

Research on the Impact of ESG Rating on Enterprise Value in the New Energy Vehicle Industry Based on BYD

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Abstract: With the impact of "dual carbon" such as carbon peaking and carbon neutrality, investors have gradually taken the non-financial information and sustainable development of enterprises as part of their investment reference. ESG rating evaluates enterprises from three aspects: environment, social responsibility, and corporate governance. At the environmental level, BYD strictly controls the emission of various wastes, greatly reduces carbon dioxide emissions, and has achieved good results in international evaluations. In terms of society, we have built a variety of employment channels, established employment platforms, absorbed local employees, and promoted social and economic development. At the governance level, the company attaches importance to sustainable development work and continuously improves the company's sustainable development communication mechanism. When the impact of BYD Group's ESG rating performance on the book value of the company, this paper concludes that the company's economic added value is positive and generally upward through the comparative analysis of basic financial indicators EVA analysis and return on net assets. In the impact of ESG rating performance on market value, the event research method is used to study and analyze BYD's ESG rating rate of return (AR) and cumulative abnormal rate of return (CAR). The results show that the year-on-year and cross-level upgrading of ESG ratings can help enterprises achieve sustained growth in economic added value.

Keywords: ESG rating, enterprise value, BYD

1. Introduction

At the 75th session of the United Nations General Assembly, China announced that it would strive to peak its carbon dioxide (CO₂) emissions by 2030 and strive to achieve carbon neutrality by 2060 [1]. After the country put forward the "3060" dual-carbon target, there are numerous subsidies and tax reductions for enterprises to make sustainable transitions, ESG stands for three distinct behaviors and competencies in the "Environment, Social, and Governance" domains. ESG refers to certain habits and capacities in the three domains of "Environment, Social, and Governance" in businesses, and serves as the main investment direction and action guideline to help China's economy achieve high-quality development.

In this paper, we take BYD Group as an example to explore the impact of ESG rating performance on corporate value. Most of the past studies focus on the more direct financial disclosure when

investors are concerned about the impact of corporate social responsibility, ESG is more authoritative and persuasive than traditional financial statements and can highlight the company's social responsibility from the environmental, social, and corporate governance levels. Strengthening the intrinsic motivation of enterprises to practice ESG and realizing the double-layer value of social value and enterprise value will increase the operating costs of enterprises and the economic returns brought by ESG will be lagging. However, enterprises will also gain a good reputation, attract foreign investment, enhance the ability of sustainable development, and strengthen their core competitiveness.

2. Literature Review

Liu et al. concluded that environmental information disclosure is significantly positively correlated with environmental performance in listed companies; the future profitability of enterprises plays a moderating role in environmental performance and environmental information disclosure [2]. According to Yau et al., corporate social responsibility encourages the improvement of corporate environmental performance disclosure and the effect of corporate environmental performance on environmental performance disclosure [3]. Yang and Xie believed that there is a significant positive correlation between CSR and environmental performance, i.e., the higher the quality of CSR disclosure, the higher the level of environmental performance; that there is a significant positive correlation between green innovation capability and corporate environmental performance; and that social responsibility significantly improves the positive correlation between green innovation capability and corporate environmental performance [4].

In analyzing the research on the correlation between social responsibility and corporate value, the public began to pay attention not only to the economic performance of enterprises but also gradually pay attention to the various responsibilities that enterprises should assume in society. Most of the current literature suggests that in the short term, social responsibility increases the cost of payment, but in the long term, there is a positive correlation between the two, which can have a positive impact on the value creation of the enterprise. Guo analyzed the coal industry as an object and found that the interaction between social responsibility and the financial performance of coal enterprises is positive; the interaction between social responsibility and the financial performance of coal enterprises has a lag [5]. Zhu and Zhao believed that enterprises with good social responsibility performance can reduce business risks; excessive business risks will reduce their financial performance; Furthermore, actively undertaking CSR can weaken the negative impact of business risks on financial performance [6].

In the studies analyzing the related aspects of corporate governance and enterprise value, the mainstream view is that the level of corporate governance and enterprise value creation present a positive correlation development. Cui Tingting thinks that incentives and enterprise value present a significant positive correlation, and the positive correlation between incentives and enterprise value is weakened with the increase in the degree of market competition, that is, there is a substitution relationship between incentives and product market competition [7].

Tobin's $Q = \text{market value} / \text{replacement cost}$ is often used by scholars to measure the market value creation of an enterprise because it can predict the investment risk and investment return of an enterprise to provide a comprehensive measure of enterprise value creation. Lin Xinyuan found that there is a significant positive correlation between corporate ESG performance and corporate market capitalization through empirical tests of Tobin's Q of listed companies. There are also significant positive correlations between corporate environmental performance, corporate governance factors, and market capitalization [8].

This research literature is divided into ESG-related research, enterprise value creation, and the impact of ESG on enterprise value creation in various aspects of analysis. After combing the related research literature found that: compared with foreign literature, China researched ESG started late,

while foreign countries have more perfect analysis and development. Therefore, the development of foreign research literature is more comprehensive. Most of the research focuses on the impact of E, S, and G on enterprise value, but the performance of the three areas of ESG can not be reflected in the financial statements, so when investors begin to pay attention to the non-financial disclosure of the enterprise, the higher the level of ESG practice, the greater the ability to obtain social capital, the greater the improvement in the degree of management's short-sightedness, and the capital constraints are alleviated, thus encouraging corporate innovation to promote innovation. For this reason, more and more scholars have begun to study the impact of the ESG performance of each enterprise on corporate value creation, most studies have found that ESG helps to enhance corporate value, but more results are based on empirical studies, and relatively few case studies. At the same time, most studies do not further analyze the impact of ESG on corporate value creation. Therefore, this paper selects BYD Group, a leading enterprise in the new energy industry, as a research object, to strengthen the research on ESG value effect by studying how good ESG performance affects corporate value creation, encourage more enterprises to respond to ESG concepts, participate in ESG practices, and contribute to coping with and solving the global climate crisis and realizing the goal of sustainable development.

3. BYD Group ESG Profile

3.1. Company Profile

BYD Company Limited ("BYD") was founded in February 1995, with its main businesses spanning four industries: automotive, rail transportation, new energy and electronics. BYD is committed to promoting the sustainable development of human society with scientific and technological innovation and helping to realize the goal of "peak carbon and carbon neutrality". Currently, BYD occupies a certain market position in the field of new energy vehicles and is favored by many consumers.

3.2. ESG rating performance of the new energy automobile industry

ESG rating is a comprehensive examination of three aspects of the environment, social responsibility, and corporate governance to evaluate the enterprise. ESG rating is divided into several levels, the highest is AAA, followed by AA, A, BBB, BB, B, and CCC is the lowest level, which is an important indicator used to examine whether an enterprise has a sense of social responsibility.

Factors such as corporate ethics and environmental conditions are becoming an extremely important part of the investment industry, and ESG ratings can be used to effectively screen out companies that do not meet the criteria. In addition, ESG is a novel investment concept, as well as a trend in the industry and a mainstream in society. The general view of ESG in the market is that it can help investors effectively avoid high-risk enterprises. The next step is to analyze BYD's ESG performance.

As can be seen from Figure 1, among the automotive companies that have been included in the MCSI ESG rating system, the proportion of ESG ratings AAA is 5%, AA 14%, A 30%, BBB 16%, BB 14%, B 23%, and CCC 0%. Among them, BYD Group's latest ESG rating published in November 2022 is AA, which is in the upper echelon globally and exceeds the majority of automotive

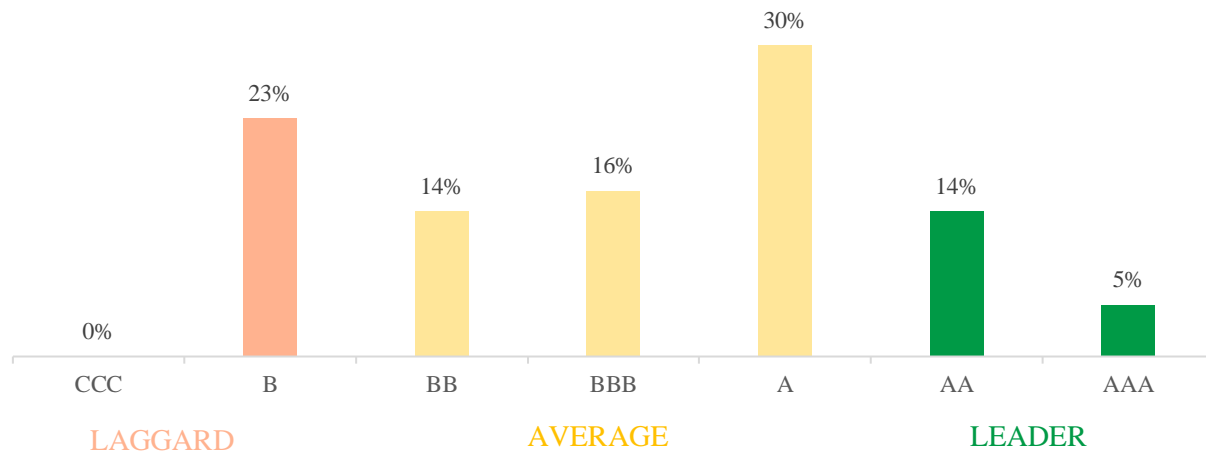


Figure 1: ESG Automotive Sector Performance Rating 2022 companies.

As can be seen in Figure 2, BYD's ESG rating is A from 2018 and continues to rise to AA in 2022. This shows that BYD has maintained its focus on environmental protection efforts and sustainability over the years and has improved in 2022.

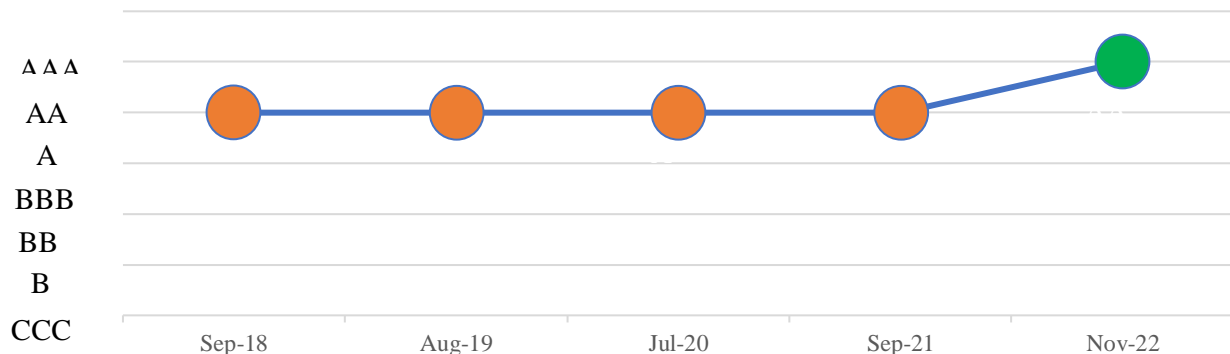


Figure 2: ESG BYD Rating Results for the Last Five Years.

3.3. BYD Group ESG Management

3.3.1. Analysis of BYD Group's performance at the environmental level

Analysis of BYD Group's performance at the environmental level: At the environmental level, BYD has formulated relevant management systems by national laws to strictly control the emission of various types of waste. Meanwhile, in August 2021, BYD built the first zero-carbon park headquarters of a Chinese automobile brand, which has significantly reduced CO₂ emissions. In 2022, with the assistance and support of SGS, an internationally recognized and authoritative testing, inspection, and certification organization, BYD obtained the "ISO14064 Certification" and the "PAS2060 Carbon Neutral Certification". "PAS2060 Carbon Neutral Certification". BYD's efforts to conserve energy

and protect the environment, minimize the impact of negative externalities, and in the long run effectively avoid complaints and dissatisfaction from residents, such as pollution lawsuits, as well as improve the efficiency of resource use.

3.3.2. Analysis of BYD Group's performance at the social level

BYD cooperates with the Human Resources and Social Security Bureau, the Employment Bureau, and other government departments, while building a variety of employment channels, establishing employment platforms, and absorbing locally employed people, which promotes the harmonious development of the society and the economy, and provides a large number of jobs in the difficult times. BYD also solved the basic living problems of some employees, paid attention to their immediate needs in housing, transportation, children's education, medical care, etc., and provided refined and regular care services to enhance their sense of belonging and happiness. In addition, BYD also gives financial support to some poor areas for educational assistance. By improving the treatment of employees and establishing a happiness park, BYD has a role in promoting the company's performance. By contributing to social welfare and promoting the popularity of education, it has established its good corporate image and reputation, attracting more investors as well as cooperation.

3.3.3. Analysis of BYD Group's performance at the governance level

At the governance level, BYD has implemented strict management within the company, paying great attention to sustainable development work and continuously improving the company's sustainable development communication mechanism. BYD has been selected as one of the 2022 Outstanding Cases of Social Responsibility of Private Enterprises and has communicated with domestic and foreign investors on ESG topics. BYD has also won many awards such as "Top 100 Listed Companies in China in ESG". BYD has established a rigorous risk management system and maintained a good reputation to gain the favor of more investors and assist in the development of the company.

4. Impact of ESG Rating Performance of BYD Group on Enterprise Value

4.1. Impact of BYD Group's ESG Rating Performance on Corporate Book Value

From 2018 to 2021, BYD's MSCI ESG rating remained at A level, and Great Wall's MSCI ESG rating rose one level every year from 2018 to BBB in 2021 and remained unchanged in 2022. In 2022, BYD took the lead in upgrading its rating to AA, two levels ahead of the Great Wall, and was in the leading position in the automotive industry. MSCI ESG rating is an ESG rating system with high market attention and recognition. For listed companies, the ESG rating embodies the ability to sustainable development of enterprises. BYD's ESG rating has risen because it is one of the few companies with excellent practices in product safety and quality and opportunities for clean technology. Based on the annual report of enterprises in 2022, this paper shows BYD's basic financial indicators and explores the impact of ESG rating results on book value.

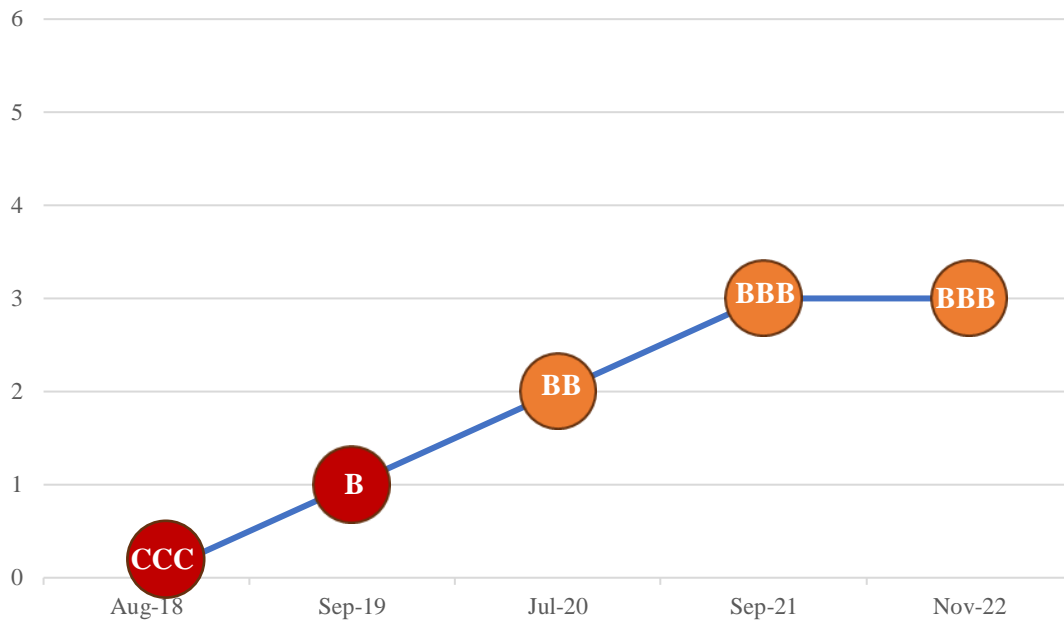


Figure 3: ESG Rating Results of Great Wall Motor MSCI in Recent Five Years.

4.1.1. Comparative analysis of basic financial indicators

In 2022, BYD achieved outstanding performance, achieving revenue of 424 billion 61 million yuan, an increase of 96.20% over the same period last year. BYD pointed out in its performance report that the sales of new energy vehicles achieved strong growth year on year and became the global leader in the sales of new energy vehicles, which promoted a substantial improvement in profitability and effectively alleviated the cost pressure brought about by the rising prices of upstream raw materials, as shown in Table 1.

Table 1: Analysis of Some Indicators of BYD and Great Wall Motor.

Some indicators of BYD and Great Wall Motor in 2022				
	Operating income	Net profit	Sales volume	Market share
BYD	424.061 billion yuan	16.622 billion yuan	1.8817 million vehicles	31.7%
Great Wall Motor	RMB 137.340 billion	8.253 billion yuan	1,061,700 vehicles-	25.6%

BYD's dominant position in China's new energy industry has been further consolidated, and the competition situation with Great Wall Motor has also changed. The main reason for this change is the impact of BYD's AA rating. According to the annual report data released by BYD in 2022, the company has made remarkable achievements in 2022. Under the current situation, BYD's leading position in China's new energy industry has been unshakable.

4.1.2. Analysis of Return on Equity

The financial situation of enterprises can be reflected by the return on net assets, to explore the impact of ESG rating performance on business performance. The return on equity assesses the effectiveness with which a firm uses its own capital. The more than the value of the indicator, the higher the return

on investment. This paper selects the financial data from 2018 to 2022 to analyze BYD, as shown in Figure 4.

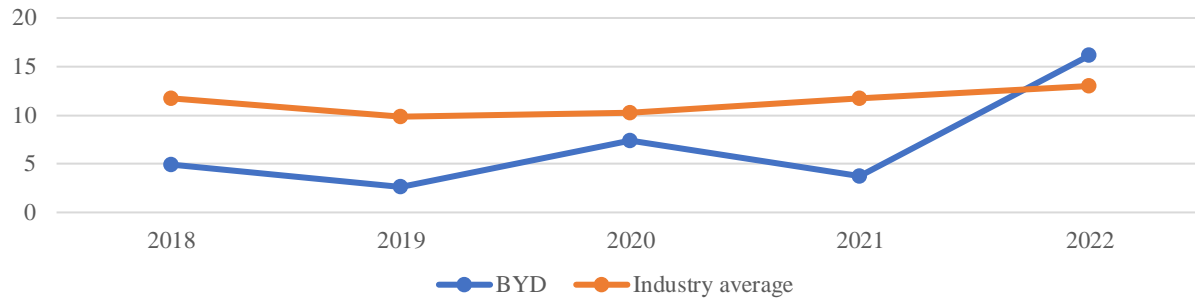


Figure 4: Comparison chart of BYD's return on equity and industry average in the past five years.

In this paper, BYD's return on net assets in 2018-2022 is compared with the industry average. From Figure 4, we can see that BYD's return on net assets has changed a lot. In 2018-2021, BYD's yield on net assets was lower than the average of the automotive industry. In 2022, BYD's return on equity rose sharply to 16.14%, higher than the industry average return on equity of 13%. This shows that BYD has achieved significant profit growth in the year, benefiting from strong sales growth of new energy vehicles, profit improvement, and market share expansion. BYD successfully increased its sales revenue in 2022, and its net profit increased, thus increasing the return on net assets. According to the ESG rating performance of enterprises, BYD has been upgraded from A-level in 2021 to AA-level in 2022, which means that the company's progress and achievements in environmental, social, and corporate governance have been recognized by MSCI. These developments not only improve the company's social recognition but also increase the value of the brand, which helps to attract more investors, partners, and customers, thus gaining a better competitive advantage for the company in the market. These beneficial impacts are eventually demonstrated through financial performance, including an increase in return on capital employed.

4.1.3. EVA analysis

Economic Value Added (EVA) can be used to measure the ability of appraise creation of enterprises. To effectively analyze the influence of business operation on the intrinsic value of businesses, this paper chooses to use EVA to measure. Different from judging the impact of enterprise operation only based on net profit, by modifying net profit, EVA accounts for both the cost of debt capital and the cost of equity capital., so it can more accurately measure the efficiency of enterprise operators in capital use and value creation. Therefore, EVA can more comprehensively evaluate the impact of ESG management on shareholder wealth. The calculation formula of economic value added is:

$$EVA = NOPAT - TC \times WACC \quad (1)$$

Were, NOPAT: net operating profit after tax; TC: total capital; WACC: weighted average cost of capital. In this paper, the average capital cost rate is simplified, and the average capital cost rate of central enterprises is 5.5% for analysis [9].

From Table 2, we can see that the EVA value of BYD in 2018-2022 is generally on the rise, and the EVA value is greater than zero, which indicates that enterprises can create considerable wealth value for shareholders in the process of developing low-carbon economy and obtaining higher ESG rating.

Table 2: Calculation of BYD's Economic Value Added in 2018-2022 (million yuan).

Project/year	2018	2019	2020	2021	2022
Net profit after tax	92.35	88.07	121.93	105.66	295.918
Adjusted capital	1116.5	1323.81	1215	1043.26	774.99
EVA value	30.94	15.26	55.11	48.28	253.30

BYD is an enterprise dedicated to the innovation and upgrading of new energy vehicles. According to the ESG performance of the enterprise, BYD strives to achieve the goal of reducing carbon emissions, protecting the environment, and realizing the social value of the enterprise in every step from R & D to sales [10]. Thus obtaining the AA ESG rating of MSCI. Since 2018, BYD has continuously increased the proportion of new energy vehicles in its automotive business, exceeding 82% in 2021. In March 2022, it announced that it would stop producing traditional fuel vehicles, promote low-carbon development in an all-around way, and actively support the country to achieve the goal of "double carbon".

Since MSCI incorporated BYD into shares in 2018, investors and consumers have begun to pay more attention to its ESG factors. As one of the companies with the highest ESG rating in the automotive industry, BYD takes sustainable development as its development concept and has won a good reputation.

To sum up, by obtaining a good ESG rating, enterprises can establish a good corporate image among various groups such as consumers and investors, thus having a positive impact [11]. This will help enterprises to achieve sustained growth in economic value added and maintain stable growth in the face of various uncertainties such as the market. A higher rating can reflect the value of the company's sound operation and standardized governance and also means that it will attract more investors.

4.2. Impact of BYD Group ESG Rating Performance on Market Value

This section focuses on analyzing whether BYD's ESG rating performance has achieved the effect predicted in this paper and the reaction in the market, using the event study method to study and analyze the one-race return (AR) and cumulative abnormal return (CAR) after BYD's ESG rating level has changed, and exploring whether the company's rating upgrade can have an impact on the value of the company or even in the industry.

First, the entire event period is clarified including the estimation period and the ex-post observation period. In this paper, we refer to MSCI's upgrade of BYD's ESG credit rating to an industry-leading AA level. For the selection of the event date, this paper chooses November 15, 2022, as the date of information disclosure after BYD's ESG rating performance is rated by the rating agency MSCI. This paper takes a total of 12 business days before and after the event date as the window period for trading [-6.6]. The estimated date of the whole event is [-51.-11], a total of 40 business days for the analysis and research. In this research analysis, the analytical method chosen in this paper is the market model prognostic return which is more widely used in business analysis.

Rit is used to represent the company's true rate of return for BYD at day t, and Rmt to represent the company's industry market rate of return at day t. The computational modeling equation is established:

$$R_{it} = \alpha + \beta R_{mt} + \epsilon_t \quad (2)$$

where α and β are the regression coefficients of the formula and ϵ_t is the error residual term. Linear regression of the company's real return and industry market return of BYD in the estimation period $[-51, -11]$, get the regression coefficients α and β and the error residual term ϵ_t and make a scatter plot.

Using the regression function in Figure 5 and the return R_{mt} during the window period, the expected daily return R_{it}^e of BYD during the window period can be calculated, and the abnormal return AR_{it} of BYD during the window period and the cumulative excess return CAR during the window period can be calculated according to Eqs. where R_{it} denotes the actual return of BYD Group during the event window period and $CAR(t_1, t_2)$ denotes the sum of BYD's excess returns during the period t_1 to t_2 .

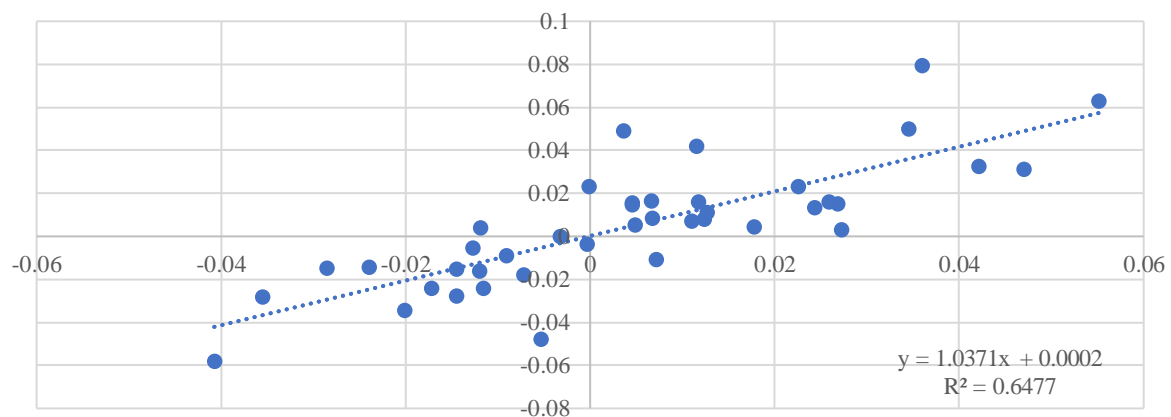


Figure 5: The firm return of BYD and regression results.

As can be seen from Figure 6, BYD's has an extremely clear positive trend around the event date. However, in fact, on the day of the event, investors did not conduct much in-depth investigation on the first sustainability report released by BYD based on previous social responsibility reports and lacked relevant reference materials.

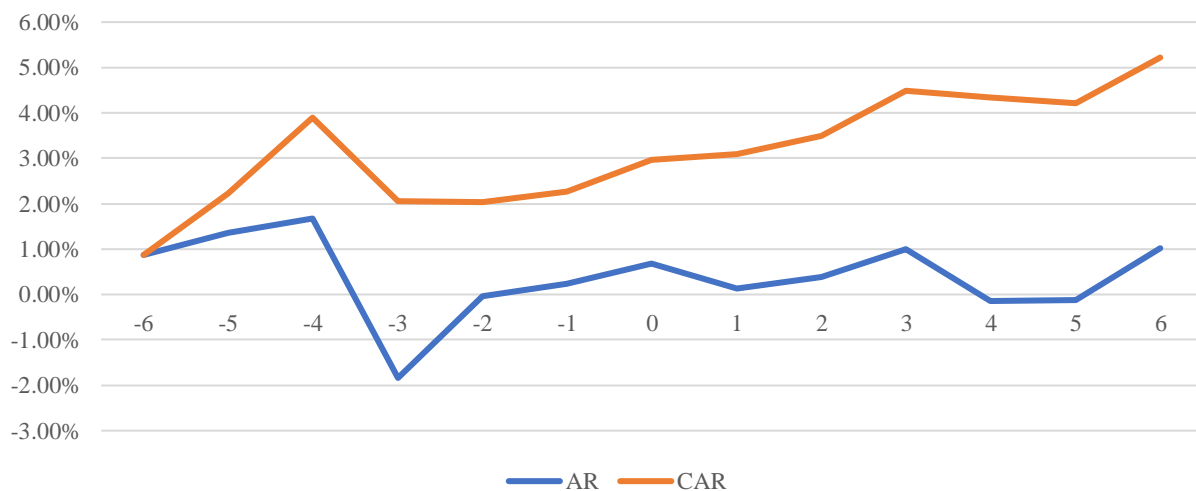


Figure 6: BYD AR_{it} and CAR Trend.

But the fact that investors on the day of the event did not conduct much in-depth investigation into the first sustainability report released by BYD based on previous social responsibility reports and lacked relevant references led to a delay in investors' views on the event.

However, investors on the day of the event did not conduct an in-depth investigation into the first sustainability report issued by BYD based on previous social responsibility reports and lacked relevant reference materials, which led to a certain time lag in investors' views on the event, and the excess return on the day of the event was

The day after the event and the first day did not generate positive excess returns. There was a large decline in BYD before MSCI's rating disclosure on the company, and then a pullback after that and steady growth. As a whole, the abnormal returns were all positive and reached 5.22% on the sixth day after the event day, from which it can be interpreted that investors have a positive attitude towards BYD Company after learning about the rise in the performance of the ESG ratings, and the company's share price has shown a positive trend in the stock market, which increased the short-term performance of the company to a certain degree, increasing the value of the company.

To sum up, BYD enterprise insists on optimizing its own ESG rating performance through high efficiency and high quality, and the sustainability report released to the public which is improved based on the social responsibility report will lead to the increase of the enterprise's excess return in the short term, and along with the gradual rational thinking of the investors, the excess return gradually tends to be zero, but the cumulative excess return is still at a high level, and it is expected that in the case of investors' long term It is expected that the market value of enterprises will be further increased in the future if investors and enterprises work together to improve ESG performance in the long term.

5. Conclusion

To achieve the goal of "double carbon" as soon as possible and promote the high-quality development of the economy, in the context of this employment environment, this paper takes BYD, a new energy automobile company, as the target of analysis, and analyzes the impact of ESG ratings on corporate value creation.

ESG ratings help improve the book value and market value of enterprises. While seeking economic benefits, ESG ratings can help enterprises enter a virtuous cycle of development. Developing ESG while seeking economic benefits can help enterprises enter a virtuous cycle of development, i.e., an upward revision of ESG ratings has a positive impact on enterprise value. In other words, an increase in ESG rating will have a positive impact on enterprise value. BYD has always attached great importance to ESG metrics, and thanks to MSCI's continuous upgrading of BYD's ESG rating, BYD's ESG rating has been upgraded from an A rating for three consecutive years, from 2019 to 2021, to an AA rating in 2022. The economic value added to BYD's book value has also increased significantly. And the economic value added to BYD's book value is also increasing gradually. The paper also analyzes the perception of ESG ratings by using event analysis and by comparing BYD with its industry competitors through multiple perspectives. The paper also analyzes that the market will react positively to a company with a higher ESG rating the market value of the company will increase and the market capitalization of the company will also increase.

A rise in ESG ratings can enhance corporate sustainability and increase investor confidence, thereby easing corporate financing pressures and improving risk resistance. Excellent management ability can integrate the company's resources into the right direction more reasonably, maintain the efficiency of management, and increase earnings and financial income, thus increasing the market value and book value of the enterprise. The increase in ESG rating can form the benchmark of the industry and gain more recognition from consumers.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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