

Study on EVA Evaluation and Enterprise Over-Investment Behavior

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Keywords: EVA; Economic Value Added; EVA evaluation; over-investment

Abstract: Enterprises investment behavior and efficiency has always been the focus of academic attention, which is closely related to the performance evaluation methods of corporate management, and good performance measures can influent and improve investment efficiency of enterprises. In recent years, investment brings tremendous pressure to the economic development. However, the data shows that the investment efficiency of China's central enterprises is low and does not match the level of investment. SASAC formally added EVA indicator which is the measure of value creation capacity of enterprises, as the head of the state-owned enterprises core indicators of performance appraisal in 2010. This paper collects data of listed companies of A-share central SOEs from 2008 to 2014, tests and counts the scale of over-investment according to Richardson investment model, examines the effectiveness of the EVA assessment system, and explores whether it meets the SASAC's expectation of effectively investment, or what improvements it can make.

1. Introduction

Since the reform and opening up, the evaluation of management by central SOEs has been based on financial indicators, and the financial indicators are dominated by traditional market share, sales, profits, and profitability. Some managers of central enterprises often unilaterally pursue the expansion of enterprise scale and use free cash flow for the expansion of inefficient production capacity. As a result, companies only pay attention to financial indicators and ignore the capital cost. Therefore, SASAC was established in March 2003, began to assess the head of the central government as a contributor. The assessment is divided into three terms. The main task of the third term (2010-2012) of the management of the central company is to replace ROE with EVA and incorporate it into the annual assessment of central enterprises.

For the investigation of over-investment motives of listed companies, the principal-agent theory is a more recognized view. On one hand, corporate investment can help management increase its controlled resources, expand its rights. Management will accelerate the growth of the company's scale through over-investment, increasing its own salary by improving its performance. It may also lead managers to choose the non-profitable projects which net profit value(NPV) is negative, leading to the inefficient investment behavior. On the other hand, some investment projects which seem high profit have potential high costs in the early stages. Therefore, after thinking about the balance between the input and output, managers make decisions to abandon high profit projects, which leads to underinvestment. This is the two-sided nature of principal-agent problem.

At present, few scholars study how research performance evaluation and assessment which the decision of the management's rational investment is constrain over-investment behavior. A good performance evaluation indicator is the core of the performance evaluation system. The company regards the economic value added(EVA) as a performance evaluation indicator and can evaluate the management performance more objectively and fairly. It can prompt manager to make appropriate investment decisions and improve management efficiency so as to maximize the value of the company.

2. Literature Review and Hypothesis

At present, principal-agent is considered by the academic circle as the root cause of enterprise over-investment. Due to the special system of our country, the central enterprise does not have a clear owner. The purpose of the manager is to pursue personal interests, and the owner is to increase the value of company. Therefore, there is a disagreement between the goals of the manager and the owner, leading to more prominent agency problems. In addition, managers are more inclined to enhance their control and achieve the private benefits. Managers are keen to expand the scale of the company to obtain more benefits and power. The unilateral pursuit of investment scale and quantity has caused serious over-investment problems. Therefore, how to ease the problem of principal-agent between owners and managers becomes the key to controlling the over-investment of central enterprises.

In addition, special institution may also lead to over-investment. The owner of the central enterprises is the country, and the industries involved are closely connected with the national economy and stability. Therefore, when the central government is facing the financial crisis, the government will support it by increasing investment or other policies so that it can continue to operate. It makes the central enterprises lack of risk consciousness because of the government aid, so it is not the level of risk what determines the investment decision eventually. Therefore, pursuing the scale of investment unilaterally will make companies more inclined to non-efficient investments.

H1: Chinese central enterprises have over-investment behavior.

According to the principal-agent theory, it is effective to mitigate the agency problems between business owners and managers and improve investment efficiency through establishing an effective supervision and incentive system, to make the interests of owners and operators consistent. The performance evaluation index is the standard of the manager's actions. The manager makes corresponding actions to maximize his own interests under this standard. Therefore, good performance indicators can ease the principal-agent problem and guide managers to make decisions in accordance with the shareholders' interests.

In order to curb over-investment, the SASAC used EVA as the main basis for assessing the performance of central SOE managers. Before the EVA assessment, the SASAC mainly used ROE as the index with the highest proportion of performance evaluation. This kind of performance evaluation index ignores the cost of equity capital, which easily leads to one-sided pursuit of net profits. It will encourage the non-efficiency investment, which has a negative effect on the increase of corporate value. Especially for central enterprises, debt funds are relatively easy to obtain and the cost is low. Managers tend to invest in projects with a negative net present value for maximizing ROE. Different from ROE, EVA defines corporate profits from the perspective of maximizing shareholder value, allowing shareholders to set a minimum return on capital for corporate managers. It considers not only the cost of debt capital, but also the cost of equity capital, which will help improve capital utilization and avoid inefficient investment. Therefore, the concept of EVA and capital cost could constrain and motivate managers to invest cautiously and urge managers to choose investment projects that are beneficial to the corporation value. So, EVA plays a role in suppressing over-investment. Based on this, we put forward the hypothesis 2:

H2: EVA performance evaluation can significantly inhibit the over-investment of central enterprises.

3. Data

3.1 Models

We refer to the investment model proposed by Richardson (2006) for regression and quantify the investment level of the sample. The residuals represent the degree of over-investment to test hypothesis 1. The residual is positive for over-investment and negative for underinvestment.

$$INV_t = \alpha_0 + \alpha_1 Growth + \alpha_2 Lev_{t-1} + \alpha_3 Cash_{t-1} + \alpha_4 Age_{t-1} + \alpha_5 Size_{t-1} + \alpha_6 RET_{t-1} + \alpha_7 INV_{t-1} + \sum Industry + \sum Year + \varepsilon \quad (1)$$

After quantifying the level of enterprises over-investment, the residuals were regressed to observe the effect of EVA on the over-investment behavior. Through observing the coefficient of the dummy variable EVA, we examine the difference in over-investment behavior after the EVA assessment.

$$OverINV_t = \beta_0 + \beta_1 EVA + \beta_2 CZCF + \beta_3 Growth + \beta_4 Size + \beta_5 Direpro + \beta_6 Compensation + \beta_7 FCF + \beta_8 ADM + \beta_9 ORECTA + \sum Industry + \sum Year + \varepsilon \quad (2)$$

3.2 Variable definitions

TABLE 1. Definition of Variables

Variable	Definition
<i>INV_t</i>	(cash paid for construction of fixed assets, intangible assets and other long-term assets-disposition of fixed assets, intangible assets and other long-term assets hand-drawn cash / total assets at the beginning of year t
<i>Growth_{t-1}</i>	Growth rate of main business income in t-1 year
<i>Lev_{t-1}</i>	Asset-liability ratio at the end of year t-1
<i>Cash_{t-1}</i>	The ratio of cash and short-term investments to total assets at the end of year t-1
<i>Age_{t-1}</i>	The natural logarithm of the company's listing age as of the end of year t-1
<i>Size_{t-1}</i>	The natural logarithm of the company's total assets at the end of year t-1
<i>RET_{t-1}</i>	Annual return on stocks in t-1 year
<i>INV_{t-1}</i>	(Cash paid for the construction of fixed assets, intangible assets and other long-term assets - Hand drawn cash for disposal of fixed assets, intangible assets and other long-term assets) / Total assets at the beginning of the t-1 year
<i>Industry</i>	Industry dummy variables
<i>Year</i>	Annual dummy variable
<i>OverINV</i>	The level of excessive investment in year t, which is equal to the positive regression residual in model (1).
<i>EVA</i>	Dummy variable, 1 for 2010-2014, 0 for 2008-2009
<i>CZCF</i>	The ratio of cash flow from financing in year t to total assets at the end of the year
<i>Direpro</i>	The size of independent directors equals the proportion of independent directors to the total number of directors
<i>Compensation</i>	Executive compensation, which is equal to the natural logarithm of the top three executive compensation of the company
<i>FCFF</i>	The free cash flow in year t, which is equal to the ratio of the balance of the company's operating cash flow after depreciation, amortization and expected new investment to the average total assets. Among them, the new investment in year t is the expected capital investment estimated by model (1).
<i>ADM</i>	Management costs as a percentage of main business income in year t
<i>ORECTA</i>	The ratio of other receivables to total assets at the end of year t

3.3 Sample

The data selects the listed companies of the central SOEs of the A-share board from 2008 to 2014. It does not include financial, insurance industry, *ST, ST and PT, companies listed overseas at the same time, and missing field data. After filtering, a total of 1790 samples are observed between seven years. Database from CSMAR, using Excel2013, STATA12.0.

Table 2 shows the number and proportion of the over-investment enterprises. After 2010, the proportion of sample with over-investment activities dropped sharply to 35.66% (2010). The proportion has generally declined from 2010 to 2014. The lowest figure is 80, 30.77% in 2014. Judging from the declining trend, the over-investment behavior of the central enterprises was suppressed after the implementation of the EVA assessment policy.

TABLE 2. Descriptive Statistics

Year	Number of Over-investment Enterprises	Sample size	Percentage
2008	102	239	42.68%
2009	111	258	43.02%
2010	92	258	35.66%
2011	90	258	34.88%
2012	90	258	34.88%
2013	92	259	35.52%
2014	80	260	30.77%

4. Regression

TABLE 3. Regression Results of Capital Investment Model

	Coef.	T
_cons	0.6781***	8.04
Growth(t-1)	0.0059**	2.33
Lev(t-1)	-0.0275**	-2.01
Cash(t-1)	0.0820***	4.66
Age(t-1)	-0.0048	-0.6
size(t-1)	-0.0278***	-7.16
RET(t-1)	-0.0347	-0.58
INV(t-1)	0.3024***	13.3
Industry; Year	Control variable	--
N=1790, F=28.42, Prob > F=0.0000, Adj R2=0.1959		

Notes: Significance *** p < 0.01; ** p < 0.05; * p < 0.10.

Table 3 shows the regression results of model (1). The coefficient of Cash_{t-1} and INV_{t-1} are significantly positive (p-value < 0.01), The coefficient of Lev_{t-1} is significantly negative (p-value < 0.05). The other coefficients are not significant. The symbol of the coefficient of each variable is in accordance with the expected hypothesis. Therefore, the capital investment model can be used to measure the level of excessive investment of listed companies in China's central enterprises.

TABLE 4. Regression Results of EVA Affecting Over-investment

	Coef.	T
_cons	0.1174	1.45
CZCF	0.0745***	6.68
Growth	0.0111***	4.57
size	-0.0074*	-2.19
Direpro	-0.0002	-0.01
Compensation	-0.0034**	-0.99
FCFF	0.0068***	1.41
ADM	-0.0324	-0.88
ORECTA	-0.0310	-0.45
EVA	-0.0492**	-17.62
N=1658, F=44.72, Prob > F=0.0000, Adj R2=0.3107		

Notes: Significance *** p < 0.01; ** p < 0.05; * p < 0.10.

Table 4 shows the regression results of model (2). The coefficient of Growth, CZCF, and FCFF are significantly positive (p-value < 0.01). The coefficient of Size and Compensation are significantly negative. The coefficient of EVA is significantly negative (p-value < 0.01), which indicates EVA weakens the over-investment behavior as the index of the highest weight of the performance appraisal. EVA has been implemented for seven years. Due to the adequate preparation and long-term pilot work, the enterprise values advocated by EVA have been fully recognized by the enterprises and it

has achieved good results. The data has been tested to exclude multicollinearity and heteroskedasticity and the conclusion is relatively robust.

TABLE 5. Robust test

Coef.	Model (2)	(A)	(B)
_cons	0.1174	-0.3527	0.0394*
CZCF	0.0745***	0.4207***	0.0971***
Growth	0.0111***	0.1407***	0.0047
size	-0.0074*	-0.0006	-0.0020
Direpro	-0.0002	-0.0302	-0.0003
Compensation	-0.0034**	0.0506	0.0026
FCFF	0.0068***	0.0049*	0.1898***
ADM	-0.0324	0.3465	-0.0359
ORECTA	-0.0310	0.1948	-0.1052
EVA	-0.0492**	-1.8481***	-0.0017**

In order to more fully discuss the impact of EVA performance evaluation on the investment behavior, we also define the company with positive residual as 1, the rest are 0, re-logistic regression results are shown in Table 5(A). The results show that the coefficient of the EVA dummy variable is still significantly negative (p-value < 0.01), which proves that the application of EVA inhibits the over-investment behavior of central enterprises.

The Richardson model assumes that the listed company's investment behavior is normal and there is no systematic over-investment phenomenon. We divide the residuals into three groups according to size, then use the group with the largest residual as the over-investment group to regress model (2). Table 5(B) shows the results that compared with the results of the original model (2), the conclusions did not change substantially, which indicates that the conclusion of this paper is more robust.

5. Conclusion

The research results show that there are indeed excessive investment behaviors in the central enterprises. after 2010, EVA performance evaluation have played a role in restraining the central enterprises from over-investment. This not only supports the effectiveness of SASAC's efforts in implementing, but also promotes the popularization of EVA performance assessment to a wider scope. Since the implementation of the EVA performance assessment in 2010, some expected results have been obtained in seven years. We suggest that although EVA performance has played an effective role in restraining over-investment behavior, it can make a further improvement.

Acknowledgement

This research is supported by the Fundamental Research Funds for the Central Universities (B17JB00280).

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