



Research article

Financial risk analysis and control of new energy vehicle companies

——Taking BYD Company as an example

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Abstract: China plans to peak CO₂ emissions before 2030 and achieve carbon neutrality before 2060. Under this “dual carbon” strategic goal, the new energy vehicle (NEV) market continues to expand, and financial risks are becoming increasingly prominent. In this paper, we took BYD as a case study and analyzed its financial risks from four dimensions, financing, investment, operation, and growth, using financial ratio analysis and horizontal comparison with SAIC Motor, Great Wall Motor, and Tesla over the period 2019-2024. The results revealed that (1) BYD’s current ratio declined from 0.99 in 2019 to 0.75 in 2024, while its quick ratio fell from 0.75 to 0.51 over the same period, indicating deteriorating short-term solvency. (2) The cash ratio improved from 0.12 in 2019 to 0.31 in 2024, suggesting strengthening immediate payment capacity. (3) BYD’s debt-to-asset ratio remained high, rising from 68.00% in 2019 to 74.6% in 2024, exceeding the industry average of approximately 60%, reflecting significant long-term solvency risk. (4) Net cash flow from investing activities was consistently negative from 2019 to 2024, reaching –1,291 billion yuan in 2024, indicating insufficient investment-related cash liquidity. (5) Accounts receivable turnover increased substantially from 2.74 times in 2019 to 12.52 times in 2024, while inventory turnover improved modestly from 4.12 to 6.03 times, though both remained below peer levels. To mitigate these risks, we proposed measures, including optimizing the capital structure, strengthening investment benefit analysis, improving accounts receivable and inventory management, and increasing R&D investment.

Keywords: financial risk; new energy vehicles; risk identification; risk control; BYD

JEL Codes: G15, F36, C40

Abbreviations: BYD: BYD Co., Ltd.; CO₂: Carbon Dioxide; COVID-19: Coronavirus Disease 2019; EV: Electric Vehicle; JEL: Journal of Economic Literature; NEV: New Energy Vehicle; PID: Proportional-Integral-Derivative; PV: Photovoltaic; R&D: Research and Development; RMB: Renminbi (Chinese Yuan); SAIC: SAIC Motor; SoC: State of Charge

1. Introduction

To effectively implement the requirements of the Paris Agreement and achieve the China goal of carbon neutrality, with a peak of carbon before 2030 and neutrality in 2060, the development of new energy vehicles has become a global consensus. This not only reduce dependence on fossil fuels but also minimizes pollution and greenhouse gas emissions, as well as helping achieve the “dual carbon” (Cheng et al., 2024). This will also support the transformation of the automotive industry and achieve sustainable development (Xu et al., 2024). The government has successively introduced several preferential policies to support the new energy vehicle industry, including tax subsidies and consumer incentives, to promote the consumption potential of new energy vehicles; in April 2022, the State Council issued the “Opinions on Further Unleashing Consumption Potential and Promoting the Continuous Recovery of Consumption”, which stated that it would improve the quality of green consumption, actively advocate a green lifestyle, and support the accelerated development of new energy vehicles. In September, the Ministry of Finance and other three departments jointly issued the “Announcement on Extending the Policy of Exemption from Vehicle Purchase Tax for New Energy Vehicles”, extending the exemption period for new energy vehicles to December 31, 2023, promoting consumption in the new energy vehicle market and helping the market grow steadily. It is worth noting that climate risks are affecting the investment and financing behavior of enterprises (Li et al., 2026; Zhang et al., 2026). There may be a significant relationship between the policy uncertainty and corporate financial risks.

Furthermore, new energy vehicle companies are facing more intense market competition. The new energy vehicle industry has a high investment, long construction cycle, and difficult R&D characteristics. Therefore, it is particularly important to identify, evaluate, and make targeted suggestions on the financial risks of new energy vehicle companies. With the reduction of electric new energy vehicle power consumption, the carbon reduction effect of electric new energy vehicle operation will be more significant. Among domestic new energy vehicle manufacturers, BYD is in a leading position in the industry with its outstanding production and sales volume, mature technology, and stable profitability.

Therefore, based on the basic theory of financial risk, we use the relevant financial data of BYD, SAIC, Great Wall Motors, and Tesla from 2019 to 2024 to conduct a horizontal and vertical comparative analysis of financial ratios. We then identify and analyze the company’s debt repayment ability, profitability, operating ability, and growth ability from the four dimensions of financing, investment, operation, and growth to discover the financial risks and put forward risk control suggestions. As such, we aim to help BYD effectively prevent financial risks with reference significant to guiding new energy vehicle companies in financial risk management and control.

Based on the relevant literature of scholars and the basic theory of financial risk, we conduct a comparative analysis of financial indicators to identify the financial risks, and then analyze the causes of the risks and propose risk control measures. Ongel et al. (2019) pointed out that cost control is crucial for new energy vehicle companies, and effective cost management will directly affect the company's profit level and market competitiveness. Ballinger et al. (2019) analyzed the vulnerability of electric vehicle deployment to critical mineral supply. The key factors leading to financial risks were highlighted, and improvement strategies were proposed. Gatzert et al. (2019) believed that the way of publishing debt-paying capacity and financial reports should be optimized and that the textual information is more important than the financial data. Purves et al. (2015) pointed out that in the development process of an enterprise, the financial analysis of an enterprise cannot only consider the use of financial ratio analysis, but also pays attention to the non-financial factors of the enterprise. De Jesus Silva Dos Santos et al. (2025) argued that auditing plays a crucial role in ensuring the quality of financial reports. Especially when the enterprise is lagging in development, financial analysis from a strategic level is more meaningful for the future development of the enterprise. Ahmed et al. (2025) proposed a fuzzy-logic-based PID control strategy for photovoltaic (PV)-powered electric vehicle (EV) charging systems to address operational uncertainties such as fluctuating solar irradiance, grid instability, and dynamic load demands. Qays et al. (2026) proposed a hybrid model for SoC estimation in EV secondary battery packs to address circulating current issues that cause overheating and lifespan reduction. Their experimental results showed that the proposed model reduces SoC estimation error to 0.043%, minimizes determination time to 0.477 seconds, and extends battery pack lifespan by 27.7% compared to other methods. For NEV manufacturers like BYD, these improvements translate into lower warranty costs, reduced operational risks, enhanced product reliability, and improved customer total cost of ownership, all of which contribute to stronger financial performance and growth potential.

Financial analysis plays an important role in analyzing the current status of an enterprise (Bartram et al., 2015; Deng et al., 2025; Hannan et al., 2012; Valaskova et al., 2018). Chi et al. (2022) conducted a financial risk study for 37 listed companies in the photovoltaic industry, using text mining and binary logistic regression models for a comprehensive assessment. The results showed that among all influencing factors, the impact on financial risk is the most significant. Fang et al. (2025) analyzed the environmental factors of the new energy vehicle industry and analyzed the financial ratios and four major financial capabilities of Tesla and BYD. Liu et al. (2025b) argued that three leading firms, BYD, NIO, and XPeng, have notable differences in their financial performance. Liu et al. (2025a) argued that corporate green transitions significantly mitigate financial risk of corporations.

These scholars have analyzed new energy vehicle companies from different perspectives and use different methods. In this article, we analyze the financial risks of enterprises from four dimensions: financing, investment, operation, and growth, and make a horizontal comparison with SAIC Group, Great Wall Motors, and Tesla in the same industry during the same period, revealing the financial status of BYD. The analysis angle is relatively novel, and the compared companies are comparable. Through financial risk identification and financial problem analysis, corresponding financial risk management measures are proposed, which can reduce the possibility of financial risks in BYD. This has certain guiding significance and practical significance for guiding new energy vehicle companies in financial risk management and control.

This paper makes several marginal contributions to the financial risk analysis of new energy vehicle companies using BYD as a case study. First, we extend the analysis period to 2019–2024, capturing recent policy changes and BYD's global expansion, which enhances the timeliness of the

findings. Second, we conduct a systematic four-dimensional analysis (financing, investment, operation, and growth) combined with a horizontal comparison against three key competitors, SAIC Motor, Great Wall Motor, and Tesla, offering a more comprehensive benchmarking of BYD's financial position. Third, we provide a balanced interpretation of risk indicators, recognizing that BYD's high accounts payable ratio (over 40% of total liabilities) reflects not only liquidity risk but also strong bargaining power over upstream suppliers. Fourth, unlike vague recommendations in prior research, we translate each identified risk into specific, quantifiable, and actionable measures tailored to BYD, such as reducing the debt-to-asset ratio to below 60%, adjusting the debt maturity mix, and using reverse factoring to accelerate cash conversion. Finally, we embed empirical analysis within a clear theoretical framework supplemented by the Altman Z-score model, ensuring that theory consistently guides data analysis. In summary, we provide an up-to-date, multi-dimensional, and practically oriented financial risk analysis relevant to BYD and other NEV companies.

2. Definition of financial risk

2.1. Concept and characteristics of financial risk

2.1.1. Definition of financial risk

Financial risk refers to the unstable factors that business entities may encounter in their daily activities, which may lead to economic losses and operational risks. There are two definitions of financial risk: broad and narrow.

From a narrow perspective, financial risk is financing risk, specifically the risk of bankruptcy caused by the inability to repay the principal and interest of debts on time when the company operates through debt, as well as the risk of large fluctuations in earnings per share. In short, the core of narrow financial risk is the risk caused by the debt burden of the company, especially the risk of not being able to repay the matured debts.

From a broad perspective, financial risk covers the financial operations of an enterprise throughout its production and operation. This risk is affected by the complexity of the internal and external environment and contains many uncontrollable factors that may lead to differences between the actual financial results of an enterprise and the expected financial results.

2.1.2. Characteristics of financial risk

- **Objective existence.** Financial risk is objective. Its formation and generation are derived from external market conditions, social, political, and economic environment and the limitations and characteristics of the enterprise. Its occurrence is inevitable.

- **Uncertainty.** Due to the complexity and variability of the internal and external environment, the results of financial activities are often difficult to fully predict and control.

- **Coexistence.** Financial risk is positively correlated with returns, that is, the greater the business risk of an enterprise, the higher the return may be. While pursuing returns, corporate financial managers need to scientifically prevent and control risks to achieve the company's profit goals.

- **Controllability.** Although financial risks cannot be completely avoided, risk management measures can be reasonably avoided through diversification of investments, control of debt scale, and

use of financial instruments to reduce or transfer corporate financial risks.

- Lossy. The existence of financial risks will inevitably have an adverse impact on the daily business activities of the enterprise. Improper control will cause losses to the enterprise and threaten the survival of the enterprise to a certain extent.

2.1.3. Characteristics of financial risk

The types of financial risks are divided into financing risk, investment risk, operating risk, and growth risk.

- Financing risk. This refers to the possibility that an enterprise may lose its ability to repay debts due to borrowing funds and the variability of its profits.

- Investment risk. This refers to the risk that the investment entity may suffer losses or bankruptcy in future business activities in order to achieve its investment objectives and is the main consideration for investment decisions.

- Operational risk. This refers to the risk that the future operating cash flow of an enterprise may change due to changes in production and operation or changes in the market environment, thereby affecting the market value of the enterprise.

- Growth risk. This refers to the risks and uncertainties that an enterprise may encounter during its development. These risks come from inside and outside the enterprise and affect the long-term development and profitability of the enterprise.

2.2. Financial risk management theory

2.2.1. Concept of financial risk management

Financial risk management refers to the process of identifying, analyzing, and applying reasonable and effective methods to manage all risks arising from the daily activities of economic entities to ensure safe and sound business operations and protect their economic interests.

2.2.2. Financial risk management process

The risk management process mostly includes risk identification, risk analysis, and risk control.

- Risk identification. The first step of financial risk management is risk identification, which is to timely identify factors that may have an adverse impact on the financial situation of the enterprise. The steps of risk identification are shown in Figure 1, which includes four steps such as data collection, financial ratio calculation, horizontal & vertical comparison and financial risk identification.

- Risk analysis. Financial risk analysis is the second step of financial risk management. After identifying financial risks, it is used to deeply explore the causes of risks and provide support for the subsequent financial risk response strategies. Risk analysis starts from internal and external factors. Comprehensively analyzing BYD's financial risks from internal and external factors is more comprehensive and general.

- Risk control. Financial risk control is the final link in risk management. Risk control is based on the current identified risk status and the probability of risk occurrence, and takes appropriate measures to reduce financial risks. Risk prevention is enhanced from internal financial risks and external environmental risks.

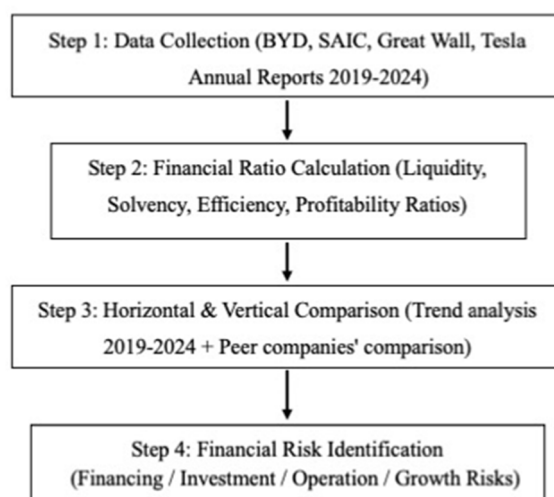


Figure 1. Methodological flowchart of financial risk analysis for BYD.

3. Financial risk analysis of the BYD company, a new energy vehicle company

3.1. Introduction to the BYD Company

BYD Co., Ltd. (“BYD”) was established in February 1995 and is headquartered in Shenzhen, Guangdong Province. The company has more than 700,000 employees, and its business spans four major industries: automobiles, rail transit, new energy, and electronics. It is listed in Hong Kong and Shenzhen, with revenue and market value exceeding RMB 100 billion. BYD was originally engaged in the production of batteries and other electronic products. In 2003, BYD officially entered the automobile manufacturing industry by acquiring the Xi’an Qinchuan Automobile Factory and established BYD Auto. In 2008, BYD launched mass-produced plug-in hybrid vehicles and began to enter the new energy vehicle industry.

After continuous development, BYD has achieved remarkable results. Its products cover passenger cars, commercial vehicles, public transportation and other fields, and it has built a strategic layout for international sales. BYD announced that it will stop the production of fuel vehicles in 2022 and focus on pure electric and plug-in hybrid vehicle business in the automotive sector in the future. Moreover, BYD is the first traditional automaker in the world to announce the official suspension of fuel-powered vehicles and focus on new energy. So far, BYD has become the most well-known new energy vehicle manufacturer in China and the leader of the domestic new energy vehicle industry.

3.2. Financing risks

3.2.1. Financing risk identification

- Short-term debt repayment capacity

In our study, the Current Ratio and Quick Ratio are adopted as core financial indicators to measure the short-term solvency and liquidity risk of BYD. Current Ratio is calculated as Current

Liabilities/Current Assets. Current assets include cash, accounts receivable, inventory, and other assets that can be converted into cash or consumed within one year. Current liabilities refer to debts due within one year, such as short-term loans and accounts payable. The Current Ratio reflects a company's ability to cover its short-term obligations with its short-term assets. Quick Ratio is calculated as (Current Assets-Inventory) / Current Liabilities. The Quick Ratio excludes inventory from current assets because inventory is typically less liquid and may take longer to convert into cash. This provides a more conservative measure of a company's ability to meet immediate obligations without relying on the sale of inventory. Finally, we have added the Cash Ratio as a third indicator for short-term solvency analysis, calculated as Cash Ratio equals (Cash + Marketable Securities) / Current Liabilities.

Table 1. BYD Company's short-term debt repayment capacity indicators from 2019 to 2024.

Indicator	2019	2020	2021	2022	2023	2024
current ratio	0.99	1.05	0.97	0.72	0.67	0.75
quick ratio	0.75	0.75	0.72	0.49	0.47	0.51
Cash ratio	0.12	0.14	0.29	0.15	0.24	0.31

Note: Data source is from the company's annual report.

Table 1 shows that BYD's current ratio showed a downward trend from 2019 to 2024, with the highest value being 1.05 in 2020, and remained basically stable from 2019 to 2021. The current ratio in 2023 was 0.67, down 0.05 from the end of 2022, and 2024 was equivalent to 2022, which means that BYD's current liabilities are higher than current assets. The decline in the current ratio from 2022 to 2024 was mainly due to the increase in accounts payable and other payables. BYD's quick ratio showed a clear downward trend from 2019 to 2024. This indicates that the company is facing liquidity challenges, resulting in a decrease in quick assets relative to current liabilities.

BYD's current ratio and quick ratio are on a downward trend because BYD's production scale has expanded and the scale of short-term loans has increased. The company has the ability to effectively extend the loan period, and the loan period is about three years. BYD's ability to repay short-term debts is within a controllable range.

The cash ratio increased from 0.12 in 2019 to 0.31 in 2024. This upward trend indicates that BYD has been progressively strengthening its immediate solvency position over the six-year period, which helps mitigate the short-term payment pressure arising from its high accounts payable over 40% of total liabilities.

- Comparison of short-term debt repayment ability in the same industry

We select SAIC Group, Great Wall Motors, and Tesla as comparison objects, as shown in the following table 2:

Table 2. Comparison of current ratios from 2019 to 2024.

Indicator	2019	2020	2021	2022	2023	2024
BYD	0.99	1.05	0.97	0.72	0.67	0.75
SAIC	1.10	1.11	1.13	1.07	1.13	1.17
Great Wall Motors	1.25	1.22	1.13	1.12	1.07	1.09
Tesla	1.14	1.86	1.38	1.53	1.73	2.02

Note: Data source is from the company's annual report.

Table 3. Comparison of quick ratios from 2019 to 2024.

Indicator	2019	2020	2021	2022	2023	2024
BYD	0.75	0.75	0.72	0.49	0.47	0.51
SAIC	0.99	0.97	1.02	0.91	0.95	1.03
Great Wall Motors	1.14	1.13	0.99	0.89	0.83	0.88
Tesla	0.8	1.59	1.08	1.05	1.25	1.61

Note: Data source is from the company's annual report.

From the table 3 above, BYD's current ratio and quick ratio are low. The average current ratio of the automotive industry is about 1, while BYD's indicator is on a downward trend, and the other two peer companies remain relatively stable. In view of this situation, BYD's short-term debt repayment ability is under great pressure and requires more working capital to repay short-term debts. Although the amount of liquid assets is high and the risk to creditors is low, it still needs to maintain a high level of attention and vigilance.

BYD's quick ratio is low, lower than SAIC and Great Wall, which indicates that BYD's short-term debt repayment ability after deducting slow-moving inventory is low. Compared with Tesla, BYD's short-term debt repayment ability is weak, and there is a big gap between the two. From this perspective, BYD's short-term debt repayment ability is poor and does not meet the requirements of the same industry, indicating that its ability to repay debts quickly is weak and there is a large financial risk.

- Long-term solvency

Table 4. BYD Company's long-term debt-paying capacity indicators from 2019 to 2024. (unit: %).

project	2019	2020	2021	2022	2023	2024
debt-to-asset ratio	68.00	67.94	64.76	75.42	77.86	74.6
property rights ratio	2.13	2.12	1.84	3.07	3.52	3.94

Note: Data source is from the company's annual report.

Table 4 shows that from 2019 to 2024, BYD's debt-to-asset ratio showed a fluctuating upward trend, a downward trend from 2019 to 2021, and was around 75% from 2022 to 2024, with heavy debt pressure. BYD's equity ratio has been high in the past six years, and the equity ratio from 2019 to 2024 was far higher than 1, indicating that BYD's long-term debt situation is not optimistic, with high financial risks and poor debt repayment ability.

- Comparison of long-term debt-paying ability in the same industry

We select SAIC Group, Great Wall Motors, and Tesla as comparison objects, as shown in the following table 5:

Table 5. Comparison of debt-to-asset ratios from 2019 to 2024. (unit: %).

indicator	2019	2020	2021	2022	2023	2024
BYD	68.00	67.94	64.76	75.42	77.86	74.6
SAIC	64.58	66.28	64.14	66.03	65.94	63.77
Great Wall Motors	51.90	62.77	64.58	64.82	65.96	63.64
Tesla	76.4	54.6	49.2	44.26	40.34	39.64

Note: Data source is from the company's annual report.

The average debt-to-asset ratio of the new energy vehicle industry is about 60%. The data in the table above show that BYD's debt-to-asset ratio was similar to that of SAIC and Great Wall in the first three years, and was stable at around 65%. This shows that its debt-to-asset ratio is at a normal level in the industry, and the creditor risk is also within a reasonable and controllable range. However, it is worth noting that BYD's debt-to-asset ratio has been around 75% in the past three years, indicating that its long-term debt repayment ability is weak. The main reason may be that BYD uses a high financial leverage to achieve rapid expansion and development, so BYD needs to bear considerable financial risks. This shows that compared with its peers, BYD's asset structure is not healthy enough and needs further improvement and optimization. In comparison, although Tesla's debt-to-asset ratio was higher than BYD's before 2020, the ratio has been declining and fell below nearly 40% in 2024. Therefore, Tesla's long-term debt repayment ability is also better than BYD, and BYD needs to use financial leverage reasonably to reduce the company's debt-to-asset ratio.

In general, BYD's debt repayment ability is poor, which means that when facing emergencies, the company may face huge financial pressure, affecting its normal operations.

3.2.2. Financing risk issues

- Unreasonable debt maturity structure

Table 6. BYD Company's Debt Maturity Structure from 2019 to 2024. (unit: billion,%).

project	2019	2020	2021	2022	2023	2024
total liabilities	1330.4	1366	1915.35	3724.71	5290.86	5847
current liabilities	1080.29	1064	1713.03	3333.45	4536.67	4960
current liabilities ratio	81%	77.89%	89.45%	89.50%	85.75%	84.83
non-current liabilities	250.11	301.3	203.3	391.26	754.19	886.8

Note: Data source is from the company's annual report.

Table 6 shows that as BYD's business production expands yearly, except for in 2020 when the current liabilities ratio was lower than 80%, the remaining years have remained at a high level of more than 80% and approached 90% in 2021-2022. This shows that BYD is facing great debt repayment pressure. It is worth noting that the increase in total liabilities is mainly caused by current liabilities. BYD needs to be highly vigilant about potential financing risks.

- Unreasonable debt structure

Table 7. BYD Company's debt structure from 2019 to 2024. (unit: billion,%).

project	2019	2020	2021	2022	2023	2024
short-term loans	403.32	164	102	51.5	183.23	121
Proportion of liabilities	30.32	12.01	5.33	1.38	3.46	2.07
long-term loans	119.48	147.5	87.44	75.94	119.75	82.58
Proportion of liabilities	8.98	10.80	4.57	2.04	2.26	1.41
accounts payable	225.2	429.8	731.6	1404.37	1944.30	2416
Proportion of liabilities	16.93	31.46	38.20	37.70	36.75	41.32
notes payable	136.48	89.26	73.31	33.28	40.53	23.84
Proportion of liabilities	10.26	6.53	3.83	0.90	0.77	0.41

Note: Data source is from the company's annual report.

As can be seen from the table 7, the proportion of short-term loans, long-term loans, and bills payable in liabilities is generally on a downward trend, while the proportion of accounts payable has increased significantly. Although the proportion is decreasing in terms of numbers, the base is increasing significantly yearly. After reviewing the annual report, it was found that more than 99% of BYD's accounts payable are payable to suppliers within one year, and the company is facing great debt repayment pressure. If BYD fails to repay accounts payable in time due to purchases on credit, BYD will face considerable supply chain payment pressure, and failure to adjust in time may lead to financing risks.

3.3. Investment risk

3.3.1. Investment risk identification

- Inward investment

Table 8. BYD Company's cash flow statement from investing activities from 2019 to 2024 (unit: billion).

project	2019	2020	2021	2022	2023	2024
Cash inflow from investing activities	24.01	188.18	127.22	133.11	231.05	154
Cash outflow from investing activities	232.81	332.63	581.26	1339.07	1487.69	1445
Net cash flows from investing activities	-208.82	-144.43	-454.14	-1205.96	-1256.64	-1291

Note: Data source is from the company's annual report.

From the data in the table 8, we can see that the company's net cash flow from investment activities was negative in the five years from 2019 to 2024, and the net cash flow in 2021 to 2024 exceeded -120 billion yuan. The sharp increase in cash outflow and net cash flow in 2022-2024 was mainly due to the significant increase in cash paid for the purchase and construction of fixed assets, intangible assets, and other long-term assets during the period. This shows that BYD is actively maintaining its expansion state, but it should be noted that the cash inflow from investment activities at this stage cannot make up for the outflow, and the net cash flow deficit is showing an expanding trend. BYD should remain highly vigilant.

- Foreign investment

Table 9. BYD Company's overseas investment from 2019 to 2024 (unit: billion).

project	2019	2020	2021	2022	2023	2024
long term equity investment	40.60	54.66	79.05	154.85	176.47	190.8
investment income	-8.09	-2.73	-0.57	-7.91	16.35	22.91

Note: Data source is from the company's annual report.

As can be seen from the table 9, BYD's overseas investment in 2019–2024 was relatively large; the amount of long-term equity investment has increased yearly, from 4.06 billion in 2019 to 19 billion in 2024, an increase of more than four times. In terms of investment income, except for 2023–2024,

the rest of the years are negative, mainly due to BYD's complex layout, and the profit of the automobile business is injected into new businesses with poor profitability such as Yunrail and Yunbus, which indirectly reflects that BYD has certain risks in its overseas investment.

3.3.2. Investment risk issues

- Insufficient cash liquidity for investment activities

BYD's cash inflows from investment activities from 2019 to 2024 were less than its outflows, and the net cash flow showed negative growth year by year and exceeded -120 billion yuan in the past two years. This shows that BYD's cash liquidity for investment activities is insufficient. BYD continues to increase investment in order to further consolidate and expand its market share, but once the investment cannot get a positive return and the liquidity of funds is insufficient, BYD will face huge financial pressure, thereby increasing investment risks.

- The rate of return on overseas investment projects is not high

BYD's total overseas investment from 2019 to 2024 increased significantly, but the corresponding investment income was negative in the first four years and only became positive in 2023-2024, which shows that BYD's overseas investment project rate of return is not high. BYD increased investment and expanded production scale in order to achieve high returns, but lacked in-depth research on the feasibility of investment projects, resulting in increased investment risks.

3.4. Operational risk

3.4.1. Operational risk identification

Table 10. BYD Company's operating capacity calculation table from 2019 to 2024. (unit: frequency).

project	2019	2020	2021	2022	2023	2024
Current Asset Turnover	1.15	1.43	1.56	2.08	2.22	2.31
Accounts receivable turnover	2.74	3.68	5.58	11.30	11.96	12.52
Inventory turnover	4.12	4.43	5.03	5.75	5.76	6.03
Total asset turnover	0.65	0.79	0.87	1.07	1.03	1.06

Note: Data source is from the company's annual report.

According to the data in the above table 10, BYD's operating capacity indicators have shown a positive growth trend; the accounts receivable turnover rate has achieved a significant increase, which has increased by more than 4 times from 2019 to 2024. Compared with previous years, BYD has shown higher efficiency in accounts receivable management.

We select SAIC Group, Great Wall Motors, and Tesla as comparison objects, as shown in the following table 11-13:

Table 11. Comparison of inventory turnover rates from 2019 to 2024. (unit: frequency).

indicator	2019	2020	2021	2022	2023	2024
BYD	4.12	4.43	5.03	5.75	5.76	6.03
SAIC	12.81	10.63	10.90	8.98	6.97	6.33
Great Wall Motors	14.92	12.45	10.66	6.08	5.75	6.25
Tesla	6.2	6.5	8.2	6.52	5.98	6.26

Note: Data source is from the company's annual report.

Table 12. Comparison of accounts receivable turnover rates from 2019 to 2024. (unit: frequency).

indicator	2019	2020	2021	2022	2023	2024
BYD	2.74	3.68	5.58	11.30	11.96	12.52
SAIC	20.29	17.02	16.69	13.06	11.09	8.92
Great Wall Motors	29.10	28.98	29.15	22.83	25.10	27.95
Tesla	21.6	19.6	28.3	33.5	30	24.65

Note: Data source is from the company's annual report.

Table 13. Comparison of current asset turnover rates from 2019 to 2024. (unit: frequency).

indicator	2019	2020	2021	2022	2023	2024
BYD	1.15	1.43	1.56	2.08	2.22	2.31
SAIC	1.75	1.38	1.40	1.32	1.24	1.04
Great Wall Motors	1.43	1.23	1.31	1.27	1.53	1.60
Tesla	0.55	0.66	1.07	1.57	1.77	1.80

Note: Data source is from the company's annual report.

In a horizontal comparison, BYD's inventory and accounts receivable turnover rates are low compared to SAIC and Great Wall, while its current asset turnover rate has surpassed the two companies since 2020 and continues to maintain its leading position. This phenomenon reveals BYD's relatively slow inventory and accounts receivable realization speed, which may be due to excessive inventory backlogs, reflecting its insufficient operating capacity. Compared with Tesla, BYD's inventory liquidity is poor, and there may be a risk of an inventory backlog. Tesla's accounts receivable is converted into liquid cash at a faster rate, and the efficiency of capital use is also increasing. However, BYD is still at a low level, with a large amount of accounts receivables and a greater risk of bad debts.

Table 14. Comparison of total asset turnover rates from 2019 to 2024. (unit: frequency).

indicator	2019	2020	2021	2022	2023	2024
BYD	0.65	0.79	0.87	1.07	1.03	1.06
SAIC	1.03	0.84	0.85	0.78	0.75	0.64
Great Wall Motors	0.86	0.77	0.83	0.76	0.90	0.97
Tesla	0.77	0.73	0.94	1.13	1.02	0.85

Note: Data source is from the company's annual report.

As is shown in Table 14, BYD's total asset turnover rate was similar to that of the three companies in the first three years. Since 2021, it has exceeded SAIC and Great Wall, but is the same as Tesla. This phenomenon shows that BYD has significantly improved its total asset utilization rate, thereby improving its corporate operating capabilities.

In general, BYD has significant deficiencies in the management of the accounts receivable and inventory. To optimize the company's operating efficiency and capital flow, BYD must increase its management of inventory and accounts receivable. Specifically, BYD needs to strengthen the management mechanism of accounts receivable and improve the inventory management strategy, aiming to speed up the turnover of funds and thus improve the overall operating efficiency.

3.4.2. Operational risk issues

(1) Inadequate credit management

Through the previous analysis, we found that BYD's accounts receivable turnover rate and capital utilization rate are low. This is because BYD has adopted an overly loose credit policy, which has led to accounts receivable occupying a large amount of funds, affecting the company's capital utilization rate and normal capital turnover. Based on this situation, it shows that BYD has obvious deficiencies in credit management, and there are problems such as a long collection cycle and high bad debt risk.

(2) Low inventory management efficiency

According to the data in table 11, BYD's inventory turnover rate is much lower than that of other companies in the same industry, especially in the first three years. The inventory turnover rates of SAIC and Great Wall in the same industry are more than twice that of BYD, and the gap is obvious. In addition, BYD's inventory turnover rate has remained at 4-5 times from 2019 to 2024, which shows that BYD has a large amount of inventory and a slow cash conversion speed, reflecting that BYD has room for improvement in inventory management.

3.5. Growth risk

3.5.1. Growth risk identification

Table 15. BYD Company's growth capacity calculation table from 2019 to 2024. (unit: billion,%).

project	2019	2020	2021	2022	2023	2024
operating income	1277.39	1565.98	2161.42	4240.61	6023.15	7771
operating income growth rate	-1.78	22.59	38.02	96.20	42.03	29.02
net profit	21.19	60.14	39.67	177.13	313.44	415.9
net sales	1.66	3.84	1.84	4.18	5.20	5.35
profit margin						

Note: Data source is from the company's annual report.

From the table 15 above, we can see that BYD's total operating revenue showed a significant growth trend from 2019 to 2024, with a growth rate of 96.2% in 2022. From 127.739 billion in 2019 to 777.1 billion in 2024, this was a huge growth, and it was the result of its expanded production and sales scale, the launch of new products or services, and the expansion of market share. Net profit growth fluctuated from 2019 to 2022, with faster growth from 2022 to 2024. The decline in net profit in 2021 was due to the large increase in costs, especially raw material prices, which led to a sharp decline in net profit.

BYD's net profit margin generally increased from 2019 to 2024, reaching a maximum of 5.35% in 2024. The net profit margin has shown a fluctuating trend. The continuous growth in operating income and the slow growth in net profit are because BYD was affected by raw material prices in the early stage, and spent more investment costs on operations, which affected the change in net profit margin.

We select SAIC Group, Great Wall Motors, and Tesla as comparison objects, as shown in the following table 16.

Table 16. Comparison of operating income growth rates from 2019 to 2024. (unit: %).

indicator	2019	2020	2021	2022	2023	2023
BYD	-1.78	22.59	38.02	96.20	42.04	29.02
SAIC	-6.53	-12.00	5.08	-4.59	0.09	-15.73
Great Wall Motors	-3.04	7.38	32.04	0.69	26.12	16.73
Tesla	14.5	28.3	70.7	51.35	18.8	0.95

Note: Data source is from the company's annual report.

Comparing the data, BYD's revenue growth rate significantly surpassed SAIC Group, with an upward trend in the first four years and reaching 96.2% in 2022. This shows that BYD's operating conditions, market share, and business prospects are good, and the company's growth ability is very good. However, Tesla's growth ability was generally better than BYD before 2022, and its operating income significantly decreased from 2022 to 2024.

In general, BYD's future development prospects are very optimistic. As upstream raw material production capacity continues to increase, prices gradually return to normal, and downstream vehicle manufacturers' profitability will gradually recover, BYD's growth potential should not be underestimated.

3.5.2. Growth risk issues

- Low net profit margin

BYD's operating income has grown significantly in the past five years, with the growth rate reaching 96.20% in 2022. However, the growth in operating income has not brought about a significant increase in net profit, and the net profit margin increased from only 1.66% in 2019 to 5.35% in 2024. The slow growth rate of net profit margin has led to an increase in BYD's growth risk.

- Inadequate response to external risks

The negative growth in BYD's operating income in 2019 was due to a significant reduction in government subsidies. The development of the new energy vehicle industry was profoundly affected by the COVID-19 pandemic. External factors such as policy adjustments and subsidy cuts will bring uncertainty to the industry, leading to increased growth risks.

The sharp decline in BYD's net profit in 2021 was caused by a sharp increase in the prices of upstream raw materials for new energy power batteries. The fluctuation of raw material prices is often accompanied by rapid changes in market supply and demand. This uncertainty will lead to supply chain instability, which will affect the company's production and operations. In the face of these external risks, BYD's response strategy is insufficient, resulting in increased growth risks, affecting the company's stable development.

4. Reasons for BYD's financial risks

4.1. Irrational capital structure leads to financing risks

Through the analysis above, BYD's current ratio and quick ratio have declined significantly in the past six years, its debt-to-asset ratio has exceeded 75% in the past two years, and its current liabilities ratio has continued to exceed 85% in the past four years. Its high debt-to-asset ratio, irrational capital structure, and extensive use of financial leverage for scale expansion have put heavy pressure

on the company's debt repayment ability. On the one hand, more than 99% of BYD's accounts payable are payable to suppliers with an age of less than one year. The unreasonable debt maturity structure is easily affected by fluctuations in bank interest rates, thereby increasing repayment pressure and financing risks. On the other hand, the sharp increase in BYD's total liabilities is mainly caused by current liabilities, which means that BYD will find it difficult to liquidate assets to pay suppliers' debts in the short term, and the debt financing risk will increase.

The problems with BYD's debt maturity structure and debt composition are that there are many current liabilities and the financial risk pressure is relatively high. Once there are difficulties in capital supply or turnover, it will have an adverse impact on the company's credit status and increase the company's financial burden. Once faced with changes in the market environment, BYD will bear greater financial risks.

4.2. Insufficient cash liquidity and low project yields lead to investment risks

Through the previous analysis, BYD's cash inflow from investment activities has been less than its outflow for a long time, and the net cash flow in the past three years has exceeded -120 billion yuan, resulting in insufficient liquidity for BYD. BYD maintains a state of continuous expansion and actively invests in future growth potential but sacrifices the health of cash flow in the short term. This will be accompanied by higher financial risks. Once the market environment changes or the income from investment activities changes, it will face greater investment risks.

BYD's overseas investment has increased significantly in the past five years, but the investment income was negative in the first four years and achieved only positive income in 2023–2024. The low rate of return on overseas investment projects was due to the fact that BYD's related investments in the new energy vehicle industry chain cannot be supported by government subsidies due to the influence of macro policies. Furthermore, BYD's investment is concentrated in long-term projects such as battery technology research and development and new energy infrastructure construction that cannot generate income in the short term, resulting in increased investment risks.

4.3. Imperfect management of accounts receivable and inventory leads to operational risks

Through the previous analysis, BYD's accounts receivable and inventory turnover rates are lower than those of its two peers. In particular, in 2022, BYD's accounts receivable with an age of less than one year accounted for less than 70% of the total accounts receivable, and more than 30% of the funds were recovered in the second year or more. This phenomenon reflects BYD's loose credit policy, which in turn prolongs the company's payment cycle. It is worth mentioning that BYD's bad debt provision for accounts receivable has exceeded 2 billion yuan in the past three years, which has increased the risk of bad debts and increased operating risks.

BYD's inventory management has significant deficiencies, resulting in a low inventory turnover rate, which will not only put pressure on the company's capital chain, but also have a negative impact on the company's normal operations and product quality, leading to increased operating risks.

4.4. The narrowing of industry profit margins leads to growth risks

BYD's operating income exceeded 700 billion yuan in 2024, but the growth rate of net profit did not increase in the same proportion as operating income, and the net profit margin was low. The substantial growth of operating income is the result of the implementation of the sales strategy of small profits but quick turnover, which hides the cruel fact that the overall brand rise of China's automobile industry and the process of automobile companies gradually moving from low-end to high-end must achieve the reconstruction of the industry's profit distribution mechanism through fierce price wars.

As a company with global influence, BYD faces fierce competition in domestic and international markets as well as diversified external risk challenges, including policy changes and market uncertainties. Policy adjustments in 2019 caused BYD's sales performance to decline, while the sharp rise in raw material prices in 2021 directly affected its net profit to decrease significantly. These external risks have narrowed the company's profit margins, had a significant negative impact on BYD's operations, and led to an increase in growth risks.

5. Suggestions on improving BYD's financial risk control capabilities

5.1. Financing risk control measures

5.1.1. Pay attention to corporate debt issues

Based on the data in a previous article, BYD's debt-to-asset ratio has shown a fluctuating growth trend in recent years, especially in the past two years, where it exceeded 75%. Changes in the debt-to-asset ratio are often the result of the combined effect of multiple factors, including the company's debt management strategy, capital expenditure, debt financing method, profitability, and market environment.

Given that BYD's asset-liability ratio increased significantly in 2022-2024, the company needs to attach great importance to its debt management system, analyze and pay close attention to existing debts. First, BYD needs to, strengthen communication and coordination with suppliers to improve credit capabilities; and second, it needs to strengthen docking with banks to make reasonable arrangements for short-term debt funds to reduce debt default risks. Once cash flow difficulties arise, banks can provide "blood transfusions" in a timely manner. These measures are aimed at ensuring the rationality of the debt structure, maintaining financial stability, and effectively controlling potential financial risks, laying a solid foundation for the company's continued healthy development.

5.1.2. Optimize capital structure

From the previous analysis, BYD's asset-liability ratio has always been at a high level, and the debt maturity structure and method are unreasonable. To reduce financing risks, BYD should improve its capital structure and control and adjust the debt scale. Moreover, BYD should make full use of its own original funds and reduce the scale of external borrowing. It should also use diversified financing channels, such as issuing bonds and stocks, to raise funds and diversify its financing risks.

5.2. *Investment risk control measures*

5.2.1. Strengthen the management of cash flow from investment activities

Based on the analysis above, BYD's cash inflow from investment activities has been less than its cash outflow for a long time, and its cash liquidity from investment activities is insufficient. To reduce the risk burden in the company's investment activities, BYD should adopt a step-by-step investment strategy based on its financial strength to prevent excessive investment from causing a tight capital chain.

In addition, a continuous cash flow monitoring mechanism needs to be implemented in investment activities to ensure that the company has sufficient cash dispatch capabilities to effectively respond to the uncertainty of the external environment and potential emergency funding needs.

5.2.2. Strengthen the analysis of the benefits of external investment

Based on the previous analysis, BYD's external investment amount showed a significant upward trend from 2019 to 2024, and investment income was negative for four consecutive years from 2019 to 2022. To improve the company's overall benefits, BYD should strengthen the analysis of external investment benefits, aiming to optimize resource allocation and improve economic benefits.

BYD should strengthen its in-depth research on market trends, accurately grasp the development dynamics of the industry, and provide strong information support for investment decisions; moreover, it should also pay attention to the risk assessment of investment projects, use scientific methods and means to comprehensively assess the potential risks of projects, and provide reliable basis for decision makers.

In addition, BYD should focus on the construction and improvement of the investment benefit analysis feedback mechanism to adjust the investment strategy in a timely manner and ensure the optimization of investment benefits. This series of measures aims to strengthen BYD's ability in external investment benefit analysis, improve the company's investment efficiency, and lay a solid foundation for the company to achieve sustainable development.

5.3. *Operational risk control measures*

5.3.1. Strengthening accounts receivable management

In the past four years, BYD's provision for bad debts of accounts receivable has remained above RMB 2 billion, and the long collection period has led to an increase in bad debt risk. In view of this situation, it is crucial for BYD to strengthen accounts receivable management and establish a strict credit management system. The company should adopt a comprehensive and systematic strategy, that is, to implement a strict credit assessment process for all customers who apply for credit transactions. Credit sales orders need to be evaluated and approved by the credit management department before being approved by the management authority and the financial department, aiming to shorten the company's collection cycle and improve the efficiency of capital operation, thereby enhancing operational capabilities.

Compared with the other three companies in the same industry, BYD's accounts receivable turnover rate is relatively low. In particular, in 2019, BYD's accounts receivable turnover rate was only 2.74 times, while Great Wall Motors was 29.10 times and Tesla was as high as 30 times. In

response to this problem, BYD urgently needs to adopt a more efficient accounts receivable management strategy, including but not limited to accelerating the recovery of accounts receivable and increasing the frequency of account write-offs. These measures will help BYD to manage its liquidity more effectively in the future and meet its growing funding needs. Furthermore, maintaining a dynamic supervision mechanism for existing accounts receivable and contract asset balances is a necessary measure to ensure that BYD can effectively avoid major bad debt risks and ensure financial stability.

5.3.2. Strengthen inventory risk management

Through the analysis above, we found that BYD's inventory turnover rate is far lower than the industry average, reflecting its poor inventory liquidity. This shows that BYD needs to strengthen inventory risk management, analyze the reasons for its inventory backlog, pay close attention to changes in external environment such as policies and markets, understand consumers' wishes as much as possible, formulate reasonable production plans, keep inventory quantities within a controllable range, avoid inventory backlogs, and strengthen inventory liquidity management.

5.4. *Growth risk control measures*

5.4.1. Develop potential markets

Under the background of the development of the "dual carbon" goal, new energy vehicles have developed rapidly with their advantages of energy conservation and emission reduction. Facing the challenges of intensified price competition pressure in the industry, reduced subsidies for new energy vehicles and higher audit standards, BYD should take advantage of its leading position in the field of new energy vehicles by first improving product quality, and then using price advantages to consolidate its position in the mid- and low-end markets. In addition, the development of domestic and international markets should go hand in hand. BYD should actively deploy overseas markets, take advantage of local policy advantages to develop overseas markets to increase market share, and continuously improve the international reputation of its products.

5.4.2. Increase R&D investment

Facing the opportunity of technological innovation in the automotive new energy vehicle industry, major automakers attach great importance to R&D capabilities. As a leading enterprise, BYD's R&D expenses have continued to increase year by year, with an investment of nearly 40 billion yuan in 2023, a change rate of 97.39%. Among the R&D personnel, the number of researchers increased by 47.56%, among which the change rate of master's and doctoral degrees in the educational structure exceeded 160%.

In April 2022, BYD announced that it would stop producing fuel vehicles, becoming the world's first traditional automaker to "go electric". The major move of abandoning fuel vehicles indicates that BYD needs to continue to increase R&D investment in the development and research of new energy vehicles, improve R&D efficiency, overcome the "bottleneck" of technology development, and further improve the size, durability, safety, and other aspects of the battery to shorten the gap between BYD's current technical level of new energy vehicles and the world's leading new energy vehicles. It is also

necessary to attract high-end talents and retain talents through relevant talent preferential policies to enhance its own R&D “soft power”.

5.4.3. Enhance the ability to respond to external risks

Facing the subsidy policy reduction in 2019, the COVID-19 pandemic, and the rising raw material costs in 2021, BYD has inevitably suffered a certain degree of negative impact. Therefore, the company needs to pay close attention to changes in the external environment and improve the prediction and response mechanism for external risks, aiming to formulate targeted risk management strategies to reduce the adverse impact of external uncertainties on the company’s operating activities. At present, China has the situation that the basic equipment related to new energy vehicles is not perfect, and the popularity of equipment such as charging piles is low. However, with the advancement of the country’s “dual carbon” strategic goals and the development of new energy vehicles, BYD’s new energy vehicles have good development prospects.

6. Conclusions

In this paper, we select BYD, a leading domestic enterprise in the new energy vehicle industry, and identify and analyze BYD’s financial risks from four dimensions: Financing, investment, operation, and growth, based on the financial risk theory and the financial data of the past six years. We also compare BYD with SAIC, Great Wall Motors, and Tesla in the same industry and draw the following conclusions:

In terms of financing, BYD faces the problem of unreasonable debt maturity structure and composition, and its debt repayment ability is weak; in terms of investment, cash outflow has been greater than inflow for a long time, cash liquidity is insufficient, and the rate of return on foreign investment projects is not high; in terms of operation, inventory turnover rate and accounts receivable turnover rate are low, credit management level is insufficient, and inventory management efficiency is not high; in terms of growth, the net profit margin is low, the response to external risks is insufficient, and there is a risk of unstable development. In general, BYD has a high financial risk.

The causes of BYD’s financial risks are also analyzed from four perspectives, and it is concluded that unreasonable capital structure leads to financing risks, insufficient cash liquidity and low project returns lead to investment risks, imperfect accounts receivable and inventory management lead to operating risks, and uncertainty in the external environment leads to growth risks.

In response to the financial risks faced by BYD, we propose suggestions for improving control capabilities from the two perspectives of internal financial and external environmental risks, mostly including optimizing capital structure, strengthening internal investment benefit analysis, strengthening accounts receivable and inventory risk management, and increasing R&D and industry response strategies.

In this article, we identify, analyze, and make recommendations on BYD’s financial risks. As a leader in the new energy vehicle industry, we hope that this analysis will help the healthy and stable operation of the new energy vehicle industry and provide reference opinions for other companies in the same industry.

Author contributions

Conceptualization: W.C., M.H., H.Y. and P.F.; Software: W.C., M.H., H.Y. and P.F.; Validation: W.C., M.H., H.Y. and P.F.; Formal Analysis: W.C., M.H., H.Y. and P.F.; Investigation: W.C., M.H., H.Y. and P.F.; Resources: W.C.; Data Curation: W.C.; Writing–Original Draft Preparation: W.C., M.H., H.Y. and P.F.; Writing–Review & Editing: W.C., M.H., H.Y. and P.F.; Visualization: W.C., M.H., H.Y. and P.F.; Supervision: W.C. and P.F.; Project Administration: W.C., M.H., H.Y. and P.F. All authors have read and agreed to the published version of the manuscript.

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Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

Conflict of interest

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