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The Analysis of New Energy Vehicle Enterprise Investment Value - Take BYD Company Limited as an Example

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Abstract. The global new energy vehicle (NEV) industry is experiencing rapid growth, with China positioned as a key driver. This study examines BYD Company Limited(BYD), a leading Chinese NEV manufacturer, through integrated analytical frameworks including PEST analysis, DuPont analysis, and a two-stage Free Cash Flow Discounted Cash Flow (DCF) model to forecast the company's enterprise value, financial performance over the next five years, and equity valuation. The results indicate a 5.61% upside potential for BYD, underscoring its compelling investment appeal. While the analysis confirms BYD's robust growth prospects, it also identifies persistent challenges, particularly in financial risk management and global market penetration. Accordingly, strategic recommendations are proposed to address critical areas such as liquidity optimization, debt structure refinement, and international brand expansion. These insights aim to enhance BYD's operational resilience and competitive positioning in the evolving NEV landscape. This research provides actionable intelligence for investors and industry stakeholders seeking to navigate opportunities and risks within the high-growth NEV sector.

Keywords: New energy vehicles, BYD, PEST analysis, DuPont analysis, Free Cash Flow Discounted Cash Flow Model

1. Introduction

The global automotive industry is undergoing a significant transformation towards electrification, and China’s new energy vehicle (NEV) industry has gradually built a solid foundation in terms of technology, industrial chain integration, and market demand. With continued policy support and subsidy incentives, in 2024 alone, China's NEV production reached 12.866 million units, representing a year-on-year increase of 35.5%, with its production and sales accounting for over 60% of the global total [1]. This study focuses on comprehensively evaluating the investment value of BYD, a leading enterprise in China’s NEV industry. Although previous studies has examined BYD’s financial performance, technology development, and market share, few studies has systematically assessed its investment value through multi-dimensional and integrated analytical approaches. This research uses the DuPont analysis framework based on BYD's 2024 financial data which has just been published , through DCF Model to forecast the future value of BYD ,as well as stock market performance . Additionally, investment value theory and PEST analysis are employed to provide a comprehensive assessment. Statistical analysis methods are used to verify and interpret

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the findings. The main questions include: What is BYD's current financial performance and market position? What is the current macro environment that BYD is facing? What are the influencing factors of BYD's investment value, and how to improve it? What is the future stock valuation of BYD， does it worth investing? This research is expected to provide a reference for investment decisions in the new energy vehicle industry, help the enterprise identify its advantages and disadvantages, and to provide suggestions for future development.

2. Macro-environmental analysis of BYD in China based on PEST model

Political Environment: The NEV industry is currently in a phase of rapid development, bolstered by strong governmental support and public recognition. China's New Energy Vehicle Industry Development Plan (2021–2035), issued by the General Office of the State Council, emphasizes advancing electrification, connectivity, and intelligentization through integrated innovation, core technological breakthroughs, and optimized industrial ecosystems to achieve sustainable growth and solidify China's position as an automotive powerhouse [2]. However, BYD faces challenges from declining subsidies and tightening emission standards, necessitating cost reduction through technological innovation. Additionally, the EU's imposition of countervailing duties on Chinese EVs directly impacts BYD's European expansion. Geopolitical tensions, particularly U.S.-China trade disputes, further require strategic adjustments in supply chain management (e.g., critical raw material sourcing) and global market entry policies.

Economic Environment: Data from the China Association of Automobile Manufacturers (April 11, 2025) reveals robust growth in China's automotive sector: Q1 2025 production and sales reached 7.561 million and 7.47 million units, up 14.5% and 11.2% year-on-year, respectively. NEV production and sales surged to 3.182 million and 3.075 million units, marking YoY increases of 50.4% and 47.1% [3]. As the NEV market leader, BYD benefits significantly from this expanding consumer base. Nevertheless, intensifying competition and margin pressures from upstream cost volatility demand enhanced operational efficiency.

Social Environment: Growing global environmental awareness has amplified demand for sustainable mobility, aligning with BYD's "Cool the Earth by 1°C" brand ethos. Its plug-in hybrid models, featuring ultra-low fuel consumption (2.9L/100km), have become pivotal in transitioning consumers from ICE vehicles to EVs, with 2024 sales reaching 1.31 million units. However, BYD struggles with premium market penetration, as evidenced by the sustained sales decline of its Denza luxury sub-brand, which fell below 10,000 units in August 2024 [4]. This highlights persistent challenges in brand elevation and consumer perception in high-end segments.

Technological Environment: BYD has a number of patented technologies in the battery field, including 3C batteries, solar batteries, energy storage batteries, etc. BYD is currently the world's largest lithium-ion battery manufacturer in terms of production capacity. The technological innovation in the field of batteries has laid a profound technical foundation for BYD to enter the field of new energy vehicles. It can be said that BYD's battery technology is the most important factor for BYD to be able to stand on the field of new energy vehicles.

3. Business structure and operational performance

3.1. Business structure

BYD has developed a comprehensive and vertically integrated industrial structure that spans the entire value chain of the new energy vehicle industry, from upstream resource control and core

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technologies to midstream research and manufacturing, and downstream market expansion and services. In the upstream segment, BYD focuses on the development of key resources and core technology accumulation. In the battery technology field, it independently develops lithium-ion batteries, nickel-metal hydride batteries, and fuel cells. Key metals like lithium, cobalt, and nickel are crucial for manufacturing power batteries. After achieving success in nickel-cadmium batteries, BYD developed nickel-metal hydride and lithium batteries and became one of the international battery giants. By 2018, it already become the world's largest manufacturer of such batteries.

In midstream manufacturing and R&D, BYD takes technological innovation as the core driving force. As a leading global new energy vehicle manufacturer, producing a wide range of vehicles from electric cars to commercial vehicles. Its "Blade Battery" has high safety and energy density, and is a major selling point for its electric vehicles. BYD also has strong R&D capabilities in vehicle manufacturing, electronic control systems, and battery management technology. In the electronics business, it provides design, development, and manufacturing services for various products. In the downstream market, BYD has achieved diversified product applications and a global layout. It is one of the world's largest electric vehicle manufacturers, and its products are exported globally. In the rail transit field, it has developed "Cloud rail" and "Yunba", which have entered many international markets. BYD's energy storage technology is widely used, and it also focuses on building charging infrastructure and establishing a perfect after-sales service system. It is also involved in battery recycling and secondary utilization.

3.2. Market performance

This comprehensive industrial chain layout has directly contributed to BYD’s impressive financial and market performance.In 2024, BYD reported an operating income of 777.102 billion yuan, a year-on-year increase of 29.02%, and its net profit reached 402.54 billion yuan, a year-on-year increase of 34%. In terms of market performance, BYD consolidated its leadership in global new energy vehicle (NEV) sales, achieving a record 4.272 million units in 2024, representing a 41.26% year-on-year growth compared to 2023. This growth was driven by a diversified product portfolio covering all market segments, including pure electric vehicles (1.765 million units, 41.5% of total NEV sales) and plug-in hybrids (2.485 million units, 58.5%) [4].

Globally, BYD expanded its footprint to over 100 countries and regions across six continents, with products sold in more than 400 cities. In 2024, its overseas NEV sales surged to 417,204 units, accounting for 9.77% of total sales and marking a 71.86% year-on-year increase. Key markets included Europe, Southeast Asia, and Japan, and localized production in countries like Mexico and Thailand enhanced cost efficiency and supply chain resilience, enabling BYD to navigate trade barriers such as EU anti-subsidy tariffs [4].

4. BYD profitability calculation: Based on DuPont analysis

DuPont Analysis Framework and Core Index Decomposition: According to the DuPont analysis framework proposed in the paper, Return on Equity (ROE) can be decomposed into three core ratios reflecting a company's profitability, operational efficiency, and financial leverage [5]:

$$\text{ROE} = \text{Net Profit Margin} \times \text{Total Asset Turnover} \times \text{Equity Multuplier} \quad (1)$$

The following analysis is based on BYD's financial data from 2020 to 2024 [4, 6, 7].

Analysis of Core Ratios:

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$$\text{Net Profit Margin} = \frac{\text{Net Profit}}{\text{Operating Revenue}} \times 100\% \quad (2)$$

From 2020 to 2021, the net profit margin dropped from 3.84% to 1.84% due to the pandemic and rising raw material costs. It rebounded to 5.35% in 2024 as scale effects and sales of high-margin products (e.g., Blade Battery vehicles) improved profitability.This may caused by cost control,with gross margin stabilized at 19.44% in 2024 (vs. 19.38% in 2020), while R&D expenses increased to 6.85% of revenue, supporting product differentiation and pricing power. Besides, selling expenses as a percentage of revenue decreased from 3.23% to 3.1%, and management expenses stabilized at ~2.4%, as scale diluted fixed costs.

$$\text{Total Asset Turnover} = \frac{\text{Operating Revenue}}{\text{Average Total Assets}} \quad (3)$$

The total asset turnover increased from 0.79 times in 2020 to 1.07 times in 2022, slightly decreasing to 1.06 times in 2024, indicating overall improved asset utilization.

$$\text{Equity Multiplier} = \frac{\text{Total Assets}}{\text{Shareholders' Equity}} \quad (4)$$

Rose from 3.12 in 2020 to 3.94 in 2024, reflecting higher leverage. Driving Factors are debt structure and equity growth. First, debt-to-assets ratio increased to 74.64% (2024), but interest-bearing debt accounted for only 17.93%, relying mainly on interest-free liabilities (e.g., accounts payable, 49.2% of current liabilities), ensuring low financial risk. Besides, parent shareholders' equity grew from RMB 56.8 billion to RMB 185.3 billion (CAGR 33.4%), but faster total asset growth drove the equity multiplier higher.

Liquidity and solvency: Between 2020 and 2024, BYD's liquidity indicators exhibited signs of fluctuation and structural stress. The current ratio declined from 1.05 in 2020 to 0.67 in 2023, rebounding to 0.75 in 2024, indicating fluctuating short-term solvency. Negative net working capital (-RMB 125 billion in 2024) suggests reliance on short-term debt financing. The quick ratio also dropped from 0.75 to 0.51, reflecting weaker liquidity after excluding inventory. Despite improved inventory turnover, high inventory values (RMB 116 billion in 2024) require monitoring. In terms of long-term solvency, BYD reported a debt-to-assets ratio of 74.64% in 2024, higher than the peers, but lower interest-bearing debt makes BYD's leverage safer. Similarly, the debt-to-equity ratio reached 2.94, slightly higher than the peers, but BYD's focus on operational liabilities reduces financial risk compared to traditional asset-heavy enterprises.

5. Corporate development advice

Based on the preceding analysis of BYD's macro-environment and financial prformance, this section proposes multifaceted recommendations for the company's future development. To address the risks revealed in the financial analysis—particularly its high debt-to-asset ratio and weak short-term solvency—BYD should prioritize its financial structure. This includes reducing reliance on short-term liabilities managing debt growth in line with equity and asset expansion, and maintaining low interest burdens through prudent long-term debt planning. In terms of product strategy, while BYD aims to increase the share of premium models (over 20%) with launches like the Yangwang U7 and Denza N9, the performance of its high-end sub-brands remains weak [4]. For example, Denza's monthly sales fell below 10,000 units in August 2024 [4]. To enhance competitiveness in the premium segment, BYD must focus on improving brand value through design innovation, differentiated technology, and more targeted marketing.

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Improving after-sales service and infrastructure is also essential. Expanding 4S dealerships and certified third-party service centers can improve service acccessibility and customer satisfication. At the same time, accelerating the development of charging stations and battery-swap technology will mitigate challenges such as prolonged charging times and insufficient facilities [8]. Also, BYD must proactively mange supply chain risks. Although NEV demand remains strong due to policy support, geopolitical tensions and raw material shortages pose ongoing challenges [9]. To mitigate these threats, the company must optimize supply chain management by diversifying raw material procurement channels and strengthening supplier partnerships to mitigate risks. On the international front, with European automakers likely to respond to Chinese EV expansion by forming alliances and investing in advanced technologies, BYD should strengthen overseas partnerships [10]. Collaborating with local partners to co-develop charging infrastructure and after-sales networks will ease market entry, support localization, and enhance brand influence in key regions [11].

6. Enterprise value assessment of BYD based on the DCF model

The Discounted Cash Flow (DCF) model estimates enterprise value by discounting projected future cash flows to their present value. A company's value is recognized by both theoretical and practical standards only if it demonstrates sustainable future profitability. In this valuation case, historical cash flow analysis informs the forecast of future free cash flows (FCF).

Table 1: Data sources and key assumptions [4]

Ratio	Value	Calculation Basis
Interest-bearing debt	4,045,960.00	BYD's latest annual report
Equity capital	18,525,110.40	BYD's latest annual report
Debt weighting	17.93%	Proportion of interest-bearing debt
Equity weighting	82.07%	Proportion of equity capital
Beta coefficient (β)	1.2586	Sourced from Choice Database
Risk-free rate	1.68%	10-year Chinese government bond yield
Expected market return	7.08%	Long-term annualized return of the CSI 300 Index
Cost of equity	8.48%	CAPM model: $Re = Rf + \beta(Rm - Rf)$
Cost of debt	5.29%	Reference the 5-year average actual interest rate
Discount rate	7.76%	$WACC = (E/V \times Re + D/V \times Rd \times (1 - Tc)$
Perpetual growth rate	2.00%	Reference the long-term GDP and inflation trends in developed economies

For BYD, the discount rate is derived from the risk-free rate, market risk premium, and beta coefficient, ultimately yielding the enterprise value through the discounting process,as shown in Table 1 [12]. Historical FCF Calculation:

$$\text{FCF} = \text{Earnings Before Interest and Tax} \times (1 - \text{Income Tax Rate}) + \text{Depreciation and Amortization} - \text{Increase in Working Capital} - \text{Capital Expenditure}.$$

$$\text{The Income Tax Rate} = \frac{\text{Income Tax Expense}}{\text{Total Profit}} \times 100\%$$

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Then, the results are shown in Table 2.

Table 2: 2020-2024 Free Cash Flow (Million yuan)

Subject	2020A	2021A	2022A	2023A	2024A
Enterprise Cash Flow	10521.16	-71128.65	263555.89	103325.57	-137815.39

The Cash Flow of BYD Auto in the Next Five Years is forcasted in Table 3:

Table 3: 2025E-2029E Free Cash Flow (Million yuan)

Predicted Cash Flow	-17459.67	25524.71	38442.30	50235.45	61096.81

Discounted Value Calculation: Fast-Growing Period (2020–2030): The present value of free cash flows (FCF) discounted at the WACC totals CNY 115.78 billion. Perpetuity (Post-2030): The formula is:

$$\text{Perpetuity Value}\left(\text{PV}\right) = \frac{\text{FCF}_{2030}\times(1+\text{g})}{\text{WACC}-\text{g}}$$

When g = 2%, the perpetual FCF is 61.097 billion yuan, yielding a discounted terminal value of 690.392 billion yuan. Total Enterprise Value: The formula is:

Enterprise Value = Present Value of Fast Growing Period+Present value of perpetuity + Cash equivalents − Interest − bearing liabilities

Calculating that the enterprise value is 868.456 billion yuan, corresponding to an implied share price of 298.51yuan (total shares outstanding: 29.09 million). Valuation Result: Table 5shows that The DCF model suggests a fair value of CNY 298.51 per share for BYD, representing a 5.61% upside from the current price (CNY 282.66), indicating undervaluation.

Table 4: Valuation results (Share Price: CNY)

Metric	Value
Company	BYD
Ticker	002594.SZ
Shares Outstanding (mn)	29.09
Current Share Price (Date: April 15th, 2025)	282.66
Market Cap	8,223.33
PE (TTM)	24.25
PB	5.92
Fair Value-Share Price	298.51
Fair Value-Market Cap	8,684.56
Upside Potential	5.61%

Sensitivity Analysis: Impact of WACC and Perpetual Growth Rate (g): A WACC increase from 7.16% to 8.36% reduces the fair value from CNY 317.77 to CNY 256.68;

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A perpetual growth rate increase from 1.65% to 2.40% raises the fair value from CNY 256.68 to CNY 360.21 (seen in Table 6).

Key Drivers: A 1% decline in revenue growth reduces the fair value by 3–5%; A 1% improvement in gross margin increases the fair value by 2–3%.

Table 5: Sensitivity analysis matrix (Share Price: CNY)

Base Case Price		WACC												
	298.51	7.16%	7.26%	7.36%	7.46%	7.56%	7.66%	7.76%	7.86%	7.96%	8.06%	8.16%	8.26%	8.36%
Perpetual Growth Rate	1.65%	317.77	311.66	305.77	300.08	294.59	289.29	284.16	279.20	274.40	269.76	265.26	260.90	256.68
	1.70%	320.24	314.03	308.04	302.27	296.69	291.31	286.11	281.08	276.21	271.51	266.95	262.53	258.25
	1.75%	322.75	316.44	310.36	304.49	298.83	293.37	288.09	282.99	278.05	273.28	268.66	264.18	259.84
	1.80%	325.31	318.90	312.72	306.76	301.01	295.46	290.11	284.93	279.92	275.08	270.40	265.86	261.46
	1.85%	327.92	321.40	315.12	309.06	303.22	297.59	292.15	286.90	281.82	276.91	272.16	267.56	263.11
	1.90%	330.58	323.94	317.56	311.41	305.48	299.76	294.24	288.91	283.75	278.77	273.95	269.29	264.78
	1.95%	333.28	326.54	320.05	313.80	307.77	301.96	296.36	290.95	285.72	280.66	275.78	271.05	266.47
	2.00%	336.04	329.18	322.58	316.23	310.11	304.21	298.51	293.02	287.71	282.59	277.63	272.83	268.19
	2.05%	338.86	331.88	325.17	318.71	312.48	306.49	300.71	295.13	289.74	284.54	279.51	274.65	269.94
	2.10%	341.73	334.62	327.80	321.23	314.91	308.81	302.94	297.28	291.81	286.53	281.42	276.49	271.72
	2.15%	344.65	337.42	330.48	323.80	317.37	311.18	305.21	299.46	293.91	288.55	283.37	278.36	273.52
	2.20%	347.64	340.28	333.21	326.42	319.88	313.59	307.53	301.68	296.04	290.60	285.35	280.27	275.36
	2.25%	350.68	343.19	336.00	329.09	322.44	316.04	3 09.88	303.94	298.22	292.69	287.36	282.21	277.22
	2.30%	353.79	346.17	338.84	331.81	325.05	318.54	312.28	306.25	300.43	294.82	289.40	284.17	279.12
	2.35%	356.97	349.20	341.74	334.59	327.71	321.09	314.72	308.59	302.68	296.98	291.48	286.18	281.05
	2.40%	360.21	352.29	344.7	337.41	330.41	323.69	317.21	310.98	304.97	299.19	293.6	288.21	283.01

7. Conclusion

This study provides a comprehensive evaluation of BYD's investment value through integrated macro-environmental, financial, and valuation analyses. BYD has solidified its leadership in China's NEV sector, driven by robust revenue growth (29.02% YoY in 2024), expanding global market share (9.77% of sales), and technological dominance in battery innovation. Operational efficiency has improved, as evidenced by the rise in total asset turnover from 0.79x (2020) to 1.06x (2024), while the DCF model estimates a fair value of CNY 298.51 per share, implying a 5.61% upside.

However, challenges persist. A high debt-to-assets ratio (74.64%) and reliance on short-term liabilities expose liquidity risks, reflected in a current ratio below 1.0 (0.75 in 2024). The underperformance of its premium Denza sub-brand also signals ongoing difficulties in penetrating high-margin markets. Geopolitical headwinds, such as EU countervailing duties and U.S.-China trade tensions, further complicate global expansion efforts. To sustain growth, BYD should optimize its capital structure, strengthen band positioning through innovation, and accelerate infrastructure deployment to address consumer needs. Strategic global partnerships and supply chain diversification are also essential to manage external risks. This research has limitations. The DCF model's sensitivity to assumptions—particularly the 2% perpetual growth rate and 7.76% WACC—highlights the need for scenario-based analyses to account for macroeconomic volatility. Furthermore, the study prioritizes financial metrics over ESG factors, which increasingly influence investor decisions in the NEV sector. Future research should incorporate dynamic valuation frameworks, cross-industry benchmarking, and longitudinal data to refine predictive accuracy.

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In conclusion, BYD's strategic positioning and execution capabilities position it as a compelling investment opportunity, albeit contingent on addressing structural vulnerabilities. Stakeholders must balance optimism about its growth trajectory with prudent risk management to navigate the evolving NEV landscape.

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