

From the Perspective of Investment Efficiency to See the Risk Management in Electric Power Industry

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Abstract. With the continuous electrification of the global economy, the electric power industry has attracted the largest amount of energy investment in the world for two consecutive years. Under the background of the current new normal economy, the role of electric power resources in the national economic and social life is becoming more and more important. Therefore, this paper studies the investment efficiency of electric power industry, it is concluded that the inefficient investment in electric power industry is common in China at present, which is accompanied by the excessive power of management and excessive government intervention. Based on this, some suggestions are put forward to improve the enterprise's inefficient investment behavior through risk management.

1. Introduction

In August 2018, the International Energy Agency released the World Energy Investment Report 2018, which shows that the total global energy investment was 1.8 trillion dollars in 2017. With the continuous electrification of the global economy, the electric power industry has attracted the largest amount of energy investment in the world for two consecutive years, with strong investment in power grids and renewable energy sources.

The electric power industry is a basic industry in China. It plays not only a decisive role in the daily life of residents, but also a very important role in the overall economic development of China, providing basic electric power support for other industries. From the macro perspective, China's electricity supply and demand show certain contradiction. As shown in Table 1, the situation is mainly manifested in the supply of electricity is greater than the demand. From 2008 to 2016, the total growth rate of China's electricity energy consumption reached 77.46% in the past nine years. As the demand for electricity energy in the market increases year by year, the state or the private sector has increased their investment in the total installed capacity of power enterprises.



Table 1. Total electricity production and consumption in China

Year	Electricity Production (Unit: Billion k.w.h)	Electricity Consumption (Unit: Billion k.w.h)	Power Energy Supply and Demand Gap (Unit: Billion k.w.h)
2008	34668.8	34541.4	127.4
2009	37146.5	37032.2	114.3
2010	42071.6	41934.5	137.1
2011	47130.2	47000.9	129.3
2012	49875.5	49762.6	112.9
2013	54316.4	54203.4	113.0
2014	56495.8	56383.7	112.1
2015	58145.7	58020.0	125.7
2016	61424.9	61297.1	127.8

Data source: National Bureau of Statistics

Under the background of the current new normal economy, the application of electric power in various regions of China is not balanced, and the overall utilization rate of electric power resources is relatively low. From the micro level, it is necessary for the the electric power industry to invest more costs in technology research and development, increase the intensity of technological innovation, and develop more effective energy-saving technologies to meet the various needs of customers. As can be seen from Table 2, the R&D expenditure of China's electric power industry increases year by year. And in 2016 and 2017, the scale of R&D expenditure of Listed Companies in the electric power industry ranked first among all industries (11 industry categories in total). Innovation investment is conducive to improving the financial performance of enterprises (Dong Xiaoqing, 2014), market value and so on. However, there are high cost, long cycle and high risk in Innovation investment. Once innovation fails, enterprises may face investment failure, capital chain rupture, market competitiveness decline, or even near bankruptcy. Therefore, it is of practical significance to study the innovation investment efficiency of the power industry, which can effectively promote the sustainable development of the electric power industry and play an important role in stabilizing the national economic development.

Table 2. R&D expenditure of listed companies in China's electric power industry

Year	The Industry Average of R&D Expenditure Scale Ln (Total R&D expenditure + 1)	Industry Ranking
2013	17.649	2/11
2014	17.725	2/11
2015	17.823	2/11
2016	17.967	1/11
2017	18.094	1/11

Data source: WIND

2. Problem of Investment Efficiency in Electric Power Industry

In China, the electric power industry is characterized by high investment and low efficiency. This paper chooses the data of the electric power industry from 2012 to 2017 as the statistical sample, applies the measurement model of investment efficiency proposed by Richardson in 2006, and measures the inefficient investment of the electric power industry by the regression residual in model (1). As shown in Table 3, the average and median of inefficient investment (Non_invest) are greater than zero, which indicates that the investment in China's electric power industry is more manifested by

over-investment. From the degree of inefficient investment ($|Non_invest|$), the average of 0.063 is higher than the median of 0.033, indicating that the degree of inefficient investment of Listed Companies in China's electric power industry is very serious.

Table 3. Non-Efficient Investment of Listed Companies in China's Electric Power Industry

Year	Name	N	Mean	Median	Max	Min	Std
2012	Non_invest	71	0.092	0.046	3.413	-0.046	0.402
	$ Non_invest $	71	0.098	0.046	3.413	$6.278e^{-4}$	0.401
2013	Non_invest	79	0.034	0.032	0.171	-0.372	0.065
	$ Non_invest $	79	0.050	0.035	0.372	0.001	0.054
2014	Non_invest	79	0.049	0.028	0.781	-0.055	0.115
	$ Non_invest $	79	0.059	0.033	0.781	$1.354e^{-4}$	0.111
2015	Non_invest	81	0.042	0.025	1.291	-0.070	0.149
	$ Non_invest $	81	0.057	0.033	1.291	$2.131e^{-4}$	0.144
2016	Non_invest	82	0.060	0.020	2.378	-0.214	0.271
	$ Non_invest $	82	0.077	0.029	2.378	$7.786e^{-4}$	0.267
2017	Non_invest	85	0.033	0.025	0.289	-0.131	0.054
	$ Non_invest $	85	0.045	0.028	0.289	$7.183e^{-4}$	0.045
Non_invest		477	0.051	0.027	3.413	-0.372	0.209
$ Non_invest $		477	0.063	0.033	3.413	$1.354e^{-4}$	0.206

The specific description of model (1) is as follows:

$$\begin{aligned}
 Inv_t = & \alpha_0 + \alpha_1 Gro_{t-1} + \alpha_2 Lev_{t-1} + \alpha_3 Size_{t-1} + \alpha_4 Re_{t-1} + \alpha_5 Cash_{t-1} + \alpha_6 Age_{t-1} \\
 & + \alpha_7 Inv_{t-1} + Ind + Year + \varepsilon_{i,t}
 \end{aligned} \quad (1)$$

Among them, Inv_t and Inv_{t-1} represent the newly increased capital investment of an enterprise in T-period and T-1 period respectively. Gro_{t-1} represents the growth rate of business income in T-1 period. Lev_{t-1} represents the T-1 asset-liability ratio of an enterprise. $Size_{t-1}$ represents the size of an enterprise in T-1 period, which is equal to $\ln(\text{total assets} + 1)$. Re_{t-1} is measured by the annual return on shares of an enterprise in T-1 period considering cash dividend reinvestment. $Cash_{t-1}$ represents the cash holdings of an enterprise at the end of T-1 period. And Age_{t-1} represents the listing life of an enterprise up to the T-1 period.

3. Reasons of Inefficient investment in Electric Power Industry

3.1. Excessive managerial power

Management is the main decision maker for enterprises to choose investment projects. And the comprehensive ability of investment decision-makers is the most important influencing factor affecting the investment decision-making behavior. As the basic industry, the management makes investment decision depending on the development status of electric power enterprises themselves, but the investment decision-making is more reflected in the personal thinking of managers. Managers' professional knowledge, corporate social responsibility, investment experience and so on directly affect the success or failure of investment. However, in China, the phenomenon of excessive managerial power in the electric power industry is quite common. 62% of the manager hold shares in the company. And the proportion of independent directors in 288 listed companies in the electric power industry is lower than the average value of the industry, which will affect the supervision of the board of directors and provides convenience for enterprise management to seek self-interest. It also shows that the power of management is generally greater in China's electric power industry.

3.2. *Government intervened*

In China, except for a few large-scale electric power generation enterprises, there are many inefficient and small-scale electric power generation enterprises in the market. Many small-scale electric power generation enterprises can promote local development in terms of tax and employment. However, Considering the overall situation of the electric power market, the government formulates relevant regulations and policies, which be taken to reduce the number of inefficient and small-scale electric power generation enterprises. In addition, considering China's institutional structure, local power is more likely to be bought off by interest groups, which will aggravate inefficient investment.

4. Policy Suggestions of Risk Management on Improving Investment Efficiency in Electric Power Industry

4.1. *Enterprise*

On the one hand, it is necessary to disclose information reasonably of managers and employees, strengthen the sharing and communication of investment decision information with employees, construct a reasonable ownership structure, guarantee the construction of internal board of directors and board of supervisors, and design perfect management incentive plan. On the other hand, the electric power enterprises need to continuously improve the level of information management of internal organizations through advanced management concepts. Enterprises communicate and share the internal information of investment decision effectively through the hierarchical communication and sharing mechanism within the information system, and obtain various feedback from the enterprise in time, so as to provide a real and reliable internal information basis for investment decision-making.

4.2. *Institutional investor*

Over the past decade, China's capital market has achieved a leap-forward development. In 2010, the market value of institutional investors' holding stock in China was ¥10.826 trillion, and in 2017 it reached ¥28.254 trillion. In only seven years, the growth rate of the market value of institutional investors' holding stock reached 161%. Meanwhile, in 2010, the market value of institutional investors' holding stock (¥10.826 trillion) only accounted for 41% of the total market value of A share market (¥2654.2 billion). In 2017, by contract, the market value of institutional holding stock (¥28.254 trillion) accounts for 50% of the total market value of A-share market (¥56.709 trillion). It can be seen that institutional investors are increasingly entering China's securities market. At the same time, the supervision of China's securities market is becoming more and more perfect. Therefore, in China's electric power industry, institutional investors should actively play their role in risk management, directly participate in the public operation by participating in the shareholders' meeting and the election of the board of directors, reduce the degree of information mismatch between the owner and the operator of the enterprise by using their own professional ability, provide scientific decision-making basis for the investment decision-makers, and improve the investment efficiency of enterprise.

4.3. *Government*

Considering the characteristics of large investment funds, long investment cycle and promote the development of related industries in this industry, the local government often intervene in the development of enterprises to a certain extent, resulting in the over-investment in the electric power enterprises. Therefore, local governments should reduce their interference in enterprises. On the one hand, they should follow market rules to create a scientific and healthy market environment for the development of enterprises. On the other hand, the government should actively promote the reform process of marketization of managers, so that executives with better performance can get better appointment and executives with poor performance will lose the employment market. In this way, it

can restrain the abuse of managerial power and improve the investment efficiency of electric power enterprises.

5. Conclusion

The role of electric power resources in the national economic and social life is becoming more and more important. Therefore, it is an urgent task to improve the inefficient investment in the electric power industry. We should improve the internal governance structure of enterprises to control the power of management within a reasonable range, reduce government intervention to promote the industry marketization to ensure the vigorous development of the power industry.

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