Environmental protection investment performance evaluation of coal enterprises

Jing Yan, Min Li, Jieping Han
School of Economics and Management, Northeast Electric Power University, Jilin 132012, China.

Abstract: With the emergence of environmental problems, all sectors of society are working hard to reduce carbon emissions and pursue green and high-quality development. Coal enterprises as a high-polluting enterprise, environmental protection as their own responsibility, actively undertake social responsibility, and actively carry out environmental protection investment, but the enterprise is the main body of profit, in the process of environmental protection investment can have a positive performance impact on the enterprise, need to have an evaluation standard, this paper from the financial point of view, for coal enterprises to build environmental protection investment performance evaluation system, This paper probes into the impact of environmental protection investment on financial performance, analyzes the mechanism of the impact of environmental protection investment on financial performance, and finally puts forward some suggestions for the development of environmental protection investment in coal enterprises.

Key words: Coal enterprises; Environmental protection investment; Financial performance

Introduction

In recent years, due to the uncontrolled exploitation and consumption of fossil energy, resulting in a large amount of carbon dioxide accumulation in the air, resulting in global warming, in this regard, the United Nations called on countries to take various measures to deal with the problem of global warming, China actively responded to the call of the United Nations, put forward the "double carbon" goal, promised to achieve "carbon peak" before 2030, To achieve "carbon neutrality" before 2060. Enterprises actively undertake environmental protection investment to assume social responsibility, but the impact of environmental protection investment on performance is uncertain. Existing literatures have studied the relationship between environmental protection investment and financial performance through empirical analysis, but there is no unified performance evaluation system to evaluate the performance of environmental protection investment. Based on coal enterprises, this paper constructs a performance evaluation system for environmental protection investment of coal enterprises. Which can provide reference for the follow-up research.

I. Analysis of financial performance of environmental protection investment

Environmental protection investment refers to the investment activities of enterprises in the construction of environmental protection facilities, research and development of environmental protection technologies and environmental management in order to ensure the coordination between their own development and ecological environmental protection. Financial Performance According to the Interim Measures for the Management of Comprehensive Performance Evaluation of Central Enterprises, the financial performance of enterprises can be quantitatively analyzed from four aspects: profitability, asset quality, debt risk and business growth.

For profitability, coal enterprises need to eliminate backward production equipment, invest more manpower, material and financial resources to transform production equipment, introduce environmental protection technology, purchase environmental protection equipment, etc., so that the cost of the enterprise in the early stage will increase significantly, and the production cost will also decrease with the maturity of production technology in the later stage, so as to improve operating profit and cut costs; For asset quality, enterprises establish intelligent logistics platform, take customer demand as the center, production and processing coal, enhance customer experience, which is conducive to improving inventory turnover; At the same time, the enterprise has more say in the upstream and downstream business, which is conducive to improving the bargaining power, so as to improve the operation capacity; For business growth, the adoption of advanced survey technology and automation equipment can reduce the damage and pollution to the natural environment, realize the recycling of resources and waste water treatment and other environmental protection measures to reduce environmental pollution. Make enterprises have strong competitiveness, increase product efficiency, promote the increase of business growth rate, increase market share, and enhance the growth ability of enterprises; For debt risks, enterprises need external investment and bear financing costs. Due to financing constraints, enterprises may not be able to raise enough funds. However, if enterprises actively respond to the government's call for environmental protection investment, on the one hand, the pollution control effect can reach the national standard, and on the other hand, the government will pay attention to the performance of corporate environmental responsibility, it will make enterprises gain the favor of the government. Thus, government subsidies will be increased to help enterprises escape from the predicament of tight funds.

II. The construction of environmental protection investment performance evaluation system

An important criterion for evaluating the financial performance of environmental protection investment is the impact of environmental protection investment on financial performance. This system selects four indicators that can reflect the financial performance of coal enterprises according to the above mechanism analysis, and establishes a system for evaluating financial performance. The comprehensive score calculated by entropy method is used to represent financial performance. Then Granger causality test is used to verify the relationship between environmental protection investment and financial performance.

1. Comprehensive score of financial performance

The entropy method is mainly used to determine its weight based on the dispersion degree of the indicator. The information utility value of the evaluation indicator depends on the difference between the information entropy of the indicator and 1, which directly affects the size of the weight. The greater the information utility value, the more important it is to the evaluation, and the greater the weight. Based on the above performance impact analysis, the following indicators are selected to evaluate the comprehensive financial performance, as shown in Table 2.1:

Table 2.1 Financial performance evaluation system

First-level indicators	Secondary index	Tertiary indicators	Explanations	Indicator Types
Financial performance	Profitability	Cost expense margin	Total profit/total cost expense	Positive indicators
		Gross margin	Gross profit/sales revenue	Positive indicators
		Net margin on sales	Net profit/sales income	Positive indicators
		Return on total assets	Net profit/total assets of the enterprise	Positive indicators
		Return on equity	Net profit/business owner's equity	Positive indicators
	Operational capacity	Inventory turnover	Cost of goods sold/Average inventory balance	Positive indicators
		Accounts receivable turnover	Operating income/average accounts receivable balance	Positive indicators
		Total asset turnover	Net operating income/Average total assets	Positive indicators
	Solvency	Current ratio	Current assets/current liabilities	Positive indicators
		Asset-liability ratio	Total liabilities/total assets	Moderation indicators
	Ability to grow	Revenue growth rate	Increase in operating income for the current period/operating income for the previous period	Positive Indicators
		Net profit growth rate	Increase in net profit for the current period/previous period's net profit	Positive indicators
		Net worth growth rate	Increase in net assets for the current period/Net assets for the previous period	Positive indicators
		Growth rate of total assets	(Ending total assets - Beginning total assets)/Beginning total assets	Positive indicators

2. Granger causality test

According to the requirements of traditional econometrics, in order to avoid "pseudo-regression" in the empirical test results and lead to bias in the research results, it is necessary to determine the stationary series of random variables, and then use Granger causality test to verify the relationship between two economic time series X and Y. The ratio of environmental protection investment and shareholders' equity disclosed in the Corporate Social Responsibility Report of an enterprise over the years is selected as the independent variable, the selected data is scored by entropy method to obtain a comprehensive financial performance score as the dependent variable, and the two are tested by Granger causality test.

III. Analysis of numerical examples

This paper takes S Enterprise as an example for analysis. Founded on November 8, 2004, S Enterprise was listed in A shares and H shares respectively in 2005 and 2007. It is the largest coal listed company in China and the world's leading coal-based comprehensive energy listed company, mainly engaged in coal, electricity and other six sectors of business. As the core industry of S enterprise, the coal industry has an approved production capacity of 340 million tons, accounting for about 8% of the country. In 2023, the output of commercial coal is about 324.5 million tons, and the sales volume of coal is 450 million tons, ranking first in the country.

Stata software was used to conduct stationary test on the data, and the environmental protection investment intensity of Enterprise S was taken as the independent variable (X), and the comprehensive score calculated by entropy method was taken as the dependent variable (Y). The original time series data and the test results after first-order and second-order difference were obtained. After the first-order and second-order difference, the data was transformed from the original non-stationary time series to the stationary time series. Both of them are stable at the level of second-order difference 5%, and the P-value is significantly less than 0.05, indicating that the data is more stable after second-order difference processing. Therefore, this study conducted Granger causality test on the data showing stationarity after second-order difference to verify the relationship between the two.

After verifying the stationarity test of the data, the results of the Granger causality test output by Stata are used to carry out a 3-period lag on the data in the specific test, and different test results of the 3-period lag are given respectively. See Table 3 for the specific test results:

Table 3.1 Test results of the number of lag periods

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	.070113				.004874	.350889	.305285	.423233
1	.667977	1.1957	4	0.879	.009298	.969459	.832649	1.18649
2	6.46707	11.598	4	0.021	.007522	.642351	.414335	1.00407
3	25.3264	37.719 *	4	0.000	000694 *.	2.05935 *	2.37857 *	1.55294 *

Table 3.2 Relationship between environmental investment and financial performance

EquationExcluded	chi2dfProb>chi2
d2yd2x	264.0330.000
d2yALL	264.0330.000
d2xd2y	1.464130.691
d2xALL	1.464130.691

According to the test results, when the original hypothesis is that X is not the cause of Y increase, Prob is less than 0.05, indicating that the original hypothesis is rejected, indicating that X is the cause of Y increase; When the original hypothesis is that Y is not the cause of X increase, the Prob value is greater than 0.05, indicating that the original hypothesis is accepted, that is, Y is not the cause of X increase. To sum up, in the lag period of 3 periods, enterprise environmental protection investment is the reason to improve enterprise financial performance, but financial performance is not the reason for enterprises to increase environmental protection investment.

According to the above results, it can be seen that the environmental protection investment of enterprise S has positive financial performance, but it is time-sensitive and will have a more obvious effect when the investment is delayed for the third period, while the financial performance in the current period is not obvious. This is because most of the initial environmental protection investment of Enterprise S is used to purchase cleaning equipment and update environmental protection technology, which has little positive impact on profitability. Therefore, during this period, the profitability showed a downward trend; After 2016, the environmental protection investment stabilized at about 2 billion, and the environmental protection investment as a whole showed an upward trend and remained stable in the later period, indicating that the environmental protection investment in the early stage had a positive impact on the later period and promoted the development of profitability; As for the asset quality, S enterprise reached the lowest point in 2015 under the influence of the overall situation of the industry, but with the development of coal industry capacity reduction in 2016 and other means, the asset quality of the enterprise has been improved. As for the solvency, it initially obtained a high amount of government subsidies, but after 2018, the liquidity is basically higher than 2, indicating that the environmental protection funds of the enterprise may not be fully utilized, which increases the debt servicing cost. As for the growth ability, it has a positive impact on the profitability and reputation in the early stage, which is manifested as more obvious growth ability and more stable in the later stage.

IV. Environmental protection investment performance improvement suggestions

With the frequent occurrence of environmental problems, coal must assume the heavy responsibility of protecting the environment and actively invest in environmental protection. The following suggestions are put forward for coal enterprises to improve the performance of environmental protection investment:

1. Integrate their own resources and make reasonable investment in environmental protection

Enterprises should proceed from the actual situation, analyze the specific problems, carefully analyze their own problems, development prospects, find their own problems and shortcomings, and strive to be the vanguard of green transformation with the “double carbon” goal as the direction. Firmly implement the carbon peak carbon neutral goals and tasks, optimize and adjust the company’s “14th Five-Year Plan” development plan, prepare the company’s carbon peak action plan, and improve the top-level design of transformation and development.

2. Carry out long-term planning and avoid short-sighted behavior

The environmental protection investment of enterprises will produce operating costs and management costs in the short term, which may have a negative impact on the performance of enterprises. However, if the environmental protection funds are properly used, reasonable planning will get twice the result with half the effort. Therefore, managers need to make good decisions, meet the challenges, and help enterprises develop with high quality under the new development background.

3. Strengthen government subsidies to increase the cost of pollutant discharge

The government should play a regulatory role in promoting the green development of enterprises. It should formulate emission standards and environmental protection requirements for different types of enterprises, increase penalties for enterprises that fail to meet the standards, raise the cost of pollution discharge, provide corresponding financial support for enterprises with insufficient funds, and provide subsidies for enterprises with obvious environmental protection results.

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