep falling, the "ownership absence" and "soft budget constraint" of state-owned enterprises lead to significant differences of survival and development environment between SOEs and non-SOEs. Therefore, the same business activities and behaviors of SOEs and non-SOEs may lead to different output results.

Zhang (2009) found that inefficient investment behavior of enterprises would be affected by the nature of controlling shareholders, and enterprises with state-owned shareholders are more prone to over-investment. The serious phenomenon of ownership absence in SOEs lead to insider control problem. Because the managers aim to gain private interests and expand their control, they often fail to effectively predict the social demand for enterprise products, blindly expand investment, thus

reducing enterprise performance. Jiang et al. (2009) found that the tenure of management in SOEs was significantly positively correlated with overinvestment, while the conclusion in non-SOEs was exactly opposite. Tang (2010), Kang (2012) found that the efficiency of fixed assets of state-owned enterprises was low, and the problem of diseconomies of scale existed in fixed asset investment. Wang (2016) concluded that the investment efficiency of non-SOEs in China was significantly higher than that of SOEs through grouping regression. Lian et al. (2021) found that excessive centralization would lead to inefficient investment and have a negative impact on both short-term and long-term enterprise performance. Based on the special political system and market environment in China, Zhang et al. (2022) studied CEO political connections and the financial performance of enterprises, and concluded that government policies and institutions would affect the operation and investment decisions of enterprises, resulting in the decline of financial performance. Thus, we propose the following hypothesis:

H2: The nature of equity has a moderating effect on the relationship between fixed asset investment and enterprise performance. Compared with non-SOEs, fixed asset investment of SOEs has a more significant negative impact on enterprise performance.

3. Research Design

3.1 Data Source and Sample Selection

This study selected A-share listed companies from 2015 to 2019 are taken as the research samples, and the initial samples were processed as follows. (1) Samples of financial and real estate listed companies were excluded; (2) ST and *ST samples were removed; (3) Samples with major financial data missing and abnormal data were eliminated. To avoid the impact of COVID-19 epidemic on our research, we did not use the data in 2020 and later years. A sample of 2300 listed companies was obtained. To reduce the influence of extreme outliers, all continuous variables were winsorized at the 1st and 99th percentile. All the data used in this study were obtained from CSMAR database, and processed by STATA 15.1.

3.2 Variable Design

Table 1. Variable Definitions

Type	Name	Symbol	Variable Definitions
Explained Variable	Enterprise performance	roe	Net profit / shareholder equity mean balance
Explanatory variable	Fixed asset investment	farate	Net fixed assets / total assets
Moderating variable	Equity nature	soe	SOEs = 1, non-SOEs = 0
Control variable	Enterprise size	size	Natural logarithm of total assets
	Asset-liability ratio	lev	total liabilities / total assets
	Equity Balance Degree	zhd	The top ten shareholders' shareholding ratio / the first largest shareholder's shareholding ratio
	Enterprise growth	trgrowth	(operational revenue during the current period this year—operational revenue during the same period last year) / operational revenue during the same period last year
	Industry variable	industry	When a sample is in the industry, industry = 1; otherwise, 0.
	Year variable	year	When a sample is in the year, year = 1; otherwise, 0.

According to the two hypotheses proposed, return on equity (roe) was taken as the explained variable to measure enterprise performance, fixed asset ratio (farate) was taken as the proxy variable of fixed asset investment, and the moderating variable, equity nature (soe) was introduced. To control

the influence of other relevant factors on enterprise performance, we referred to previous research models, and selected enterprise size (size), asset-liability ratio (lev), equity balance degree (zhd), and enterprise growth (trgrowth) as control variables. In addition, considering the impact of industry and macroeconomic environment on enterprise profitability, industry variables (industry) and year variables (year) were also taken as control variables. The overall selection and definition of variables are shown in Table 1.

3.3 Model Construction

To test the Hypothesis H1 and H2, we established Model (1) without considering the moderating effect and Model (2) with the moderating variable, respectively. We expected that the coefficient of $farate_{i,t}$ in Model (1) would be negative, and coefficient of the interaction term $farate_{i,t} \times soe_{i,t}$ would be negative as well.

Models (1) and (2) are as follows:

$$roe_{i,t} = \beta_0 + \beta_1 farate_{i,t} + \beta_2 controls_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$roe_{i,t} = \beta_0 + \beta_1 farate_{i,t} + \beta_2 farate_{i,t} \times soe_{i,t} + \beta_3 controls_{i,t} + \varepsilon_{i,t} \quad (2)$$

where, $roe_{i,t}$ refers to enterprise performance of enterprise i in year t ; $farate_{i,t}$ refers to fixed asset investment of enterprise i in year t ; $controls_{i,t}$ refers to all control variables, including enterprise size, asset-liability ratio, equity balance degree and enterprise growth; β_0 is the constant term and $\varepsilon_{i,t}$ refers to the random error term.

4. Empirical Analysis

4.1 Descriptive Statistical Analysis

Descriptive statistics of variables are shown in Table 2. In terms of roe, the minimum value was -0.639, that is, return on equity was negative, indicating that some enterprises were in a loss with bad business results in a certain year; the range was 0.993, that is, the gap of return on equity of sample data was up to 99.3%, indicating that there was a large gap in the financial performance of the selected samples, which met the requirements of research difference. In terms of farate, fixed asset investment of enterprises varied greatly, with the maximum value being up to 227 times of the minimum value. It can be seen that the fixed asset investment decisions of enterprises in different periods and industries had great autonomy, but the mean and median values were similar, and the standard deviation was small, that is, the dispersion degree of the overall sample was small, which indicated that the vast majority of enterprises have adopted a relatively robust fixed assets investment decision-making mode.

Table 2. Descriptive Statistics

Variable	Mean	SD	Minimum	Median	Maximum	Sample size
roe	0.0578	0.129	-0.639	0.0661	0.354	11,500
farate	0.223	0.162	0.00310	0.187	0.705	11,500
soe	0.379	0.485	0	0	1	11,500
size	22.36	1.246	19.98	22.22	26.19	11,500
lev	0.421	0.197	0.0596	0.413	0.885	11,500
zhd	1.934	0.765	1.056	1.727	4.819	11,500
trgrowth	0.181	0.458	-0.522	0.0972	3.077	11,500

From the perspective of equity nature, the roe of samples was mainly distributed between -5% and 25%. The roe of SOEs had the highest frequency between 2.5% and 5%, while the roe of non-SOEs had the highest frequency between 5% and 7.5%. Thus, the fixed asset investment efficiency of non-SOEs was generally higher than that of SOEs. According to the frequency distribution histogram of farate (Figure 1), both SOEs and non-SOEs exhibited a left-biased distribution, but the fixed asset investment of SOEs ($soe = 1$) was more dispersed than that of non-SOEs ($soe = 0$), which is basically

consistent with the reality. In general, SOEs mostly pursue diversification of investment direction and purpose, while non-SOEs tend to focus on main business and high-return investment direction.

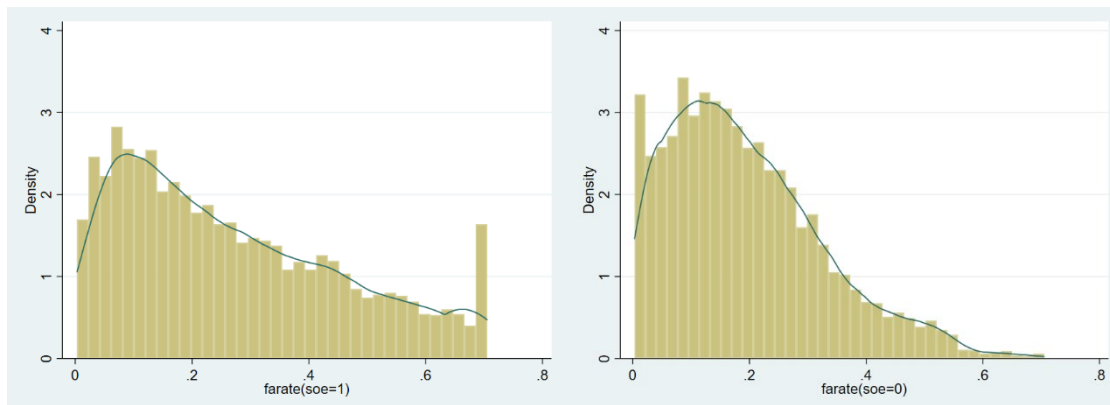


Figure 1. Frequency Distribution Histogram of farate

To further analyze the equity nature of sample enterprises, this paper divided the research objects into groups and tested the mean difference between groups. The difference of the mean difference test was the mean of the group of SOEs subtracted from the mean of the group of non-SOEs. If the difference was significantly positive, the indicator of non-SOEs was significantly higher than that of SOEs.

Table 3. Between-group Mean Difference Test

Variable	Non-SOEs Sample		SOEs Sample		Comparison		
	Sample size	Mean	Sample size	Mean	Mean Difference	t-value	p-value
roe	7144	0.0600	4356	0.0540	0.00600	2.371**	0.018**
farate	7144	0.194	4356	0.269	-0.0750	-24.720***	0.000***
size	7144	22.02	4356	22.93	-0.914	-40.846***	0.000***
lev	7144	0.380	4356	0.489	-0.109	-29.944***	0.000***
zhd	7144	2.087	4356	1.684	0.403	28.358***	0.000***
trgrowth	7144	0.212	4356	0.131	0.0810	9.196***	0.000***

Note: *, **, *** indicates significance at 10%, 5%, 1% levels respectively.

As shown in Table 3, there were great differences in the characteristics of fixed assets investment of SOEs and non-SOEs. The average investment income of non-SOEs was approximately 10% higher than that of SOEs; The fixed asset investment (farate) of non-SOEs was significantly lower than that of SOEs at the level of 1%, indicating relatively cautious investment preference of non-SOEs; The size and asset-liability ratio of SOEs were significantly higher than those of non-SOEs, while non-SOEs were significantly higher than SOEs in terms of equity balance and enterprise growth. These results are basically consistent with the actual situation, which fully proves the reliability of our data and the effectiveness of our data analysis method.

4.2 Correlation Analysis

To avoid the influence caused by data not obeying normal distribution, we tested the Spearman correlation between variables in this study. Results are shown in Table 4. The correlation coefficients between enterprise performance, fixed asset investment, and equity nature were all less than 0.2, and the maximum correlation coefficient between control variables was the coefficient between asset-liability ratio (lev) and return on equity (roe), which was 0.502, and other correlation coefficients were all less than 0.5, indicating that the regression analysis of these variables would not be affected by the multicollinearity. In addition, at the 1% level, farate was significantly negatively correlated with roe. Thus, it is preliminarily concluded that fixed asset investment may negatively influence enterprise performance, which is consistent with Hypothesis 1.

Table 4. Correlation Analysis

	roe	farate	soe	size	lev	zhd	trgrowth
roe	1						
farate	-0.102***	1					
soe	-0.061***	0.171***	1				
size	0.151***	0.077***	0.340***	1			
lev	-0.091***	0.078***	0.265***	0.502***	1		
zhd	-0.008	-0.112***	-0.300***	-0.103***	-0.091***	1	
trgrowth	0.343***	-0.103***	-0.123***	0.065***	-0.003	0.109***	1

Note: *, **, *** indicates significance at 10%, 5%, 1% levels respectively.

4.3 Regression Analysis

To further test the hypotheses proposed in this paper, regression analysis was conducted on the constructed two models respectively. Results are shown in Table 5.

Table 5. Regression Analysis Results

	Explained Variable: roa			
	Model (1)		Model (1)	
	coefficient	coefficient	coefficient	coefficient
farate	-0.065***	-8.00	-0.028**	-2.44
soe×farate			-0.064***	-4.37
size	0.029***	27.39	0.030***	27.43
lev	-0.215***	-31.79	-0.214***	-31.56
zhd	-0.012***	-8.37	-0.013***	-8.54
trgrowth	0.059***	23.95	0.059***	23.83
Constant	-0.497***	-20.55	-0.518***	-21.07
Industry	YES		YES	
Year	YES		YES	
R-squared	0.169		0.171	
F	83.13		78.63	
Observations	11,500		11,500	

Note: *, **, *** indicates significance at 10%, 5%, 1% levels respectively.

According to the regression results of Model (1), coefficient of farate was significantly negative at the 0.01 level, indicating that after controlling time effects, industry effects and other factors, with the increase in fixed asset investment of sample enterprises, costs of operating and maintaining fixed asset increased, and enterprise performance reduced correspondingly. Thus, Hypothesis H1 was verified. In Model (2), after introducing the interaction term, the coefficient of soe × farate was significantly negative at the level of 0.01, indicating that the agency problem and ownership absence of SOEs, and the differences in business objective between SOEs and non-SOEs, made the negative relationship between fixed asset investment and enterprise performance more significant in SOEs. In contrast, non-SOEs can alleviate the negative relationship appropriately. Thus, Hypothesis H2 was verified.

4.4 Robustness Test

Considering that enterprises may inflate profits through related party transactions and other means, roe may be affected by artificial manipulation. To ensure the reliability of the above research conclusions, this paper replaced the return on equity (roe) with the return on total assets (roa), which can systematically reflect comprehensive application level of enterprise total assets, to measure enterprise performance and conduct regression analysis. The robustness test results are shown in Table 6.

According to Table 6, the regression coefficient of farate and roa was still significantly negative at the 1% level, and the moderating effect of soe was also consistent with the above conclusion,

indicating that after the measurement of corporate performance was changed, our conclusion remained unchanged with robustness.

Table 6. Robustness Test

	Explained Variable: roa			
	Model (1)		Model (2)	
	coefficient	t-value	coefficient	t-value
farate	-0.024***	-5.60	-0.013**	-2.16
soe×farate			-0.016**	-1.97
size	0.016***	27.32	0.016***	27.90
lev	-0.133***	-36.49	-0.132***	-35.97
zhd	-0.010***	-6.81	-0.011***	-7.60
trgrowth	0.031***	23.79	0.031***	23.35
Constant	-0.234***	-17.84	-0.248***	-18.95
Industry	YES		YES	
Year	YES		YES	
R-squared	0.196		0.198	
F	99.90		94.59	
Observations	11,500		11,500	

5. Conclusion and Discussion

This paper selected A-share listed companies from 2015 to 2019 as sample, and 11500 sets of observations of 2300 listed companies were finally obtained through data sorting and screening. We examined the relationship between fixed asset investment, equity nature and enterprise performance through multiple regression analysis and moderating effect analysis. Our conclusions are as follows.

First, in the five-year research period, there was a significant negative relationship between fixed asset investment and enterprise performance.

The explanations for this conclusion are as follows. Heavy asset enterprises with large fixed asset investment stock have high costs and heavy burdens in operation and maintenance. In addition, enterprises which rely on fixed asset investment for continuous operation, are easy to fall into the trap of price war due to relatively low entry threshold and fierce market competition. Meanwhile, there are few opportunities for innovation, and enterprises tend to fall into the inherent business model, resulting in insufficient marginal contribution to make up for the growth of fixed costs. All these become adverse factors that limit the improvement of enterprise performance.

Combined our data analysis results with the national policy adjustment during this period, we concluded that the overall roe of the company was low and close to capital cost, which led to low reinvestment willingness and the decline of earnings. The investment in fixed assets was insufficient and the growth rate decreased year by year, while the prosperity of financial investment market attracted many enterprises to “shift from real to virtual”. The industrial optimization and upgrading strategy of “vacating cage to change bird, achieving the nirvana of the phoenix” proposed by the state around 2015, as well as the subsequent important measures of “three removal, one reduction and one supplement”, are all highly targeted economic policies, which also confirmed the risks of fixed asset investment revealed in this paper from different aspects.

Second, the nature of equity moderated the above negative relationship, such that the relationship would be stronger for SOEs than non-SOEs.

According to the comparative analysis results, income from investments of SOEs was lower than non-SOEs, and the high proportion of fixed assets of SOEs directly led to more significantly negative impact of investment on enterprise performance. Most SOEs have been established for a long time, with a large amount of capital accumulation and historical burden. Therefore, the investment efficiency of SOEs tend to be obviously lower than non-SOEs, and the investment scale tend to be obviously more dispersed than non-SOEs.

From the perspective of management, SOEs, controlled by the state or local government, generally have the phenomenon of ownership absence and agency problems. In addition, “profit maximization” is not the ultimate operation goal of SOEs. Instead, SOEs need to shoulder political and social responsibilities in the first place, and then undertake the economic responsibilities. In addition, with the support of national policies, SOEs face less fierce market competition and less risks of bankruptcy, which may lead to lag and neglect in investment decisions, resulting in inefficient investment.

Under the current economic and social environment, most enterprises, especially listed companies, no longer have an urgent need to rely only on the accumulation of fixed assets to enhance corporate value and achieve target profits. Therefore, enterprises shall fully forecast the future economic trend and market demand, make reasonable investment in fixed assets in accordance with the laws and regulations, excavate the production capacity of fixed assets, and optimize the structure of fixed assets. Meanwhile, enterprises can also transform to asset-light enterprises according to their own characteristics, invest more cash in research and development process or projects with high net present value, pursue technological leadership, bear high risks and enjoy high returns at the same time. Specifically, SOEs should continuously deepen the reform according to government policies, strengthen the sense of crisis, and promote transformation and upgrading. In addition, it is suggested to promote the competition mechanism, reinforce the external supervision, strengthen the responsibility of managers through incentive and punishment measures to guard against insider control and optimize the governance structure of enterprises.

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