

The Impact of the Measures for the Administration of Carbon Emissions Trading (for Trial Implementation) on BYD's Corporate Value

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Abstract: On January 5, 2021, China's ecological environment department issued the interim carbon emissions trading management (Trial). This policy will be implemented on February 1, 2021. The establishment of a carbon trading market with carbon dioxide emission rights as a commodity requires enterprises to respond to the state's call and thereby reduce carbon emissions. From another aspect, the implementation of this policy brings new business opportunities for enterprises. The article first discusses the impact of the carbon emission trading system on new energy automobile companies. By selecting BYD Co., Ltd., a typical new energy automobile company among domestic car companies, as the research object, and use the event study method to investigate the influence of the policy implementation on BYD's stock returns. The results show that the promulgation of the policy has a significant impact on the return of BYD's stock market, and suggestions are provided based on the research results. For the government, it should strengthen the disclosure of carbon market information, establish and improve a strict reward and punishment system, and provide preferential treatment in relevant taxes and financial subsidies. As for BYD, it vigorously develops carbon trading product innovation, develops more low-carbon and zero-carbon product varieties, and meets the diverse needs of more people.

1. Introduction

In recent years, environmental problems and natural disasters have become increasingly severe, and the world is studying how to implement sustainable development strategies. The emission of greenhouse gases is always a constant topic in a country. China's total carbon emission is much larger than other countries compared with other countries. With the goal of carbon neutrality, China has proposed a series of related policies. It is to build safe and efficient clean energy, reduce pollution and carbon, and advocate green travel. According to relevant literature, China's carbon policy will impact China's economy, whether China's GDP or other macroeconomic factors will be affected to a certain extent, and this impact is positive. Carbon policy will promote China's economic growth and, to a certain extent, impact the economy of enterprises. A policy closer to enterprises is the carbon emissions trading system, which is closely related to the economic performance of enterprises in carbon emission reduction. It is worth noting that new energy automobile companies have occupied a specific position in the market in recent years. From a few new energy automobile companies a few years ago, new energy automobiles are now widely used across the country. It can be expected that traditional auto companies. The transformation will also become an inevitable result in a few years.

This paper uses the event study method and analyzes the monthly return of stocks to investigate the impact of "the interim rules for carbon emissions trading management (trial)" (hereafter called the "administrative measures") on the monthly return of BYD Co., Ltd. We conduct quantitative empirical research on the stock returns of typical new energy automobile companies by a new policy. Then, the article provides corresponding suggestions for the new energy automobile market and related policies based on the analysis results.

The follow-up arrangement of this paper is as follows: the second part is a review of relevant literature, the third part is a brief analysis of the new energy automobile market and the future of BYD Co., Ltd., the fourth part is the result of event analysis, the fifth part is the long-term impact of the policy on BYD, and the sixth part is summary and recommendations based on the results of the analysis.

2. Literature reviews

2.1 The influence of carbon emissions trading policies on corporate economic performance

In the relatively new research on carbon trading systems, Liu, Fan, Li, Chen, Mao[1] focused on the impact of this system on the economic performance of carbon emission reduction of enterprises, using related the data analysis and simulation system draw the following conclusions: 1. The carbon trading system will have an effect on the low-carbon transformation of enterprises, and the impact is more obvious in terms of environmental performance, and its impact will become more significant as time pass by. 2. The opposing viewpoints of the "Porter Hypothesis" are confirmed. Porter [2] believes that enterprises can carry out innovation activities more efficiently in a relatively complete environmental governance policy, thereby reducing costs and improving product quality, which brings higher efficiency. The revenue generated from resource utilization exceeds the cost of implementing environmental governance. In a high-carbon market, there is more demand for carbon purchases, and the allocation of carbon allowances has a significant impact on the reduction of corporate carbon intensity. Therefore, it can be concluded that environmental policies related to reducing carbon emissions can affect the economic performance of some enterprises to a certain extent, and environmental performance is negatively related to economic performance.

2.2 The carbon emissions trading policy have an impact on the new energy automobile industry

To implement the decision and deployment of the CPC Central Committee and the State Council on building a national carbon emission trading market, on January 5, 2021, China's ecological environment department promulgated " the interim rules for carbon emissions trading management (trial)," which will be effective on February 1, 2021. For domestic self-owned brand enterprises, the reason to expand the production of new energy automobiles after the management of the fuel consumption limit of passenger vehicles is the carbon quota management of new energy cars, and the ultimate purpose of this policy is to make self-owned brands in the technological achievements and breakthroughs in strength. In the process of analyzing the government, enterprises, and consumers of the new energy automobile, Chen [3] concluded that the government plays an important role in the new energy automobile market, while the enterprises are the main body that provides technology and services to consumers in the industry. The development of the new energy automobile industry will be affected by the government's support for the new energy automobile industry and related policy requirements. It can not only improve consumers' awareness of new energy automobiles but also promote related enterprises in this regard investment in research, thereby improving the competitiveness of the industry. The relevant carbon emission reduction policies proposed by the government play a crucial role in promoting the development of new energy.

2.3 The carbon emission trading policies will enable companies to reduce carbon emissions

Earlier Klaassen et al. [4] used game experiments to prove that emission trading rights can achieve market equilibrium and maximize economic efficiency. An [5] and others concluded by using the former conclusion and using the AIM/Enduse model that CDM can greatly reduce the cost of dispatching parts and increase the transaction volume of the emission trading market for countries with developed emission reduction technology. However, CDM has little impact on technologically backward countries.

Yang [6] believed that long-term carbon emission reduction decisions need to consider external factors. In the related research on the micro-effects of carbon emissions trading, Shen, Huang, Liu [7], and others adopted the double-difference method, according to the six provinces of Shenzhen,

Beijing, Shanghai, Tianjin, Guangdong, and Hubei. The subsequent changes of enterprises have confirmed that the implementation of carbon emission trading policies can effectively promote carbon emission reduction of enterprises. However, the long-term effect requires enterprises to invest in technical emission reduction methods. Xie [8] and others believed that Chinese enterprises should consider the investment and emission reduction equipment matching the actual production capacity to better realize the emission cost optimization strategy under the emission rights trading mechanism. Wang [9] and others believed that increasing carbon emission reduction investment and setting up environmental management agencies are the best choices for enterprises. For the government, increasing carbon emission regulatory measures can reduce carbon emissions.

2.4 Analysis of experimental results

In their research, Brannlund and Lofgren [10] found that to avoid paying high fines in excess pollutant discharge, enterprises decided to take environmental protection investments to control the pollutant discharge value within the range set by the government. Similarly, Sun and Wang [11] conducted a series of studies on the willingness of enterprises to pay carbon credits under China's carbon market policy. They found that companies' expectations for the degree of control of the national carbon market and their understanding of carbon emission reduction technologies are positively related to their acceptance. It can be shown that under the carbon market policy, to control carbon emissions within the standards promulgated by the government, most companies will invest in environmental protection technology to control carbon emissions. Wang, Xu, and Bai [12] believed that when information asymmetry occurs in the primary market demand, the profits of supply chain members will be affected. However, it has a positive effect on carbon emissions. Moreover, when the information is asymmetric, there is only one case where the profit is greater than when the information is symmetric. The carbon emission is smaller than the carbon emission of the information symmetry when the average value of the basic demand is greater than the primary demand.

2.5 The carbon emission rights price makes a difference to the stock price of new energy companies

The research of Hu and Zhou [13] pointed out that the price of carbon emission rights will significantly impact new energy companies. After the positive impact in the early stage, it later turns into a negative impact. It shows that china's current carbon market has not fully and continuously exerted its positive impact on new energy companies. Under the too loose carbon market policy environment, it is challenging to make the aim of carbon emission reduction come true and lead to a decline in the market carbon price, which cannot effectively stimulate companies. Development of energy technology; under the environment of tight carbon market policy, carbon prices will rise sharply, and the cost of new energy enterprises will increase simultaneously, which is not conducive to the development of enterprises.

3. BYD's Prospect Analysis

3.1 Industry prospects

As a leader in the new energy automobile industry, BYD Co., Ltd.'s analysis of its industry prospects is the key to analyzing the impact of carbon policies on its stock price. This paper will use the PEST model to analyze the macro-environmental problems BYD faces. (1) From the perspective of national policies and laws, under the background of the "dual carbon policy", the development of new energy automobile enterprises is a high concern of the Chinese government, and the "14th Five-Year Plan" clearly proposes to focus on strategic emerging industries such as new energy automobiles, "New Energy Automobile Industry Development Plan (2021-2035)", "Notice on Carrying out New Energy Automobiles Going to the Countryside Activities in 2021" and other new policies about new energy cars. It has paved the way for the industry's future and promoted the development of the industry. (2) From the perspective of the economic environment, after the COVID-19 epidemic, in the first three quarters of 2021, China's employment rate and price situation have stabilized, the

national economy is in the recovery stage, and the level of residents' consumption continues to rise. This kind of economic situation provided a good environment for this industry. (3) From the perspective of the social environment, in recent years, the demand for crude oil in China has exceeded the supply, which has led to the continuous rise of crude oil prices. In order to break the shackles of crude oil prices, the Chinese government has begun to vigorously develop alternative energy sources such as electricity and hydrogen energy. (4) From the perspective of the technical environment, China has large nickel suppliers, and nickel is an important part of the battery, so it occupies a certain dominant position in the battery of new energy automobiles. It has relatively complete technologies in the motor, electronic control and other aspects. The technologies are at the forefront of the world, which undoubtedly provides great support for the development of new energy automobiles industry.

3.2 Company profile

BYD Co., Ltd. was established in February 1995; its general headquarter is in Shenzhen, Guangdong, with a registered capital of 2.911 billion. BYD is devoted to fostering the sustainable development of human society with technical innovation, supporting to achieve the objective of "emission peak and carbon neutrality." Furthermore, the corporate philosophy of "technology is king, innovation is the foundation" permanently persists, relying on muscular R&D strength and innovation capabilities. It plays a pivotal role in many fields such as electronics, new energy, and rail transportation. It is mainly in the IT industry in the secondary rechargeable battery business, cellular phone, computer parts, assembly business, and the automobile industry, which involves traditional fuel vehicles and new energy automobiles.

Moreover, use its technological advantages to develop other new energy products, such as solar power stations, energy storage power stations, LEDs, and electric forklifts. This company has up to 220,000 employees, covers an area of almost 18 million square meters, 30 production bases have been established around the world. In the field of new energy automobiles, studied in this paper has mastered the core technologies of new energy automobiles such as batteries, motors, and electronic controls. BYD has formed two main series of new energy commercial vehicles and passenger vehicles, covering seven conventional fields and four particular domains. BYD is undoubtedly a typical representative of domestic new energy automobile enterprises.

3.3 Enterprise growth analysis

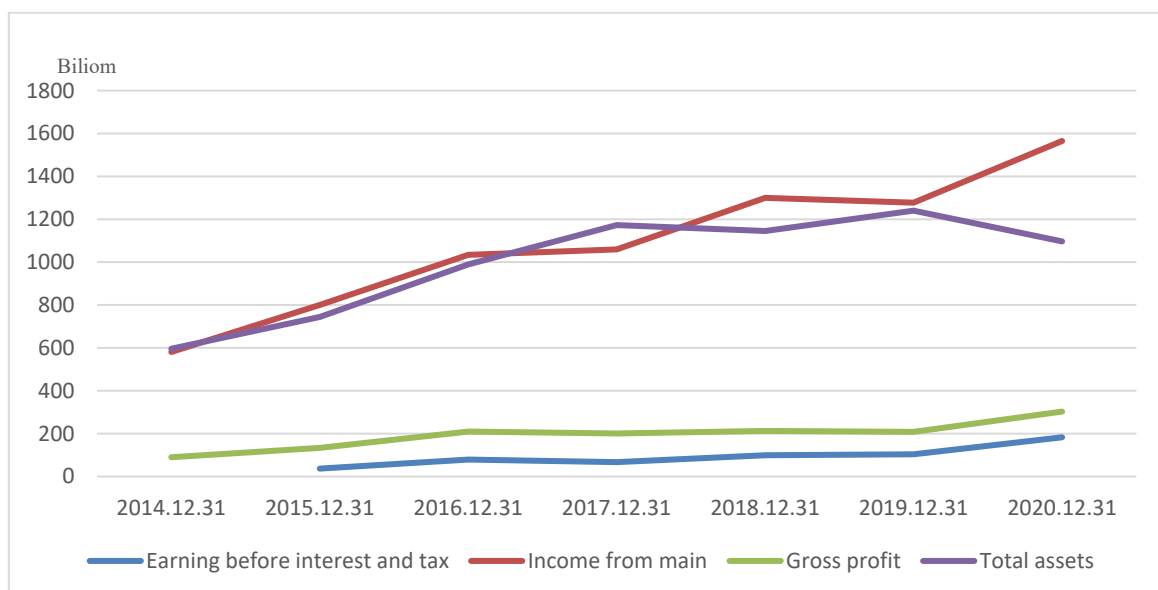


Figure 1. BYD's growth analysis line chart

From figure 1, it can be seen that BYD's total assets, operating income, gross profit, and operating profit before interest and tax are all showing a rapid growth trend, indicating that the company's growth is very good, and it is a growing enterprise.

3.4 Enterprise gross profit analysis

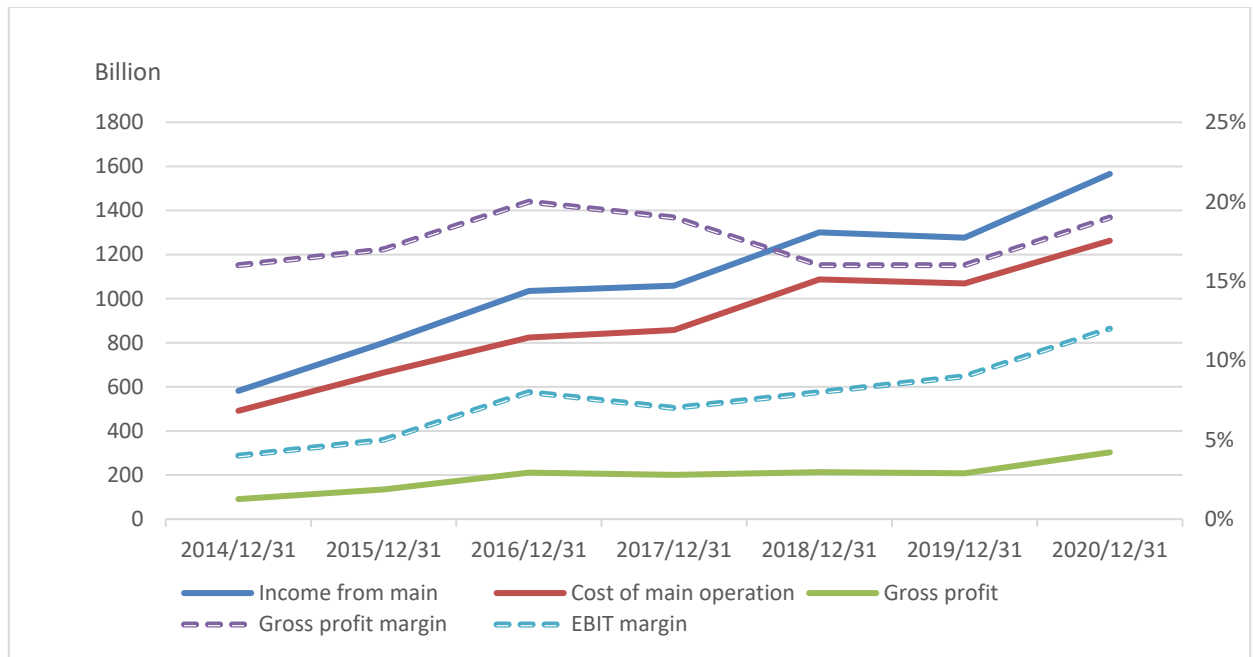


Figure 2. BYD's gross profit analysis line chart

From figure 2, it can be seen that from 2014 to 2020, in addition to fluctuations in gross profit margins, operating income and costs, gross profit, and EBIT margins all showed a steady upward trend. Overall, BYD's profit quality is relatively high, and the growth trend is excellent.

4. The impact of carbon emissions trading system on BYD

4.1 Hypothetical research

According to the above literature, we can conclude that under China's carbon emissions trading system, to meet the set carbon emission limit, maximize profits and minimize costs, companies will invest in relevant emission reduction policies. Further experiments are needed for automobile companies that already have relatively mature carbon emission reduction technologies to prove whether the carbon emissions trading system will have a more significant impact.

On the one hand, carbon emission quotas limit the carbon emissions of enterprises. According to the historical emissions of the enterprise, a certain percentage of free emission quotas are reduced each year and allocated to the enterprise. If the enterprise exceeds the carbon emission quota, it needs to purchase from the market or the government; otherwise, it will be punished, increasing the immense cost. Therefore, to maximize profits, enterprises will consider making behaviors that adapt to the business environment under the policy (Li, Shen) [14]. On the other hand, short-term policy events have a certain impact on stock prices: a favorable policy will lead to a weakening of the stock market's decline, or a bear market will turn into a bull market, and the stock market will be bullish; negative policies will lead to a weakening of the stock market's rise or a bull market will turn into a bear market, and the stock market will be bearish. (Xu, Li) [15] To sum up, this paper makes the following assumptions: implementing carbon emissions trading policy has a significant impact on stock prices.

4.2 Experimental model

The event study methodology is widely used in the financial field. It uses financial market data to analyze the impact of a specific economic event on the company's value or market, whether it produces excess returns. The event analysis method is mainly used to analyze whether an event impacts the time series. Wang and Zhu [16] believe that the most important thing about the event study methodology is to discuss the impact of an event we are concerned about in a certain period,

and it is not only applicable to research in the financial field but also to damage compensation in legal cases, government policies, etc.

4.3 Data Analysis

This empirical study selects the event study methodology to study the impact of The Interim rules for carbon emissions trading management on BYD's yield and selects the BYD index as the case index and the corresponding market index. This impact is mainly reflected in the cumulative excess returns of the data before and after The Interim rules for carbon emissions trading management. Analyze whether the cumulative excess rate of return is significantly different from 0, so as to judge the impact of events that occurred on January 5, 2021, on BYD's rate of return. The data in this paper comes from the wind database.

(1) Determine the window and sample selection: Selects February 1, 2021, as the occurrence point of the event, defines January 5, 2021, as 0, and sets the five trading days before and after the "Administrative Measures" event as the event window, denoted as T=-5, -4, -3, ..., 3, 4, 5, and the 190 trading days before the 7 days before the "Administrative Measures" are used as the estimation window of the event for analysis.

Select the period from March 18, 2020, to December 24, 2020, as the estimation window, and select the period from December 28, 2020, to January 12, 2021, as the event window, and use the estimation window for regression, and the regression The estimated coefficient estimates the event window. Since the event research method is to study the short term, the selected window should not be too long. In this paper, 5 days before and after being selected as the event window.

Modeling:

(1) Estimated normal rate of return: The formula for calculating the rate of return of BYD individual stocks:

$$R_{it} = \frac{(P_t - P_{t-1})}{P_{t-1}} \quad (1)$$

Used the CSI 300 Index as the market rate of return, and its calculation formula is:

$$R_{m(t)} = \frac{(\text{Index}_{(t)} - \text{Index}_{(t-1)})}{\text{Index}_{(t-1)}} \quad (2)$$

(2) Calculation and inspection of excess rate of return and cumulative excess rate of return. By the definition formula of excess rate of return:

$$AR_{it} = R_{it} - R_{mt} \quad (3)$$

AR_{it} is the excess rate of return of BYD stocks on day t, and R_{it} is the real rate of return of the stock on day t. Then calculate the cumulative excess return:

$$CAR_{it} = \sum_{t=-5}^{t=5} AR_{it} \quad (4)$$

Using the 196 days to the first 7 days before the occurrence of the "Administrative Measures" as the estimation period and making an estimation, the following results are obtained:

$$R_{it} = \alpha_0 + \alpha_1 R_{mt} + \varepsilon_t \quad (5)$$

t represents time, R_{it} represents BYD's yield data, and R_{mt} is the market index's yield data. Regression with the data of the estimation window can get the results shown in the table:

Table.1. Regression result

RI	Coef.	Std. Err.	t	P>t
RM	1.2603***	0.1843	6.8377	0.0000
cons	0.5094**	0.2357	2.160	0.0230
R-squared	0.1991			
F(1,198)	46.7551			
Prob>F	0.0000			

Note: ***, **, * indicate significant at the significance level of 0.01, 0.05, and 0.1, respectively.

$$R_{it}=0.5094+1.2603 \cdot R_{mt}$$

The R square is 0.1991, which means that the part of the model explained by the regression line is 19.91%, the F value is 46.7551, and the corresponding p-value is 0.0000, which is less than 0.05; that is, the whole model is significant, and the coefficient of Rmt is 1.2603, which means that every 1 increase in Rmt Each unit will cause BYD's yield to increase from 1.2603 units.

The AR and CAR tables within [-5,5] are calculated as follows:

Table.2. The AR and CAR tables

DATE	T	RI	RM	AR	CAR
2020/12/28	-5	1.4631	0.4443	0.3582	0.3582
2020/12/29	-4	-4.9646	-0.4241	-4.9276	-4.5694
2020/12/30	-3	4.1433	1.4034	1.7771	-2.7923
2020/12/31	-2	4.4624	1.9082	1.4325	-1.3598
2021/1/4	-1	6.4128	1.0828	4.4682	3.1084
2021/1/5	0	6.3552	1.9133	3.3186	6.4270
2021/1/6	1	-1.6371	0.9158	-3.3620	3.0650
2021/1/7	2	4.0407	1.7718	1.1901	4.2551
2021/1/8	3	1.0976	-0.3306	1.0116	5.2668
2021/1/11	4	3.2306	-0.9876	4.0086	9.2753
2021/1/12	5	0.9069	2.8522	-3.3644	5.9109

It can be seen that AR, the excess rate of return, is basically more than 0, while CAR is negative for three days before the implementation of the plan, and then all positive. It is preliminarily judged that the "Administrative Measures" event occurred on February 1, 2021. There is a positive impact on BYD's yield.



Figure 3. Line chart of AR and CAR

It can be seen that before the implementation time of the "Administrative Measures," the volatility

of the return rate is also relatively large, and before the point, the AR value is significantly greater than 0, most of the fluctuations fluctuate above 0, and the accumulated excess return rate is gradually increasing. Therefore, the implementation of the "Administrative Measures" on February 1, 2021, will have a significant positive impact on BYD, which will lead to an increase in yields.

4.3 Summary

This chapter firstly analyzes the impact of carbon emission trading policy on the new energy vehicle industry from the theoretical level from the aspects of enterprise economic performance, new energy vehicle industry, enterprise's own carbon emission reduction, and the impact of enterprise emission reduction willingness. By analyzing the excess rate of return and cumulative excess rate of return during the BYD window period, it is found that the accumulated excess rate of return of BYD stocks floated at zero before the policy was promulgated. After the policy was promulgated, the accumulated excess rate of return of BYD stocks increased significantly. Equity yields fluctuated in the days leading up to the policy and peaked on the day of the event. It can be seen that the increase in the cumulative excess yield of BYD stocks maybe since the promulgation of the policy has improved investors' healthy development prospects for BYD. Some investors have already learned that the policy was promulgated a few days ago, and the stock market trading activity has increased, resulting in Market valuations that have risen.

5. The long-term impact of the "Administrative Measures" on BYD

5.1 Analysis of BYD's Total Assets and BYD's Total Liabilities

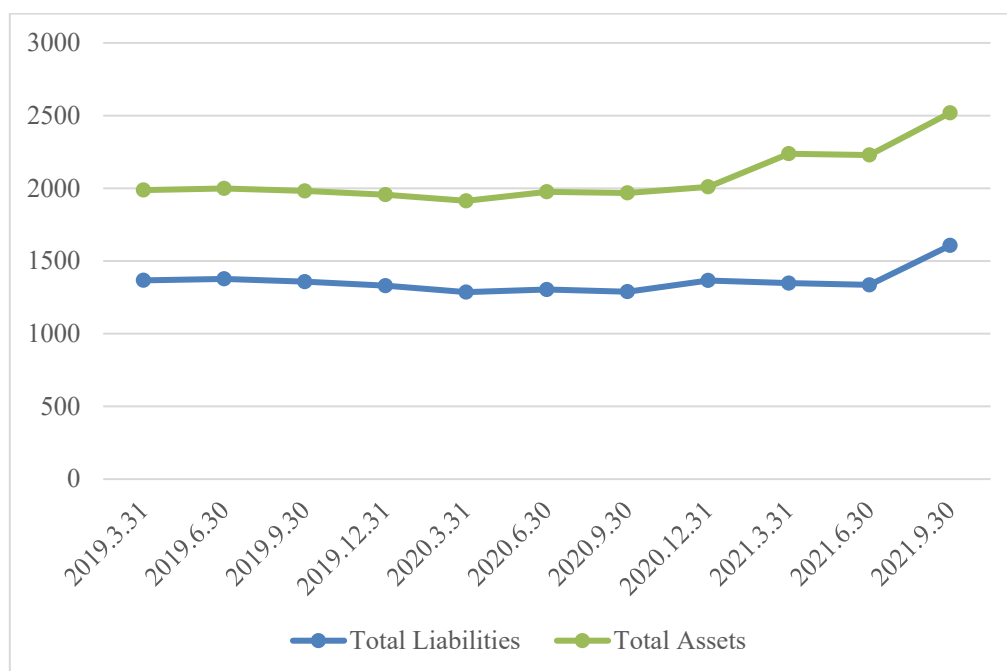


Figure 4. Line chart of total assets and total liabilities

We had researched BYD's total assets and total liabilities from March 2019 to September 2021 and BYD's current position. Based on BYD's total assets and total liabilities from March 2019 to September 2021, it is not difficult to see that the difference between BYD's total assets and total liabilities from March 2021 to September 2021 is higher than the difference in previous years, the total assets and total liabilities have a clear upward trend. Further proof that BYD Company generated more profits after implementing the policy.

After the market value approached one trillion yuan, the stock price rose fivefold in one year and hit a record high; BYD released its financial report for the third quarter of 2021. According to the financial report data, BYD achieved revenue of 54.307 billion yuan in the third quarter, a year-on-year increase of 21.98%; net profit was 1.27 billion yuan, a year-on-year decrease of 27.5%. In terms

of revenue growth, BYD's revenue growth in the second and third quarters was generally flat. To the surprise of the market, BYD's auto business performed well. According to the Dolphin Investment Research report, in the third quarter of 2021, BYD's new energy automobile sales exceeded 180,000 units, a year-on-year increase of 289%, and the company's overall sales exceeded 200,000 units, a year-on-year increase of 87%. In addition to revenue and profit, another indicator worthy of attention is construction in progress. In the financial report, BYD's construction in progress in the third quarter increased by 125% year-on-year, mainly for the battery and automobile business.

5.2 Current Status of BYD

In BYD's sales in 2021, four essential conclusions can confirm that BYD's business achieved better profits in 2021, and it has made great achievements in new energy automobiles: 1. BYD 1 in 2022 The production and sales report released on March 3 pointed out that the cumulative sales volume for the whole year of 2021 reached 740,000 units, an increase of 73.34% compared with 2020, and reached a new monthly high in December 2021. 2. In 2021, BYD's sales of new energy automobiles will reach 603,800 units, an increase of 218.3% compared to 2020. 3. In the global sales rankings of new energy passenger vehicles in November 2021 announced by foreign media, BYD's 6 models entered the top 20 in global sales and ranked first in the world with monthly sales of 90,700 units. 4. 95% of BYD's sales in 2021 will come from new energy models, of which pure electric vehicles account for more than 50%. According to BYD's official data, in September this year, BYD's passenger car sales reached 79,000 units, a year-on-year increase of 93.2%. The cumulative sales from January to September reached 452,700 units, a year-on-year increase of 68.32%; among which, the sales of new energy passenger vehicles reached 70,000 units, a year-on-year increase of 276.4%, and the cumulative sales from January to September reached 337,500 units, a year-on-year increase of 204.29%. Sales volume is a crucial factor for the capital market to measure the value of a car company. BYD's better sales data this year has also made its stock price hit a record high, and its market value has surpassed that of Mercedes-Benz. In August 2021, BYD's total market value exceeded the 900 billion yuan mark for the first time.

6. Conclusion

In general, the implementation of the carbon emissions trading policy had a very favorable impact on the return on BYD's share price in the short term. The cumulative excess return rate was positive for a total of 11 days on the 5th day before and after the implementation of the "Administrative Measures", causing the stock price Yields to rise. And from a long-term perspective, after the implementation of the "Administrative Measures", the impact on BYD's enterprises will be positive. According to the research results of this paper, the following suggestions are put forward from the perspective of the government and the enterprises themselves:

First of all, the carbon emission trading management policy is favorable for BYD and other new energy automobiles companies, leading to an increase in the stock market value. In addition, the carbon market is policy-driven, and the market trading system established by the government is primarily. It determines the overall decision-making of the enterprise, so the problem of information asymmetry will also lead to an increase in the cost of enterprise information. Therefore, the government strengthens the disclosure of carbon market information and establishes and improves the strict reward and punishment system, which can effectively reduce the information cost of enterprises and solve the problem of information lag. Secondly, encourage enterprises to innovate independently, provide subsidies for emission reduction technologies, alleviate the inhibition of investment in emission reduction technologies due to higher development costs, and provide preferential treatment in relevant taxes and financial subsidies. The technological breakthrough of new energy automobiles is complex and the investment cost is high, which makes them dependent on the support of government and national policies. The carbon emission rights trading market aims to market the carbon and flow capital into new energy automobiles enterprises. Combining macro-management and market regulation will comprehensively promote the development of the new energy automobiles industry.

Secondly, BYD itself should also actively respond to the call of the carbon policy, vigorously carry out carbon trading product innovation, develop more low-carbon and zero-carbon product varieties, and meet the diverse needs of more people. In the initial development period of the new energy vehicle industry, the state encourages enterprises to innovate through policies, which can improve the initiative and enthusiasm of enterprises to innovate. However, with the increasing number of government subsidies, enterprises gradually rely on government subsidies, which is not conducive to the further development of enterprises. Therefore, BYD needs to improve the efficiency of capital utilization, actively develop energy technology, promote enterprise development, and optimize enterprise structure when the government provides policy support.

The disadvantage of this paper: In the event study method, research the volatility of an event on the stock market, and there is no other sudden event that has an impact on the stock market during this period. Since the outbreak of the new crown epidemic has a great impact on the stock market, the window period studied in this article is one year after the outbreak of the new crown epidemic. Therefore, the new crown epidemic is not regarded as "another sudden event," and we ignored the impact of the new crown epidemic on the stock market. On this basis, the implementation of the "Administrative Measures" still has a significant positive impact on BYD's stock market value, which shows that the policy's implementation has a favorable impact on BYD in general. Secondly, this paper only studies a single company and does not study the overall new energy automobile companies. The research results may slightly deviate from the facts. It is necessary to consider the double-difference method in the follow-up research to study the impact of emergencies on carbon prices and a more targeted analysis of the new energy vehicle industry combined with China's existing characteristics. Finally, since the "Administrative Measures" were officially issued on February 1, 2021, the research on BYD's long-term impact only considers the data for the whole year of 2021, the period is short, and the possible future impact is unknown. Therefore, long-term impact There are flaws in the research part, which need to be proved in the follow-up research based on the actual situation.

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