Impact of Carbon Emission Policy on the Automotive Industry
Based on the Analysis of BYD'S Financial Statements

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Abstract. IN recent years, China has strictly controlled carbon emissions, aiming to establish and improve the economic system of green and low-carbon circular development and promote China's green development. Carbon emission policies can be beneficial to the automobile industry to promote the achievement of goals such as sustainable development. This study takes BYD, the automobile industry, as an example, to explain the current development situation and prospects of BYD, analyze its operating capacity, growth capacity and solvency, and discuss the impact of carbon emission policies on BYD and the automobile industry, so as to provide reference suggestions for the development of BYD under the current green development background. It is found that the carbon emission policy has more advantages than disadvantages for the automotive industry: increasing the competition in the automotive industry, solving the production capacity problem through the method of survival of the fittest, promoting the sustainable development of the automotive industry, and promoting China's automotive industry to build an international brand to a new level.Therefore, the carbon emissions policy is conducive to the growth of China's auto industry.

Keywords: Carbon emission policy · Low carbon economy · BYD · Financial indicators · Macroeconomic environment

1 Introduction

Recently, in order to promote the global green and low-carbon cycle development, countries have strictly controlled carbon emission standards. More and more countries have realized that bringing carbon emissions to the automotive industry is conducive to the achievement of sustainable development and other goals. Countries around the world are stuck in large-scale implementation of emission reduction actions, among which the automobile industry has the most significant impact. As we all know, most carbon emissions come from automobile exhaust running between cities. In order to promote China's green development, it is very important to introduce carbon emission policies into the development orientation of the automobile industry. Although many Chinese automobile industries are aware of the importance of low carbon, most enterprises still take a wait-and-see attitude towards the new energy industry [1].

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As early as 2011, the state issued the comprehensive work plan for energy conservation and emission reduction in the 12th Five Year Plan, in which the part of strengthening energy conservation and emission reduction management specifically describes the content of energy conservation and emission reduction in transportation, including accelerating the use of old cars and locomotives, and basically eliminating the yellow standard cars registered before 2005. Implement the fourth stage of motor vehicle emission standards, and gradually implement the fifth stage of emission standards in key cities and regions where conditions permit.Motor vehicle environmental protection newspaper management has been fully implemented, and actively promote energy-saving and new energy vehicles. In addition, in 2021, China will deepen its low-carbon transportation system. First, accelerate the development of green logistics. Secondly, promote energy-saving and low-carbon means of transportation, including accelerating new and clean energy vehicles and ships, promoting intelligent transportation, improving fuel vehicle and ship energy efficiency standards, and accelerating the elimination of old vehicles and ships with high energy consumption and high emissions. In addition, actively guide low-carbon travel. All these prove that the country is accelerating the development of new energy and clean energy vehicles while gradually reducing the proportion of traditional fuel vehicles in the production and sales of new towns and car ownership.

This kind of policy guidance may have a negative impact on the traditional automobile industry. Hong Yuee also mentioned it in the analysis of China's automobile industry organization under the stall economy [2]. She believes that the new era direction guided by low-carbon economy is the inevitable choice for China's automobile industry to maintain long-term sustainable development. But the road is not plain sailing. She believes that there are the following points: first, the low-carbon economy will increase the overall cost of the automobile industry in the short term, which will lead to lower profits of the industry. China's low-carbon policy forces the automotive industry to study new technologies. Because the development of this new technology at home and abroad is in the initial stage, and China's economic level has not yet reached the level of developed countries, this leads to the research of this new technology is often large investment but small income, and cannot receive a lot of attention at home. This also makes it impossible for enterprises to quickly obtain the economic benefits generated through technological transformation from the market. Even those automobile enterprises that have not invested in low-carbon technologies have to eliminate a large number of old models and start manufacturing new models due to the gradual tightening of automobile emission standards. In this transformation, on the one hand, the automobile industry cannot quickly obtain high enough profits from new models, on the other hand, automobile enterprises have to sell old models at reduced prices, which also reduces profits. And under the conditions of the epidemic, more enterprises will face the risk of bankruptcy or merger and reorganization. Secondly, the low-carbon stall economy has restrained the consumption demand of automobiles in the short term. The reasons are as follows: first, the impact of low-carbon economy on the automobile consumption industry is self-evident. This impact comes from people's inability to make rapid changes in values and the way they receive and supply goods in the short term. It also comes from the government's direct control over urban car ownership. This control has led to a decline in demand in the automotive industry. And in the process of product transformation, people have not established enough

awareness and trust in new products. So the low-carbon policy has a huge impact on China's traditional automobile industry, but similarly, the low-carbon economy has also brought opportunities to China's automobile industry. There are too many automobile enterprises in China, and there is a serious problem of overcapacity. By the end of 2021, the national passenger car production capacity had totaled 20.89 million, with a capacity utilization rate of 52.47%. Although this is 4% higher than 48.45% in 2020, it is still in the range of overcapacity [2]. The introduction of the national low-carbon policy will gradually solve this problem. Capable enterprises can adapt and even expand in the new policy, while backward automobile enterprises can only be eliminated in this transformation. In addition, low-carbon economy also helps enterprises to change in advance before the arrival of resource problems, increasing the sustainable development of the automotive industry [4]. New energy and clean energy vehicles are a new field in the automotive industry. At present, there are no key technological breakthroughs at home and abroad, such as difficult charging of batteries, anxiety about mileage, fast power loss in extreme weather and so on. For automobile enterprises, the cost of researching new technologies is high, but this reform is a good opportunity for China's automobile industry to establish a stronger independent brand. Take advantage of the opportunity that consumers are blank in this field to vigorously study new technologies and merge them with Chinese elements. This will not only enable the world to understand Chinese elements, but also expand China's share in the international automobile market.

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2 Countermeasures for Traditional Automobile Industry

Based on the huge market potential brought by the carbon peak and carbon neutralization goals, the form of new energy vehicles is very good. The continuous growth of the valuations of "Ideal, Xiaopeng Weilai", CATL and BYD also proves that new energy vehicles dominate the capital market. Taking BYD as an example, the company has been focusing on the research of new energy since it entered the automotive industry in 2003. In 2004, BYD's pure electric concept car was exhibited in Beijing. In 2008, the world's first mass-produced plug-in hybrid new energy vehicle was listed. BYD's valuation gradually rose after the country issued the comprehensive work plan for energy conservation and emission reduction during the 12th Five Year Plan period in 2011. From

2012 to 2019, BYD's valuation increased from about 329 to about 1300. Since 2020, the value has increased to about 8200. This is because the public gradually recognizes that the prospect of new energy vehicles and the deepening of low-carbon transportation in 2021 are possible reasons.

As the pioneer of China's new energy vehicles, BYD has an advantage in China both in terms of time and manner. First of all, BYD pays more attention to scientific and technological innovation and complements its weaknesses. It starts from the short board of domestic new energy vehicles such as batteries, chips and endurance. DM technology, blade battery, E platform, dilink intelligent networking system, d++ open ecology, dipilot intelligent driving assistance system and CTB technology are the advantages of BYD compared with other new energy vehicles. Secondly, this year, BYD announced that the company will stop the production of fuel vehicles from March 2022 and will focus on pure electric and plug-in hybrid vehicles in the future, which also marks that BYD has become the first auto company in the world to officially announce the shutdown of fuel vehicles [3]. Therefore, the traditional automobile industry can take BYD as an example to respond to national policies and gradually reduce the output of fuel vehicles. At the same time, it should focus on the development of new energy vehicles based on the development of science and technology and speed up the response to the challenges of new energy vehicles.

2.1 Analysis of Financial Indicators of BYD

In order to discuss the effectiveness of BYD's transformation decision, this study will compare the changes of BYD's financial situation before and after the commercialization of new energy vehicles through financial index analysis (profitability, solvency analysis, operating capacity analysis, growth capacity analysis), so as to evaluate the transformation effect.

2.2 Profitability

It can be seen from Table 1 that the increase and decrease trends of net profit margin, roe, ROA and gross profit margin are similar. Take the gross profit margin of sales as an example.

Sales gross profit margin: first, the sales gross profit margin is the percentage of gross profit to sales revenue or operating revenue. Therefore, the sales gross profit margin reflects the value-added part of a commodity after it is converted into an internal system through production. In other words, the more the enterprise adds value, the more the gross profit margin will naturally be calculated as follows: Gross profit margin = (sales revenue-cost of sales)/sales revenue × 100%

It can be seen from Fig. 1 that before BYD's transformation, the gross profit margin of sales had a downward trend [4]. From 2014, the first year of BYD's transformation, to 2017, the gross profit margin of sales increased steadily, from 15.55% to 19.01%. However, after 2017, although it reached a new high of 19.38% in 2019, it showed a downward trend. From 2017 to 2020, BYD's gross profit margin decreased because as China's policies became clear, more and more enterprises entered the new cake of new energy, while the entry of other companies also affected BYD's market share, resulting in

Table 1. Analysis of financial indicators

Financial ratio	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	Average in recent 5 years	Average in recent 10 years
gross profit margin (%)	13.02	19.38	16.29	16.40	19.01	20.36	16.87	15.55	15.36	14.30	16.82	16.65
gross profit margin (%)	1.84	3.84	1.66	2.73	4.64	5.30	3.92	1.27	1.47	0.45	2.94	2.71
ROE (Average value of)(%)	4.01	7.45	2.88	5.05	7.65	12.09	9.79	1.84	2.58	0.38	5.41	5.37
ROE (Diluted)(%)	3.20	7.44	2.84	5.04	7.39	9.86	8.74	1.71	2.55	0.38	5.18	4.92
ROA(%)	1.23	2.13	0.83	1.49	2.52	3.88	2.70	0.51	0.76	0.12	1.64	1.62
ROIC(%)	2.66	3.55	1.35	2.47	3.70	5.69	4.03	0.73	1.07	0.17	2.75	2.54

the decline of gross profit margin. In 2021, there are two main reasons for the decline of gross profit margin. First of all, BYD has implemented a radical pricing strategy in order to gain more share in the new energy vehicle market: in 2021, the proportion of models with a sales value of about 100000 yuan is higher than that of models with a sales value of more than 200000 yuan, and BYD's upstream raw material prices continue to rise in 2021. This has led to the reduction of BYD's profits. Secondly, BYD also increased its investment in technology research and development at the end of 2021, amounting to 10.627 billion yuan, an increase of 24.20% year-on-year in 2021. Although technology research and development has enabled BYD to have industry-leading core technologies, it has also led to a decrease in its gross profit margin in 2021.

2.3 Operating Capacity

Accounts receivable turnover rate: as the name suggests, accounts receivable turnover rate is the rate at which the company should have received the accounts within a certain period of time. Generally speaking, it is the speed at which an enterprise turns its accounts receivable into cash within one year. It can be seen from Table 2 that before and after the transformation, BYD's accounts receivable turnover rate continued to decline from 2011 to 2017, and slowly recovered to 2.58 in recent years. However, there is still a big gap between the current average value of 7.8 of social accounts receivable turnover rate. In general, the turnover rate of accounts receivable after BYD's transformation is lower than that before the transformation. If the turnover rate of accounts receivable is too low, the risk of bad debt loss will increase, and too much working capital will be placed on accounts receivable, affecting the normal capital turnover rate.

Inventory turnover rate: the ratio of an enterprise's operating cost to its average inventory within a certain period of time. This data can reflect the speed at which inventory goods are converted into inventory funds in a certain period of time. It can be seen from the table that BYD's inventory turnover rate continued to decline after 2014, the

Table 2. Operating Capacity

Financial ratio	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	Average in recent 5 years	Average in recent 10 years
Turnover rate of accounts receivable (Times)	5.58	3.68	5.82	5.01	2.26	3.27	4.54	5.43	7.58	7.98	4.47	5.12
Inventory turnover rate (Times)	5.03	4.43	4.12	4.71	4.61	4.97	5.17	5.4	5.75	5.76	4.58	4.99
Total asset turnover rate (Times)	0.87	0.79	0.65	0.70	0.66	0.79	0.76	0.68	0.73	0.70	0.73	0.73
Proportion of three expenses (%)	6.28	8.39	9.00	8.83	13.24	11.85	12.16	13.83	12.27	11.87	9.15	10.77

first year of transformation. This is not a good phenomenon (Table 2). This reflects that BYD may have problems of reduced sales or continuously lower inventory management efficiency.

Total asset turnover: total asset occupancy refers to the result of the comparison between the business income of an enterprise and its total assets every year. The total asset turnover rate can show the company's operation and asset utilization. It can be seen from the table that BYD's total asset turnover has not changed much in the past 10 years, which shows that the company's total asset utilization and operating conditions are well controlled and there are no obvious problems.

2.4 Growth Ability

Growth rate of operating revenue: the growth rate of operating revenue is the ratio of the growth of operating revenue of the current year to the total operating revenue of the previous year. It can be seen from the chart that BYD's operating revenue growth rate did not exceed 15% before 2014, and the 12.83% in 2013 was still due to the low operating revenue growth rate in 2012. However, since the transformation of BYD in 2014, the growth rate of operating revenue has fluctuated, but it is almost stable at more than 20%, and it will increase to 38.02% in 2021. This is because at the time of BYD's transformation, there was not too much competition in the domestic market in terms of new energy, and BYD had some advantages in starting as a battery and could quickly gain market share.

Net profit growth: in Table 3, we can see that BYD's net profit growth rate was as high as 579.60% in 2013, mainly because the company's net profit growth rate in 2012 was too low, which was the result of bottoming out. In the first year after the transformation,

Table 3. Growth ability.

Financial ratio	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	Average in recent 5 years	Average in recent 10 years
Growth rate of operating revenue (%)	38.02	22.59	-1.78	22.79	2.36	29.32	37.48	10.09	12.83	-4.04	16.80	16.97
Net profit growth rate (%)	-28.08	162.27	-41.93	-31.63	-19.51	78.94	551.27	-21.61	579.60	-94.12	8.22	113.52
Growth rate of net assets (%)	67.16	0.20	2.83	0.35	7.31	58.71	27.32	16.84	2.42	0.34	15.57	18.35

the net profit growth rate was as high as 551.27%. This was because the high growth of new energy gradually became prominent. As the pioneer of new energy, BYD's product sales increased [5]. Although BYD's net profit growth rate was greater than 0 in only two years from 2016 to 2021, the net profit growth rate in other years was still greater than that in 2012.

Growth rate of net assets: compared with that before and after 2014, BYD's growth rate of net assets increased significantly. In general, BYD's growth ability after the transformation is higher than that before the transformation.

2.5 Solvency

Current ratio: current ratio is the ratio of current assets to current liabilities. It is used to measure the ability of an enterprise's current assets to be used only to repay debts before the maturity of short-term debts. Generally speaking, the higher the current ratio, the stronger the enterprise's liquidity and short-term solvency. It can be seen from the chart that BYD's current ratio was around 0.65 before 2014. After the transformation in 2014, the current ratio increased year by year and finally stabilized at about 1 (Table 4).

Quick ratio: refers to the ratio of an enterprise's quick assets (current assets - balance after inventory and prepaid expenses) to current liabilities. The quick ratio can reflect the ability of an enterprise's current assets to immediately realize and repay current liabilities. It can be seen from the chart that since 2014, BYD's quick ratio has shown an overall upward trend.

Asset liability ratio: as can be seen from the chart, BYD's asset liability ratio is above 60% all the year round, reaching a peak of 69.26% in 2014. After 2014, it showed a downward trend year by year. In 2016, BYD's asset liability ratio was only 61. 81%, which is because BYD had a good sales situation in 2016 and obtained a lot of cash. In general, BYD's solvency is better than that before its transformation.

Table 4. Solvency.

Financial ratio	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	Average in recent 5 years	Average in recent 10 years
Current ratio	0.97	1.05	0.99	0.99	0.98	1.00	0.82	0.77	0.68	0.61	1.00	0.89
Quick ratio	0.72	0.75	0.75	0.76	0.79	0.78	0.58	0.58	0.48	0.41	0.75	0.66
Asset liability ratio (%)	64.76	67.94	68.00	68.81	66.33	61.81	68.8	69.26	67.46	64.86	67.17	66.8

At present, the green degree evaluation of China's automobile manufacturing enterprises includes resources, environment, economy and so on [6]. BYD faces a complex and changeable environment. For example, changes in politics, economy and technology will have a huge impact on the new energy industry. At the same time, BYD has invested too much capital in the initial stage of technology research and development, and a large amount of research spending has led to certain risks in BYD's cash flow, resulting in poor capital flow. In addition, although China has made great efforts to develop new energy, as China's new energy automobile industry is not yet mature [7], the assistance that the state can give is limited. BYD's large-scale expansion of business today is likely to lead to excessive use of financial leverage, which will also lead to financial risks.

2.6 BYD Company's Development Advice Company

BYD should improve its adaptability to the macro environment and strengthen its analysis of the macro environment so that it can respond to the additional costs caused by environmental changes in a timely manner. BYD enterprises and companies can directly establish a department to analyze the environment to ensure that they are highly sensitive in the social environment. Moreover, innovation is the driving force of development. BYD should comply with development, vigorously innovate and phase out backward models of the enterprise, and enhance the comprehensive competitiveness of the enterprise from a long-term perspective.

As the investment in new energy technology R & D requires a lot of resources and the funds are slowly returned, BYD's funds are running slowly, which is easy to cause capital problems. Therefore, BYD should control its own cash flow, maintain the debt scale of the enterprise and improve the capital turnover rate. In addition, BYD should increase its profits. This can be achieved by reducing costs. All links in the industrial chain have room to control costs and reduce unnecessary sunk costs (especially at present, BYD has just announced that it will give up the production of fuel vehicles, and should complete the transformation from fuel vehicle production to new energy vehicle production as soon as possible, so as to achieve the purpose of reducing costs). At the same time, BYD should adopt appropriate sales strategies to solve the problems of inventory backlog and insufficient profits of main sales models [8]. When formulating sales strategies, BYD should grasp the psychology of consumers, make good use of its own

technology as a leader in the industry, and eliminate people's stereotype of low price and poor quality of BYD cars in the past. Finally, it is suggested that BYD should also use the idea of game theory [9] to bring industry competitors into the influencing factors of decision-making, and predict the decisions of competitors to achieve the optimal strategy combination.As new energy vehicles today have high requirements for supporting service facilities similar to charging, the business model of the traditional automobile industry is not suitable for the new energy industry. Therefore, BYD should reform and innovate its existing business model as soon as possible. Make a choice between BTC (enterprises and consumers) and BTB (enterprises and enterprises) as soon as possible, and improve the supporting service facilities for new energy vehicles corresponding to their own business models[10].

3 Conclusion

In general, the carbon emission policy has more advantages than disadvantages for the automobile industry. Although there are a few negative effects, such as increasing the cost of the automobile industry and curbing consumer demand for automobiles in the short term, there are more advantages: first, increase the competition in the automobile industry and solve the production capacity problem through the elimination of the fittest; Second, promote the sustainable development of the automobile industry; Third, promote China's automobile industry to build an international brand to a new level. And from the perspective of BYD finance, the carbon emission policy is indeed conducive to the progress of China's automobile industry. By comparing the financial ratios of BYD before and after the transformation, we can see that BYD's abilities have improved after the transformation.

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