

Investment Value Analysis of BYD and Representative New Energy Markets

Zihan Wang*

College of Science & Technology Ningbo University, Ningbo, China

*Corresponding author: 15060340308@xs.hnrit.edu.cn

Abstract. In recent years, the new energy market has become the focus of the investment. CATL, as the midstream of the industry, and BYD and CCAG, as the downstream of the industry, have jointly promoted the development and growth of the new energy industry. As the representative of new energy vehicles, BYD has been favored by the capital market. The purpose of this paper is to provide an in-depth analysis of the investment value of CATL, BYD, and CCAG from three aspects: policy support, market demand, and technological innovation, and a comparative analysis of them. The focus is on BYD stock's position in the new energy sector. By analyzing past market data, and financial reports, this paper first introduces China's policy support for new energy vehicles, including subsidies, quotas, and other incentives. Second, it analyzes the market demand for new energy vehicles, focusing on the market size, consumer preferences, and market potential of the new energy vehicle market. Third, this paper analyzes the technological innovation of new energy vehicles, including battery technology, electric power system technology, and intelligent driving technology. Based on the above analysis, this paper concludes that BYD and its energy electric vehicle market have strong investment value. However, in the face of fierce competition, BYD needs to continue to strengthen its technological innovation, enhance its brand influence, and seize market opportunities to maintain its competitive advantage.

Keywords: BYD; CATL; CCAG; new energy vehicles; policy support; financial analysis.

1. Introduction

The new energy industry is a rapidly growing industry. The rise of the new energy vehicle industry is driven by concerns about climate change, environmental pollution, and depletion of natural resources. These factors have led governments and businesses around the world to prioritize the development and adoption of cleaner and more sustainable modes of transportation.

2021 China power lithium battery industry competition echelon

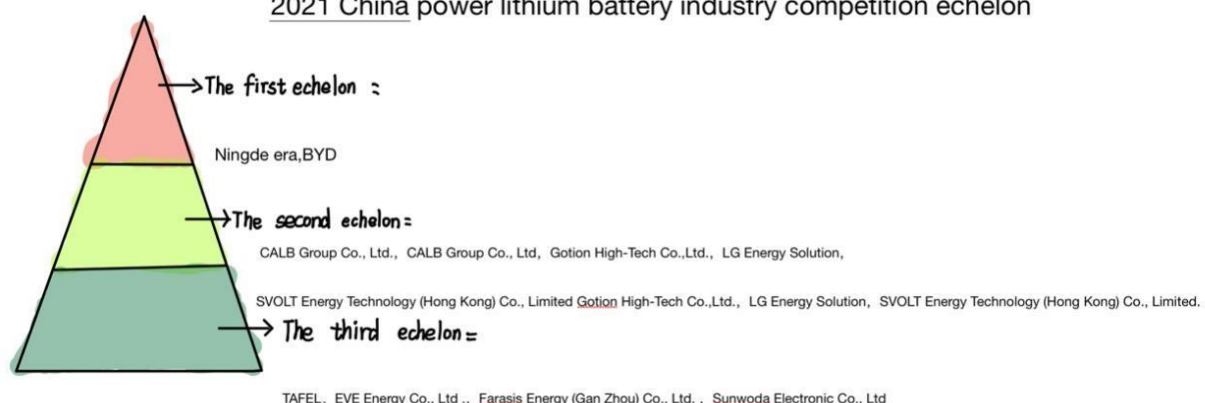


Fig 1. 2021China power lithium battery industry competition echelon

Figure 1 shows the competition pattern and market share of China's electric lithium battery industry. At present, most of the research on the supply chain of the automotive industry is based on the research on the supply chain of the traditional automotive industry, while the research on the supply chain of the new industrial branch of new energy vehicles is still relatively small [1]. China's power lithium battery industry started from zero, from small to large, with rapid development, China's power lithium battery industry has entered the key stage of industrialization construction and

promotion and application, and the industrialization process of power lithium battery has been in the international leading position. The new energy industry is also seen as a good way for innovation and economic growth. As a result, many governments are providing incentives to encourage the development and adoption of new energy vehicles. These incentives may include regulatory measures such as tax credits, rebates, subsidies, and emission standards. Government subsidies, as a means of government macro-regulation, play an important role in corporate R&D investment and performance improvement [2].

New energy vehicles have many advantages, but there are still some challenges to overcome. A major challenge is a high cost compared to conventional vehicles, which may make it more difficult for consumers to purchase. The limited driving range of many new energy vehicles is also a concern, including the lack of charging infrastructure in some areas.

However, these challenges are being addressed through technological advances and investments in charging infrastructure. In recent years, the cost of new energy vehicles has been decreasing while their driving range has been increasing, making them more competitive with conventional vehicles. The growing availability of charging infrastructure has also made it easier for owners of new energy vehicles to charge their vehicles and travel long distances.

The new energy industry will continue to grow in the coming years, driven by government policies, technological advances, and evolving consumer preferences. As more consumers become aware of the environmental and economic benefits of new energy vehicles, demand for these vehicles is likely to increase. In turn, this will drive industry innovation and investment, leading to new and more advanced new energy vehicle technologies.

Overall, the overall outlook for the new energy market is relatively promising, especially in the new energy vehicle sector.

2. Comprehensive analysis

2.1. Company information

BYD was founded in 1995 and became the world's second-largest manufacturer of rechargeable batteries in 2003. In the same year, it founded BYD Auto following a development path of independent R&D, production, and brand promotion. the company's main businesses include new energy vehicles, cell phone components and assembly parts, rechargeable batteries, and photovoltaic cells. It is also actively expanding into its urban rail business.

BYD's new energy vehicles adopt a business model of independent R&D, design, integrated production of vehicles and core components, and independent brand sales. The company has technological advantages in core components of new energy vehicles such as power batteries, motors, and electronic control systems. In addition, it is one of the leading automotive semiconductor IDM companies in China, mainly engaged in power semiconductors, intelligent sensors, optoelectronic semiconductors, semiconductor manufacturing, and services. Customers for rechargeable batteries include leading global consumer electronics manufacturers such as Samsung and Dell, as well as leading global professional robotics brands such as Ecovacs. In the power battery segment, the company has developed a highly safe lithium iron phosphate battery, or "blade battery," which is now primarily for its own use. Energy storage batteries have been shipped to more than 70 countries on six continents, with cumulative shipments of energy storage systems exceeding 6.5 kWh. The product is widely used in home and commercial energy storage.

The company's products are relatively homogeneous but widely distributed, exporting to the United States, Europe, India, and other countries. Against the backdrop of the overall automotive industry being in a linear upward phase, the company's business revenue is plastic space with great potential for growth and a very impressive growth rate [3].

2.2. Subsidiary point companies run in the financial data of the new energy industry

2.2.1 CATL: the global power battery leading enterprise

CATL was founded in 2011 and is one of the domestic and internationally competitive power battery manufacturers, its main business is the development, production, and sales of new energy vehicle power battery systems, and energy storage systems, dedicated to providing first-class solutions for global new energy applications, core technologies including power and energy storage batteries, materials, batteries, battery systems, battery recycling secondary use of the entire industry chain of research and development and manufacturing CATL, as a first-tier company in the new energy industry, has been a leader in the Chinese power battery market. According to SNE Research 2021, CATL power battery systems have been used for the first time in five consecutive years [4].

In 2017, the company led the global shipments of power lithium batteries with 11.84 GWh. In 2004, he successfully won an order for the Apple iPod, and so far he has successfully worked with Apple. With partnerships with many domestic industry giants such as Samsung, HUAWEI, VIVO, DJI, and other mainstream automotive companies, CATL has managed to gain a foothold in the global market and become the first domestic lithium-ion power battery manufacturer to enter the supply chain of top international automotive companies. Through CATL's technological innovation and large-scale manufacturing experience, it has more reference value for the new energy industry and even Chinese enterprises [5].

$$ROIC = \frac{NOPAT}{IC} = \frac{EBIT \times (1-t)}{\text{Stockholder's equity} + \text{Liability with interest}} \quad (1)$$

The financial position of CATL is analyzed from the perspective of ROIC. From the perspective of the numerator, ROIC calculates after-tax EBITDA, which excludes the impact of non-recurring gains and losses and changes in net income due to financial activities, and reflects a more realistic operating position of the company. From the denominator's perspective, IC (invested capital: capital invested) is shareholders' equity plus interest-bearing liabilities, which involves the overall investment of shareholders and creditors. It is an objective and realistic measure of a firm's intrinsic level of value creation, taking into account the possibility that the firm will increase its profitability through debt expansion (Table 1).

In 2021, the company begins early production, increasing annual battery capacity from 69.1 GWh in 2020 to 170.39 GWh in 2021. At the same time, thanks to the continued growth of the global new energy vehicle market, the company's sales have grown rapidly, up 214% year-over-year, significantly driving ROIC improvements. In 2021, the company's ROIC has improved through large-scale mass production, the overlapping cost reductions, efficiency improvements, and cost savings, the company's turnover and margins have rebounded and ROIC has rebounded to the highest point in the industry. By 2021, the company's after-tax net operating margin is well ahead, while net operating asset turnover is at the top end of the industry. For the first three quarters of 2023, the company's operating income and net income were NT\$210.3 billion and NT\$30.3 billion, up 186.72% and 97.72%, respectively, year-over-year. In the first three quarters of this year, CCAG's net profit increased by 144.90% year-on-year. In the face of the ongoing epidemic, the company's performance in the first three quarters had little impact, showing a strong upward trend and outperforming its peers.

With the vast global space for new energy vehicles, the company will strive to maintain its global leadership position with rapid growth in energy storage shipments as the company's second growth. As a result, it is currently rated as Hold.

Table 1. Important financial indicators of the CATL

CATL of the main financial indicators			
A particular year	2020	2021	2022
Operating receipt	52214	93223	138862
Revenue (%)	14.0%	78.5%	49.0%
Net profit attributable to the parent company	5437	7581	14324
Net profit (%)	19.2%	39.4%	88.9%
gross profit rate (%)	26.8%	23.4%	26.3%
ROE(%)	8.3%	9.7%	14.5%
Earnings per share (RMB)	2.33	3.25	6.15
P/E	149.78	107.42	56.85
P/B	12.39	10.46	8.24

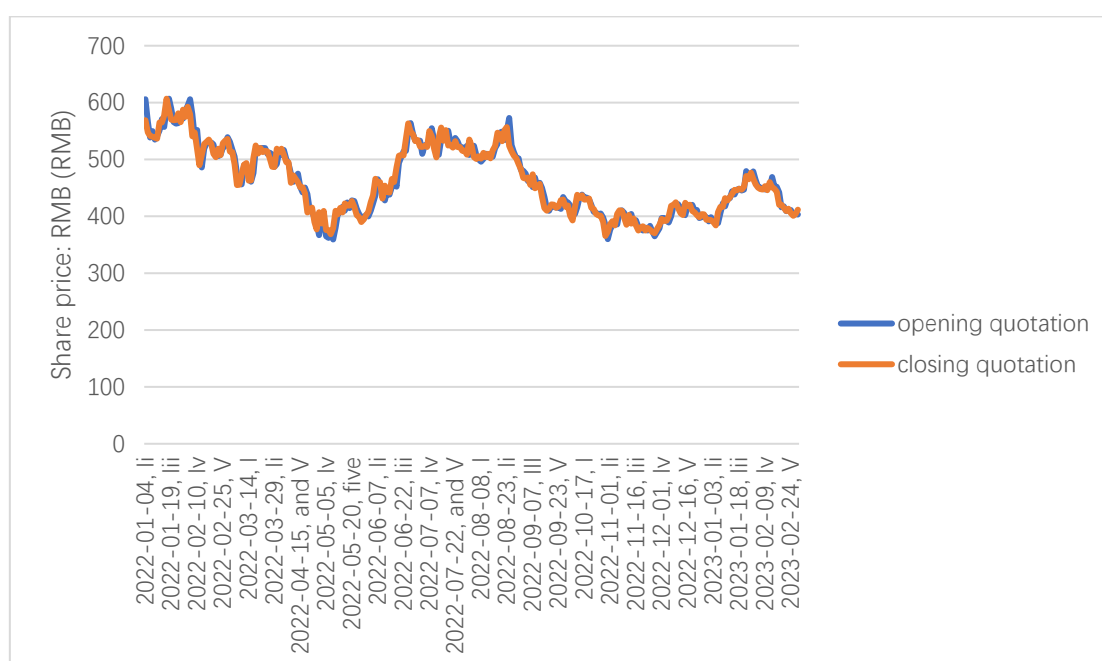


Fig 2. CATL's historical share price

Figure 2 shows the one-year historical trading price of CATL, which also has a volatile trend. For individual stocks, the top 10 active stocks include CATL. In January 2022, its overall share price peaked at nearly \$600 per share. The largest net capital inflow during this period was CATL with a net inflow of \$2.383 billion [6], but as an industry leader, CATL exhibited a high price advantage compared to other companies in the same industry, reflecting the high level of recognition and expectations in the stock market.

2.2.2 CCAG

CCAG is one of the four major Chinese automotive groups with a 160-year history, 38 years of automotive manufacturing experience, and more than 70 overseas countries and regions. In 2018, HUAWEI officially launched its "Third Venture - Innovation and Entrepreneurship Plan" and signed a strategic cooperation agreement with HUAWEI at its HUAWEI headquarters in Shenzhen. The two sides will establish a joint innovation center to promote the development of automotive intelligence and create a new mobile travel space for automotive consumers in the 5G era with the integration of people, cars, and live [7].

CCAG's improved profitability on stand-alone panorama and brand profitability. Figure 2 shows that the average gross margin in 2022 is 16.05%, which is among the highest in the industry. Since 2020, the consolidated profit of the standalone segment becomes positive. At the same time, the company's profitability improved as the period expense ratio decreased due to the growth of

standalone sales and the scale effect. In 2021, the company achieved a net profit of RMB 3,552 million, up 6.9% year-on-year. This was mainly due to the improvement brought by the company's revenue structure. The average accounts receivable turnover ratio was 35.10 (time/year), reflecting the company's fast collection. The average inventory turnover ratio was 14.00 (time/year), proving the company's very strong inventory liquidity capacity. Also, its solvency is at the forefront of the industry: the current ratio is 1.29 and the quick ratio is 1.15.

The company performed better than the industry average on a monthly basis in January 2023, when overall auto market sales were poor. Fuel car business cash cow, new energy business development prospect. We should continue to buy new models such as the iDD series, Deep Blue brand, and Avita as they will be launched in 2023.

Table 2. Important financial indicators of CCAG

Main indicators	2020	2021	2022
Operating income (one million yuan)	84,566	105,142	123,528
Revenue (%)	19.8	24.3	17.5
Net profit attributable (one million yuan)	3,324	3,552	9,591
Net profit (%)	225.6%	6.9%	170.0%
gross profit rate	14.7%	16.6%	18.3%
net profit ratio	3.9%	3.4%	7.8%
ROE	6.1%	6.5%	15.1%
EPS	0.34	0.36	0.97
P/E	42.9	40.2	14.9
P/B	2.7	2.6	2.2

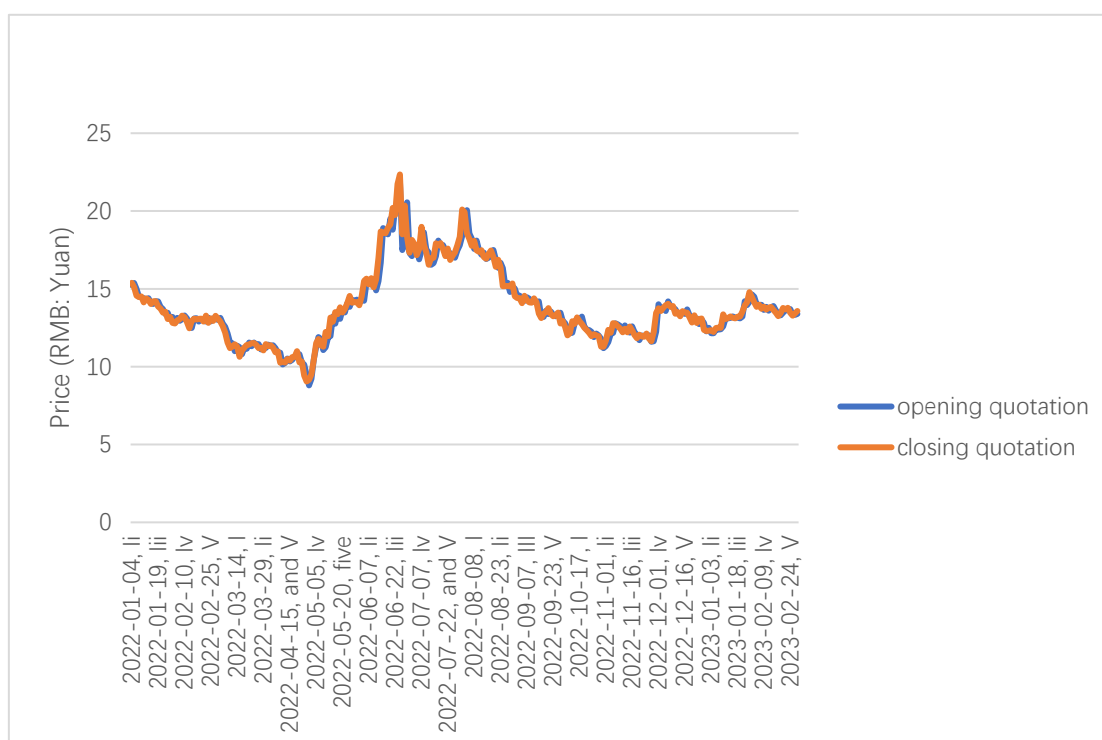


Fig 3. CCAG's historical stock price

Figure 3 shows the historical trading price of CCAG over a one-year period, which generally remained between \$10 and \$24, with the highest share price from June to August 2022. The fluctuation of the share price was also affected by the epidemic, but with the end of the epidemic and the rapid development of the new energy industry, CCAG's share price also showed an upward trend with small fluctuations.

2.2.3 BYD: Rapid growth in revenue and rapid growth in profit in 2022 show good growth of the company

In 2021, the company's revenue will be 216.42 billion yuan, up 38% year-on-year; returners' net profit will be 3 billion yuan, down 28% year-on-year, mainly due to the upstream new energy and raw material price increase. The company is in the leading position in the new energy vehicle market and leads the industry. In terms of profit, the domestic market grew year-on-year in 2020, with the new flagship car "Han" and the modified flagship SUV "Tang" being welcomed by the market, the company's net profit reached 4.234 billion yuan, up 162.27% year-on-year. In the first three quarters of 2023, product sales increased significantly, with revenue of 267.7 billion yuan, up 84.37%; net profit of 9.311 billion yuan, up 281.13%.

By 2022, the profit improvement is significant and the overall capacity is excellent. In terms of profitability, the average return on equity for the past five years is 6.02% and the average operating margin is 3.11%, with good overall stability. for the first three quarters of 2023, the gross and net profit margins are 15.89% and 3.73%, respectively. Profit has improved significantly since 2021, mainly due to the development of the tram brand and the increase in unit price. The company's gross and net margins are trending in line and remain at stable levels. However, the current ratio is 0.75 and the quick ratio is 0.38, reflecting weak short-term solvency.

Considering the company's high prosperity and large growth potential in the new energy vehicle business, and its clear advantage in the vertical industry chain in the context of anti-globalization, the company maintains a "Buy" rating.

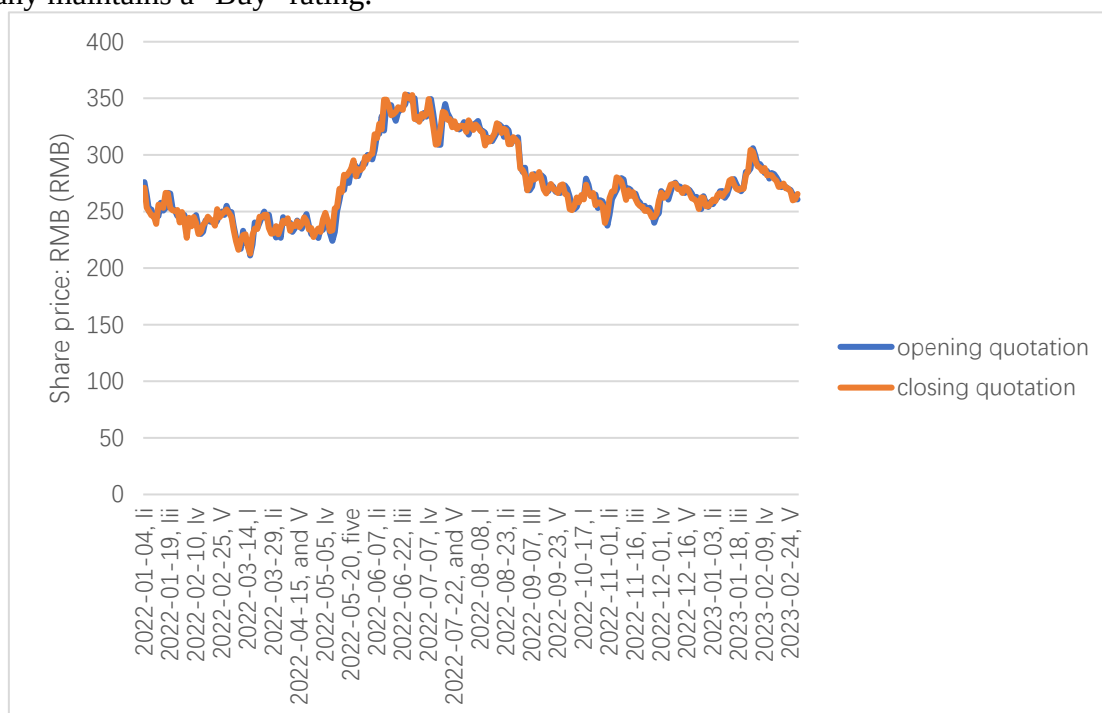


Fig 4. BYD's historic shares

Figure 4 shows the historical stock price of BYD. The overall share price fluctuates between \$200 and \$350, with rapid growth from May to June 2022. Overall, as a first-tier company in the new energy industry, BYD's stock price shows an overall growth trend and stable development.

Environmental Analysis: In this section, we will analyze the political, economic, social, and technological factors that affect BYD.

Political factors: The political environment in China has been supportive of BYD's new energy vehicles and the company's efforts to develop clean energy. The Chinese government has set ambitious goals to reduce emissions and improve air quality, which has helped increase demand for electric vehicles in China. The government has also implemented policies to encourage the production and use of electric vehicles, such as subsidies, tax exemptions, and license plate restrictions. For

example, China's State Council has announced that consumers can receive subsidies of 50 to 60 RMB for different types of new energy vehicles that meet the criteria. From a tax exemption perspective, the national government has announced tax exemptions of more than 80 billion RMB for the new energy vehicle industry by 2022. However, the risk of government policy changes could affect BYD's business. For example, if the government reduces or eliminates subsidies for new energy vehicles, it may significantly affect the demand for BYD's products.

Economic Factors: China's rapid economic growth and expansion of the middle class have led to increased demand for automobiles. According to a government work report released Sunday at the opening of China's annual parliamentary session, the Chinese government is targeting economic growth of about 5 percent for 2023. That gives us a positive sign that its economy will prosper as it has in the past without the disruption of the new crown pneumonia pandemic. Demand for new energy vehicles is also growing, with sales of electric and plug-in hybrid vehicles in China increasing significantly in recent years. This growth has been supported by government policies such as the aforementioned subsidies and tax exemptions. However, there is still a significant price gap between EVs and conventional gasoline vehicles, which may limit demand for BYD products. According to a study of auto industry analyzers, the cost of comparable and new energy vehicles is \$20,000 higher than traditional gasoline vehicles. In addition, economic factors such as inflation, interest rates, and currency fluctuations may affect BYD's financial performance.

Social factors: Social factors, such as attitudes toward environmental issues, consumer preferences, and lifestyle changes, may have a significant impact on BYD's business. In China, growing concerns about air pollution has led to an increase in demand for new energy vehicles. Consumer preferences are also shifting toward green products, which could benefit BYD products. According to Catherine Monique Bachmann, consumers are becoming more willing to buy electric vehicles over time. In addition, lifestyle changes, such as urbanization and increased commuting distances, have led to an increase in demand for vehicles.

Technology factors: Technology is a key driver of change in the automotive industry, and BYD is heavily invested in the development of new energy vehicle technology. BYD's R&D costs have reached RMB 10.87 billion as of the fourth quarter of 2022. The company has developed a range of electric vehicles and plug-in hybrids and has also invested in battery technology and energy storage systems. However, the automotive industry is very competitive and other companies are investing in new energy vehicle technologies. BYD will need to continue to innovate and invest in technology to remain competitive. In addition, advances in autonomous driving technology and the sharing economy may disrupt the traditional automotive model, thus affecting the demand for BYD products.

In summary, BYD operates in a dynamic environment with a range of political, economic, social, and technological factors that can affect its business. Despite the risk of changes in government policies and economic factors, BYD will benefit from the growing demand for new energy vehicles in China. The company's strong focus on technology and innovation is critical to maintaining its competitive position in the market. Based on this, we can expect BYD's share price to flourish in the future.

This SWOT analysis shows BYD's strengths, weaknesses, opportunities, and threats.

Strengths.

(1) BYD has strong brand recognition: BYD is a well-known brand in the electric vehicle market, which helps it attract a large customer base.

(2) Vertical integration: BYD controls the entire value chain from raw materials to production and sales, which allows it to optimize costs and improve efficiency.

(3) Technological innovation: BYD invests heavily in R&D and produces a range of innovative products that are widely acclaimed.

(4) Strategic partnerships: BYD has established partnerships with leading global companies such as Toyota to form joint ventures, develop new technologies, and expand its business scope.

(5) A diverse product portfolio: BYD produces a range of electric vehicles, including cars, buses, and trucks, enabling them to capture a range of market segments.

Disadvantages.

(1) Dependence on the Chinese market: Although BYD has begun to expand globally, its sales are still heavily dependent on the Chinese market, which would pose a risk to the company if any economic or political instability were to occur.

(2) Limited brand recognition outside of China: BYD's brand recognition outside of China remains relatively low, which makes it challenging to compete with internationally recognized brands.

(3) Supply chain risk: BYD relies on a complex supply chain that includes a limited number of suppliers of key raw materials, such as lithium and cobalt, which makes it vulnerable to supply chain disruptions.

(4) Narrow margins: BYD operates in a very competitive market with narrow margins, which makes it difficult to maintain profitability even as costs rise [8-9].

Possibilities

(1) Global expansion: BYD has begun to expand sales into international markets, such as Europe, which provides an opportunity for the company to increase its revenue and customer base.

(2) Government support for electric vehicles: Governments around the world are increasingly supporting the adoption of electric vehicles through tax incentives and other policies, creating a favorable market environment for BYD to expand sales.

(3) Growth of the electric bus market: The electric bus market is growing rapidly, and BYD is a leading player in this field, providing significant opportunities for the company to increase its market share and revenue [10].

(4) Emergence of a circular economy: A circular economy that emphasizes resource efficiency and recycling provides BYD with an opportunity to create new revenue streams and improve its sustainability.

Threats.

(1) Competition: BYD faces stiff competition from well-known international brands such as Tesla and Volkswagen, as well as domestic competitors such as Nio and Xiaopeng, which could limit its market share and revenue growth.

(2) Technology disruption: The electric vehicle market is growing rapidly and BYD must continue to innovate to keep up with the latest technologies and trends.

(3) Regulatory risk: Changes in government policies, such as tariffs or changes in electric vehicle incentives, could affect BYD's sales and profitability.

(4) Economic risk: Economic instability or recession may affect consumer demand for electric vehicles, which may negatively impact BYD's sales and revenues.

In short, BYD has become a leading player in the electric vehicle market with a range of innovative products and strategic partnerships. However, the company still faces challenges such as dependence on the Chinese market, limited brand recognition outside of China, and supply chain risks. To capitalize on opportunities and overcome threats, BYD must continue to innovate, expand its international presence, and maintain strong partnerships with multinational companies. From our perspective as investors, we can say that BYD is a good investment choice. We can expect an ideal space for value growth.

3. Conclusion

BYD is a promising investment opportunity in the new energy vehicle market. The company has strong capabilities in technology development, manufacturing, and sales, with electric vehicles, batteries, and other related products. In addition, BYD has demonstrated its ability to adapt to changing market conditions and regulatory environments, as reflected in its successful expansion into the European market and its collaboration with various partners to develop innovative solutions. Overall, under the new development model of mutual promotion of domestic and international binary in the major domestic cycle, BYD, as a leading company in the field of new energy vehicles, has been maintaining good momentum in the supply chain to market transformation and corporate strategy,

supply chain business model advantages, and sales growth, and China's new energy vehicle industry has made great contributions to the development and transformation director of the new energy vehicle supply chain.

The PEST analysis highlights various external factors that may affect BYD's future performance. The company faces significant regulatory and policy risks, particularly in China, where government subsidies for new energy vehicles are being phased out. However, because BYD works with major automakers and government entities, the company may help mitigate these risks.

The SWOT analysis also identifies key strengths, weaknesses, opportunities, and threats for BYD. BYD has strengths in its strong technological capabilities, diverse product portfolio, and extensive distribution network. Its weaknesses include dependence on government subsidies, volatile raw material prices, and limited brand recognition outside of China. Opportunities for the company include growing global demand for new energy vehicles, expansion of its energy storage business, and the potential for further collaboration with major automakers. On the other hand, BYD also faces threats from intense competition, increasing regulatory pressure, and potential supply chain disruptions.

Despite the challenges and risks, the company's strong financial performance and growth prospects make it an attractive investment option for the new net investment market. As the world moves toward a green economy, demand for new energy vehicles and related products is expected to grow significantly, and BYD is poised to capitalize on this trend. Investors should closely monitor BYD's performance and continue to evaluate its growth prospects and market position in the coming years.

Through research, this paper finds that the automotive sector has gone through three phases: downside, revitalization, and correction in 2022. Earlier this year, parts and vehicle production in the Yangtze River Delta region was severely disrupted by the Shanghai epidemic. After the outbreak, the automotive industry was quickly affected by lithium prices and the "multi-point, wide-area" outbreak. By 2022, the entire automotive industry will outperform the CSI 300. Under the macro background of rising oil prices and policy support, all companies insist on innovation, enhance hardware and software strength, continuously adjust product structure and enrich market choices. The development of the new energy industry and downstream industry has been widely concerned. This article uses comparative analysis to analyze CATL, BYD, and CCAG and finds that all three stocks show an upward trend and maintain a Buy rating. The construction of the "new energy vehicle + new energy vehicle insurance + support services" ecosystem of "automobile manufacturers + battery manufacturers + parts manufacturers + maintenance organizations + insurance companies" will help the development of new energy vehicle insurance to enlarge, and will also help the stability of the new energy vehicle industry chain and better achieve the goals of the new energy vehicle industry. It will also contribute to the stability of the new energy vehicle industry chain and better realize the contribution of "double carbon".

Finally, this paper relies on data analysis alone is one-sided, because the market factors of the new energy industry cannot be quantified, artificial intelligence and big data technology can be introduced into the analysis system in the future to optimize the data collection and analysis process, and combine the characteristics of different industries and different types of enterprises to develop personalized analysis systems to improve the efficiency and quality of financial analysis and facilitate further research.

References

- [1] Xiao-Shao. (2023). Research on the operation mode of new energy vehicle supply chain under the double-cycle development pattern--Taking BYD brand as an example. *Logistics Science and Technology* (01), 132-135. doi:10.13714/j.cnki.1002-3100.2023.01.030.
- [2] Wang N, Leng Xueyi, Qiu X & Mu Jiajia. (2022). Government grants, R&D investment and firm performance-an empirical test based on heterogeneity in the new energy industry. *Business Accounting* (24),47-51.

- [3] Wang, Yue. (2019). Analysis of financial risks and countermeasures in the new energy automobile industry. (eds.) Proceedings of the 2019 National High-end Forum on Innovation and Development of Education and Teaching (Vol. VI) (pp. 155-157).
- [4] . (2018).CS85 global debut unveiled to accelerate the third innovation and entrepreneurship strategy. Southwest Automotive Information, Editorial Board. (eds.) Southwest Automotive Information (Vol. 11, No. 392, 2018) (pp. 2). Editorial Board of Southwest Automotive Information.
- [5] Chen, Fangfang. (2022). The impact of Ningde Times R&D investment on market performance. International Business Finance and Accounting (16),17-20.
- [6] Xuanxuan Wang. (2022). Decoding Ningde Times. China Entrepreneur (10),56-63.
- [7] Lin Ran. (2023). Over 2 billion funds flow into Ningde Times. Stock Market Dynamic Analysis (03),31-32.
- [8] Li Xiaoxiao. (2023). Research on the operation mode of new energy vehicle supply chain under the pattern of double-cycle development--Taking BYD brand as an example. Logistics Science and Technology (01), 132-135. doi:10.13714/j.cnki.1002-3100.2023.01.030.
- [9] Wan Peng. (2022). Thinking about the ecological development model of new energy automobile insurance--the responsibility of insurance industry under the background of "double carbon". Zhejiang Insurance Industry Association. (eds.) Zhejiang insurance papers compilation 2022 (II) (pp. 32-42).
- [10] Zhang Wen, Jin Xia & Li Ang. (2022). Financial analysis based on natural language processing technology - A case study of BYD Company. Accounting (23),28-36.