Exploring the Effects of Managerial Capability on Investment Efficiency: The Moderating Role of Property Rights

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**ABSTRACT**

Taking 50 companies listed in Shanghai and Shenzhen stock market from 2015 to 2019 as sample, the DEA-Tobit model is used to measure the managerial capability in two steps, and OLS regression is used to test whether the managerial capability affects the investment efficiency. We further test the moderating effect of property rights on the relationship between managerial capability on investment efficiency. Empirical results show that managerial capability positively influences investment efficiency. Further research indicates that, compared to privately-owned enterprises, state-owned enterprises will restrain the effect of managerial capability to improve investment efficiency.

**Keywords:** Investment efficiency; Managerial capability; Property rights.

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**I. INTRODUCTION**

Chinese economy is experiencing an unprecedented rapid development. As a sort of capital activity, investment cannot only promote the development of enterprise, but also expand the scale of enterprises to a certain extent. Investment efficiency is an important facet to measure the development and growth of enterprises.

The existing literature examines factors that affect enterprise investment efficiency from two aspects: the internal governance mechanism and the external governance mechanism. With regard to the internal governance mechanism, both Porta et al. (2006) and Hoechle et al. (2012) empirically investigated the relationship between equity structure and investment, and found that if major shareholders control the enterprise, they usually sacrifice the collective interests for personal interests and invest in some projects with low efficiency, which will reduce the investment performance. Cheng et al. (2013) pointed out that the company's investment performance varies with different level of financial reporting quality. As for external governance mechanism, both Lang et al. (1996) and Dennis et al. (2006) found that enterprise debt leverage can inhibit some over-investment behaviors of enterprises. Li et al. (2013) found that the stronger the market competitiveness of the product, the stronger the inhibition. Li et al. (2015) examined empirically the relationship between the external governance environment and enterprise investment performance from the three dimensions, i.e., the rules and regulations, economic development, and government intervention. They pointed out that improving the external environment can promote the improvement of enterprise investment performance.

This study attempts to use the DEA-Tobit model to measure managerial capability in two steps, using 50 companies listed in Shanghai and Shenzhen stock market from 2015 to 2019, to test whether the managerial capability affects the company's investment efficiency through OLS regression, and to further study the moderating role of property rights.

**II. THEORETICAL BACKGROUND AND RESEARCH HYPOTHESES**

**A. Managerial Capability and Investment Efficiency**

For most listed companies in China's stock market, low investment performance poses a serious problem. There are two main reasons for the widespread existence of inefficient investment: information asymmetry and principal-agent conflict. Information asymmetry refers to the information asymmetry between the internal management of the enterprise and the external creditors of the enterprise. Such information asymmetry may have an adverse impact on the
debt capital cost of the enterprise, and thus form a financing constraint, which will reduce the level of investment of the company. As for the principal-agent theory because most enterprises have realized the separation of control rights and ownership rights, the management in the investment decision-making is unlikely to maximize the interests of the enterprise, but to increase their own interests to choose to invest in some inefficient projects, which will seriously harm the interests of shareholders. Management is an important decision-maker when enterprises choose investment plans, which plays an important role in the survival of the company for a certain period of time in the future. Managerial capability refers to the management’s professional knowledge, work experience in the industry and its cognitive level. On the other hand, it refers to the network resources owned by the management, i.e., its comprehensive ability to deal with difficult business management affairs in the daily operating activities. Thus, even if facing the same investment opportunities, the management with different abilities will inevitably make different investment choices, which in turn affect enterprise investment efficiency. Therefore, we hypothesize that,

H1: Other things being equal, improving managerial capability can promote the investment efficiency.

B. The Moderating Role of Property Rights in the Relationship between Managerial Capability and Investment Efficiency

For Chinese firms, the operating activities may be affected by the nature of property rights when making decisions. Gao (2013) found that the heterogeneity of property rights has a significant impact on investment efficiency. Enterprises with different types of property rights will have great differences in business objectives, government intervention and incentive mechanism, which may directly affect managerial capability to improve enterprise investment efficiency. Compared with privately-owned enterprises, state-owned enterprises seem to be easier to obtain resources (such as financing, bidding projects, etc.).

Privately-owned enterprises are less subject to local government intervention, in order to ensure their own healthy survival and sustainable development is their main business objectives (Zhao et al., 2014). The incentive mechanism of management in privately-owned enterprises can promote management to give full play to their advantages and carry out a number of activities to improve efficiency, so as to promote the economic benefits of enterprises and substantially improve the investment performance of enterprises. Under the influence of local government intervention, the operating objectives of state-owned enterprises are diversified. They usually have to implement administrative objectives and incur more social responsibility. Moreover, the promotion of senior managers of state-owned enterprises depends more on the intervention of local governments, resulting in the lack of positive drive of management on investment cost and efficiency. Therefore, we hypothesize that,

H2: Compared with privately-owned enterprises, state-owned enterprises will weaken the improvement effect of the managerial capability on investment efficiency.

III. RESEARCH DESIGN

A. Data and Samples

This paper selects the companies listed in Shanghai and Shenzhen stock market from 2015 to 2019 as the initial sample, the samples are selected according to the following rules: remove the specially treated company samples; remove listed companies in financial industry; remove listed companies with serious missing data; remove the companies whose management has changed in the five years from 2015 to 2019; exclude newly listed companies within the last two years. Thus, 50 listed companies are finally obtained as our sample. All data comes from Guotaian database (CSMAR).

The main variables in this article are handled by 1% through Winsorize.

B. Variables

Explained variable: The explained variable in this paper is investment efficiency (Eff). Generally speaking, the models used to measure enterprise investment efficiency mainly include Wurgler model, Richardson model, investment sensitivity and marginal Tobin Q model. The Richardson model measures the annual investment performance of a company based on the difference between its ideal investment levels and its actual investment level. The higher the absolute value of the difference between the ideal investment level and the actual investment level, the lower the company’s investment performance. Therefore, this paper evaluates the investment performance based on the following Richardson’s model.

$$\text{INV}_{i,t} = \alpha_0 + \alpha_1 \text{LEV}_{i,t-1} + \alpha_2 \text{TOBIN}_{i,t-1} + \alpha_3 \text{ROA}_{i,t-1} + \alpha_4 \text{AGE}_{i,t-1} + \alpha_5 \text{INV}_{i,t-1} + \alpha_6 \text{SIZE}_{i,t-1} + \alpha_7 \text{CASH}_{i,t-1} + \Sigma \text{YEAR} + \Sigma \text{IND} + \epsilon$$

where \( \text{LEV}_{i,t-1} \) refers to the capital structure of the \( i \)th company in the t-1 year, i.e., asset liability ratio; \( \text{TOBIN}_{i,t-1} \) refers to the investment opportunities of the \( i \)th company in the t-1 year, and the calculation formula is (stock market value plus liabilities)/total assets; \( \text{ROA}_{i,t-1} \) refers to the profitability of the \( i \)th company in the t-1 year, i.e., the return on assets; \( \text{AGE}_{i,t-1} \) refers to the number of years in which the \( i \)th company went public at the end of the t-1 year; \( \text{INV}_{i,t} \) refers to the level of investment of the \( i \)th company in the t year, and the calculation formula is (expenditure on construction of long-term assets minus income from the sale of long-term assets) / total assets, of which long-term assets include intangible assets, fixed assets and other long-term assets; \( \text{SIZE}_{i,t-1} \) refers to the company size of the \( i \)th company in the t-1 year, which is measured by taking the natural logarithm of the company’s total assets; \( \text{CASH}_{i,t-1} \) refers to the ratio of cash holdings of the \( i \)th company at the end of t-1 to total assets at the end of the period; \( \text{YEAR} \) refers to the annual virtual variable used to control the annual effect; \( \text{IND} \) refers to industry virtual variables used to control industry effects. \( \epsilon \) refers to the regression residual, and the absolute value taken for its value. The closer it is to 0, the higher
enterprise investment efficiency.

Explanatory variable: The explanatory variable in this article is managerial capability. There is no uniform standard for the definition of management, mainly including chief executive officer (CEO), senior management team, etc. According to the actual situation of various industries in China and different measurement methods of managerial capability, this paper defines management as the most senior management of the company, including the CEO, chairman, vice CEO, vice president, chief financial officer, chief engineer, and other management who have an impact on the company's decision-making.

We usually use proxy variables and fixed effects (e.g., media references, past abnormal salary, and manager's function) to measure managerial capability. This paper uses the DEA-Tobit model to measure managerial capability in two steps: first, the DEA is used to calculate the efficiency of sampling firms in different industries, and then the highest efficiency in each industry is standardized by industry classification, with a value of 1, to calculate the efficiency of other firms in each industry relative to the most efficient companies.

Second, the investment efficiency is determined not only by managerial capability, but also by the characteristics of the enterprise itself. For example, when negotiating with the same supplier, lower-capacity management in large-scale firms may receive greater benefits than higher-capacity management in small-scale firms, resulting in more efficient operations. Therefore, we should also eliminate the unique factors affecting enterprise efficiency and separate the part contributed by the management. The relative efficiency value of the enterprise has been calculated: the characteristic variables of the company are classified and regressed with the industry. At the same time, the annual impact is controlled, and the efficiency of the enterprise (regression residual) is managerial capability. This paper selects six characteristic variables that may have an impact on the operation efficiency of the enterprise: Market Share (MS), degree of diversification (BSC), that is, the Herfindal index of revenue (HHI index), Size (natural logarithm of total assets), Ownership (OS), Cash flow from operation (CFO), that is, the dummy variable of free cash flow and Age, that is, the natural logarithm of the number of years of listing. The dependent variable values are 0 to 1, so it is appropriate to select Tobit as the regression model:

\[
FE_{i,t} = \beta_0 + \beta_1 MS_{i,t} + \beta_2 BSC_{i,t} + \beta_3 Size_{i,t} + \beta_4 OS_{i,t} + \beta_5 CFO_{i,t} + \beta_6 Age_{i,t} + \Sigma Year + \mu
\]

Moderating variable: The moderating variable in this paper is nature of property rights. We assign the value of 1 to state-owned enterprises, and 0 otherwise.

Control variables: This paper selects the company size (Size), debt to asset ratio (L), Return on assets (ROA), Free cash flow (FCF), annual virtual variable (YEAR), and industry virtual variable (IND) as the main control variables. Table I shows the definitions of each variable.

| Variable | Symbol | Variable description |
|----------|--------|----------------------|
| Managerial capability | MA | Measured by DEA Tobit model |
| Investment efficiency | EFF | On the Richardson model / Take the absolute value. The greater the absolute value, the higher the investment performance |
| Property rights | SOE | State-owned enterprises: SOE = 1, Privately-owned enterprises: SOE = 0 |
| Company size | SIZE | Take the natural logarithm of the total assets of the enterprise |
| Asset liability ratio | LEV | Ratio of total liabilities to total assets at the end of the period |
| Return on assets | ROA | Ratio of net profit to average total assets |
| Free cash flow | FCF | Ratio of free cash flow to total assets at the end of the period |
| Annual dummy variable | YEAR | Control annual effect |
| Industry dummy variable | IND | Control industry effect |

C. Model Specification

Based on the above theoretical analysis, this paper establishes the following model to test the research hypotheses. Considering the lag effect, the control variables and interpretation variables in this paper adopt the data of lag period, and the specific estimation model is as follow:

\[
EFF_{i,t} = \gamma_0 + \gamma_1 MA_{i,t-1} + \gamma_2 SIZE_{i,t-1} + \gamma_3 LEV_{i,t-1} + \gamma_4 ROA_{i,t-1} + \gamma_5 FCF_{i,t-1} + \Sigma YEAR + \Sigma IND + \hat{\varepsilon}_{i,t}
\]

IV. EMPIRICAL RESULTS AND ANALYSIS

A. Descriptive Statistics

The results of the descriptive analysis of variables in this paper are shown in Table II. It can be seen that the average investment performance of listed companies in Shanghai and Shenzhen stock market is 0.0103, and the maximum and minimum values are 0.97 and -0.286 respectively, indicating that there are many enterprises with low investment performance in the study sample, and the investment performance of listed companies varies greatly. The average value of managerial capability is 0.0152, the maximum value is 0.415, and the minimum value is 0.454 which indicates that there are great differences in the management capability, that is, managerial capability of different enterprises to make profits by using existing resources to invest.

| Variables | Standard Deviation | Mean | Maximum Value | Minimum Value |
|-----------|-------------------|------|---------------|---------------|
| EFF       | 0.106             | 0.0103 | 0.978       | -0.286        |
| MA        | 0.165             | 0.0152 | 0.415        | -0.454        |
| SIZE      | 1.410             | 22.810 | 26.950       | 18.301        |
| LEV       | 0.203             | 0.504  | 0.865        | 0.0188        |
| ROA       | 2.819e+08         | 1.036e+07 | 2.090e+09 | -2.690e+09   |
| FCF       | 4.541e+09         | 6.026e+08 | 4.460e+10 | -1.310e+10   |

In order to test whether there are multicollinearity problems, this paper makes a correlation analysis of the main variables. Table III shows the results. It can be found that there is a significant correlation between managerial capability and enterprise investment efficiency, which
provides preliminary evidence for the following hypothesis. The correlation of other variables is relatively low, which indicates that there is no serious multicollinearity among them.

| TABLE III: CORRELATION MATRIX |
|------------------------------|
| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| EFF | - | - | - | - | - | - | - |
| MA | 0.326*** | - | - | - | - | - | - |
| SIZE | -0.156*** | -0.130** | - | - | - | - | - |
| LEV | -0.026 | 0.108* | 0.412*** | - | - | - | - |
| ROA | 0.045 | -0.063 | 0.017 | -0.032 | - | - | - |
| FCF | -0.081 | -0.092 | 0.295*** | 0.075 | -0.005 | - | - |
| SOE | -0.016 | 0.038 | 0.244** | 0.016 | -0.030 | 0.009 | - |

Note: **p<0.01, *p<0.05, p<0.1; the diagonal is a VIF value.

B. Regression Analysis

Table IV shows that the relationship between managerial capability and enterprise investment efficiency is significant at 1%, that is, the stronger the managerial capability, the higher the enterprise investment efficiency, and the more capable management can significantly improve the inefficient investment of listed companies. Hypothesis 1 has been verified, that is, managerial capability can promote the improvement of enterprise investment efficiency.

| TABLE IV: REGRESSION RESULTS |
|-------------------------------|
| Variables | Coefficient | t |
| MA | 0.203*** | 5.63 |
| SIZE | -0.009* | -1.72 |
| LEV | -0.006 | -0.17 |
| ROA | 0.000 | 1.23 |
| FCF | -0.000 | -0.30 |
| SOE | 0.006 | 0.46 |
| MA*SOE | -0.211 | -2.96 |
| Constant | 0.201* | 1.90 |
| R-squared | 0.125 | 5.87E-07 |
| F test | 6.986 | 6.986 |

Note: **p<0.01, *p<0.05, p<0.1.

If the listed company is a state-owned holding company, it will be assigned a value of 1; if it is a non-state-owned company, it will be assigned a value of 0, and the moderating role of the nature of property rights, the regression coefficient between managerial capability and the nature of property rights MA*SOE is negative, that is -0.2113, indicating that different types of property rights will affect the relationship between enterprise investment efficiency and managerial capability. Specifically, compared with privately-owned enterprises, state-owned enterprises can weaken the managerial capability to improve investment efficiency.

The reason for this may be that the relationship between the main participants and business leaders of the state-owned companies and the business owner is relatively clear, and the company’s own interests are closely related to business development, and it has more power to supervise and encourage business leaders to make effective business decisions. Moreover, in monopoly industries, state-owned enterprises are mainly state-controlled enterprises, not state-owned enterprises are mainly competitive industries, so the role of managerial capability will be more prominent, in order to occupy a place in the fierce competition, which requires management to make greater efforts to use their skills to determine whether investment projects are feasible.

C. Robustness Test

In order to confirm that the conclusions reached in this paper are robust and improve the reliability of the results, we have performed the following analysis:

Since the Richardson model may have systematic deviation in the measurement of investment performance, this paper sorts the absolute value of residual of investment performance from large to small, and divides it into three equal parts, excluding the middle group, and the other two groups are regressed again as noninvestment performance groups.

This paper uses the DEA Tobit model to calculate the residual and uses it as the basis to measure the ability of management for regression analysis. The results of regression analysis are likely to be affected by different sample distributions. Therefore, this paper re-evaluates managerial capability by dividing the managerial capability into five equal parts and make regression analysis again. The regression results of the above tests have not changed substantially from the previous results, which fully proves the hypothesis of this paper, and also shows that the conclusions reached in this paper are very robust.

V. CONCLUSIONS

The efficiency of enterprise investment has always been the focus of academic research. In today's increasingly complex and competitive economic environment, as the most important decision-maker and CEO of the company, managerial capability of the company determines whether the company can survive and develop sustainably in today's market environment. Therefore, this paper selects companies listed in Shanghai and Shenzhen stock market from 2015 to 2019 as sample and empirically examines the relationship between managerial capability and investment efficiency. Through analysis, it is found that improving managerial capability can effectively improve the problem of overinvestment and underinvestment. Further research shows that the management ability of state-owned listed companies has a significantly greater inhibitory effect on investment performance. The conclusions may enrich the research on managerial capability and company investment behavior and provide some useful information for reference for the management.

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