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Enterprise Value Valuation—BYD as an Example Based on SWOT Model and Multiple Regression Model

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BYD is one of the largest new energy vehicle companies in China. Analyzing its scenario and the factors that affect its value helps to understand and identify development opportunities and potential problems. On one hand, this paper makes a qualitative analysis of BYD, using SWOT model to study the internal capability and external environment of BYD. On the other hand, the multiple regression model is used for quantitative analysis of BYD's enterprise value, and the model is established based on three factors: enterprise fundamentals, investor behavior and psychology, and macroeconomic policy uncertainty, and the stepwise regression is carried out. The results show that the increase of institutional investors' shareholding ratio, the increase of investor sentiment index, and the increase of M2 growth rate will increase the overall enterprise value, while the increase of economic policy uncertainty will decrease the enterprise value.

Keywords: BYD, enterprise value, multiple regression analysis, investor behavior and psychology, macroeconomic policy uncertainty

Introduction

BYD Company Limited, one of China's major new energy vehicle manufacturers, has achieved a dual listing on the Hong Kong and Shenzhen stock exchanges. At present, the company's operation scale and market value have exceeded 100 billion level and has more than 700,000 employees. In the past decade, Chinese enterprises have experienced significant changes and growth, and the market value has been continuously improved, and BYD's growth process is a microcosm of the development of Chinese enterprises. On one hand, technological innovation and the rise of digital economy have provided a strong impetus for BYD's development, and the globalization process has accelerated its entry into the international market. On the other hand, the Chinese government is also constantly optimizing the business environment and launching preferential policies to support the development of new energy vehicle enterprises. In the capital market, investors also provide a steady stream of financial support for the emerging new energy industry. BYD's market value once reached 1,015.4 billion yuan, becoming the first domestic car company to join the trillion-yuan club. As a representative enterprise in the new energy vehicle industry, the analysis of BYD can not only provide suggestions for its development, but also map to other companies in this industry and provide inspiration. Through a comprehensive qualitative and quantitative analysis, we are able to identify the challenges and opportunities facing BYD and how these global

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factors contribute on its market valuation. This will provide investors with a rational and precise investment orientation to make more informed decisions.

This paper first conducts a SWOT qualitative analysis of BYD to understand its internal capability and external environment, identify its strengths and weaknesses, identify problems and opportunities, and find out the key factors affecting the development of BYD. Combined with the results of SWOT analysis, this paper then makes a quantitative valuation prediction of BYD enterprise, analyzes the possible influencing factors, and determines the influencing factors from three aspects: enterprise fundamentals, investor behavior and psychology, and macroeconomic policy uncertainty. Then, a multiple regression model is established, and the method of stepwise regression is adopted to judge whether the model is effective, and which factors can make the model best explanatory after being added to the model is compared. Finally, the model with the best explanatory ability is selected as the final prediction model. After the model is obtained, the financial data of BYD from 2011 to 2023 and other data of the corresponding years are substituted into the model, and compared with the real value, so as to verify the prediction accuracy of the model. In addition, this paper randomly selected 14 listed companies in different industries in 2023 and compared the market value rankings to further verify the prediction accuracy of the model.

Literature Review

In the context of corporate value assessment, particularly focusing on BYD as a case study, various methodologies and perspectives have been explored to evaluate its worth in the rapidly evolving new energy vehicle (NEV) industry. The integration of Environmental, Social, and Governance (ESG) factors into the valuation process has gained prominence, reflecting a broader shift towards sustainable investment practices (Gao, Niu, & Xu, 2024). This approach not only aligns with global trends but also addresses the specific challenges and opportunities presented by the NEV sector.

The financial performance and strategic positioning of BYD have been central to discussions on its investment value. The company's expansion in production capacity and scale underlines its leadership role within the industry, driven by favorable government policies and the growing demand for energy-efficient vehicles (Yu & Pei, 2017). Furthermore, the adoption of multi-factor investment value analysis models has provided a more nuanced understanding of BYD's market position and potential for future growth (Lv, 2020).

The application of Economic Value Added (EVA) models, considering ESG factors, has offered a robust framework for assessing the intrinsic value of NEV companies like BYD. These models emphasize the importance of sustainable profitability and long-term value creation, which are critical in the context of the NEV industry's transition towards greener technologies (Zeng, 2019). Additionally, the exploration of full industry chain strategies highlights the strategic importance of vertical integration and innovation in enhancing BYD's competitive edge and enterprise value (Wang, 2019).

The financial analysis of BYD reveals a complex picture, with varying assessments of its stock price and enterprise value across different methodologies. While some studies suggest that BYD's market value may be underestimated, indicating potential for appreciation (Meng, 2019; Chen, 2021), others point to the inherent risks and uncertainties associated with the NEV sector, necessitating a cautious approach to valuation (Yan, 2022).

In conclusion, from the above analysis, there is already a considerable amount of normative research on enterprise value valuation, while empirical analysis is relatively scarce. From both macro and micro perspectives, what factors will affect the value of a company? What is the impact of investor emotions and behavior on the

value of a company? Is there a relationship between political uncertainty and corporate value? These issues are of great significance to the development of enterprises, especially new energy enterprises, and require in-depth research. Therefore, this article empirically analyzes the factors influencing corporate value based on the data of A-share listed companies in Shanghai and Shenzhen from 2011 to 2023.

Qualitative Analyses: SWOT Analysis of BYD

Qualitative analysis of BYD can help us understand how the macro and microenvironment in which BYD operates affects its development and performance, thereby helping us identify relevant variables that affect BYD's market value. This article will conduct a qualitative analysis of BYD's strengths, weaknesses, opportunities, and threats through the SWOT model, and extract the factors that may affect BYD's market value.

Analysis of BYD's Advantages

First, BYD has technical cost advantage. Compared with traditional vehicles, BYD's new energy models benefit from lower production costs and more efficient marketing strategies, achieving more competitive prices and higher cost performance. The company leverages its expertise in the information technology and battery sectors to further reduce manufacturing costs and ensure maximum profits. BYD has also expanded its business scope and strengthened its independent research and development based on strong human resources, launching a number of innovations including remote driving, DM (dual mode) hybrid technology, and bidirectional inverter charging and discharging technology.

Also, BYD has brand advantage. Thanks to the capital injection of the famous investor Warren Buffett, the establishment of the BYD Charitable Foundation, and the cooperation agreement with the government on new energy vehicles, BYD's share in the new energy vehicle market has steadily increased. The new dual-mode hybrid model has further strengthened BYD's good reputation and brand image in the market with its outstanding performance. Through continuous philanthropic activities and government cooperation, BYD has established a strong brand presence.

Analysis of BYD's Disadvantages

BYD faces some challenges in automotive battery technology, such as patent issues with lithium iron phosphate batteries, inadequate electrical conductivity, low capacitance, poor low-temperature performance, and low production efficiency. In terms of the structure and safety performance of electric vehicles, BYD has a certain gap compared with the international advanced level, especially in the competition with international brands such as Daimler. In addition, BYD cars also have some minor problems in terms of quality, and their durability and performance still have room to improve compared with some big brands.

In the field of sports cars, BYD has not yet formed a clear brand advantage, due to the late start of automotive technology, technology accumulation is relatively small, and innovation ability is limited. In terms of cost control, BYD also has a certain gap compared with Japanese and South Korean auto brands. In addition, BYD's non-automotive business has been greatly affected by the economic crisis, and its performance has declined, which in turn has affected investment in new car research and development.

Development Opportunities of BYD

The government has introduced a number of policies conducive to the development of the new energy automobile industry, the establishment of the new energy industry alliance, and the upcoming introduction of relevant industry technical standards; marking China's new energy automobile industry has ushered in

unprecedented development opportunities. In 2023, China government introduced a new policy, which is to reinforce the integration and interaction between new energy vehicles and the power grid (State Council Departmental Documents Chinese Government Network, 2023). Launch of this policy indicates more new energy vehicles, especially the electric cars, will be popularized on a wider scale in China. The market will extend greatly in the future in China. For BYD, a bigger market means more opportunities for development. In China, other favorable policies have also been introduced for domestic electric vehicle brand. One of the most interesting policies is the deduction of purchase fees, which will last until 2027.12.31. In the lists of new energy vehicle models exempt from vehicle purchase tax, many vehicle models of BYD are included. This is conducive to BYD to expand sales and increase market share.

The social consumption environment has brought new opportunities to the automobile consumer market. First, as GDP per capita grows, more and more households have the financial power to buy a car. Second, in order to stimulate domestic demand, the government has introduced a series of consumption incentive policies, which has made the previously suppressed demand for car purchases begin to translate into actual purchase behavior. Third, the common consumption habits of herd effect and overconfidence mentality of consumers have also contributed to the enthusiasm for car buying in some cities.

Threat to BYD

BYD has faced dual challenges in the development process from competitors and the macroeconomic environment. Competitors' technological advances and price strategies pose a threat to BYD, especially in the field of new energy vehicles (Gao, 2021), where market competition has become increasingly fierce with the entry of brands such as Chery and Geely. In addition, bigger rivals could eat into BYD's market share and hurt its profitability by cutting costs or adjusting pricing strategies.

Macroeconomic fluctuations, such as the European debt crisis and domestic inflation problems, have made financing more difficult, affecting BYD's business expansion. Policy changes, such as the cancellation of purchase tax incentives, may also lead to a slowdown in car sales growth, affecting BYD's market performance.

In terms of intellectual property, although BYD has taken measures to protect its trademarks, patents, etc., there is still a risk of infringement, which may have an adverse impact on the company's operations. Therefore, BYD needs to continue to pay attention to market and policy changes and strengthen technological innovation and intellectual property protection to cope with the changing market environment.

By analyzing BYD through the SWOT model, we can find that many factors can affect BYD's profitability and market value. In the analysis of strengths and weaknesses, the prominent and lacking aspects such as technological costs and battery technology will affect BYD's profitability and thus its market value. In the analysis of opportunities and threats, the social consumption environment, such as people's psychological factors, and macroeconomic fluctuations will also affect BYD's market value. So, in the selection of variables in the model later in the article, the above factors will be considered, and a more detailed analysis will be conducted.

BYD Financial Information

After qualitatively analyzing BYD's internal capabilities and external environment, this article will then conduct a quantitative analysis of BYD. Firstly, we will provide a brief summary of BYD's financial information and conduct a chart analysis of its market value and return on equity from 2011 to 2023, in order to explain why this article chooses BYD as the object of analysis.

According to BYD's 2023 annual report (Sina Finance. BYD, n.d.), BYD achieved revenue of 602.32 billion yuan in 2023, an increase of 42.0%; the net profit of returning to the parent company was 300.4 billion yuan, up 80.7% year-on-year; in terms of sales, the company's annual sales increased rapidly, and its performance reached a new high. In 2023, the cumulative sales volume of vehicles reached 3.024 million, an increase of 67.79% year-on-year. While consolidating and expanding the development advantages of the domestic market, the company actively accelerates the overseas layout, and has entered Japan, Germany, Australia, Brazil, the United Arab Emirates, and other countries and regions. The company's first overseas passenger car production base Thailand factory was officially laid in March 2023, and in July and December 2023, the company announced that it would set up a large production base complex in Brazil and build a world's leading new energy vehicle manufacturing base in Hungary.

According to the financial data of BYD in the past decade, seen in Figure 1 and Figure 2, from 2011 to 2023, the company's total market value increased from 66.621 billion to 849.97 billion, the return on equity (ROE) increased from 6.98% to 24.4%, the return on asset (ROA) increased from 2.335% to 5.12%, the earnings per share increased from 0.046 yuan to 10.320 yuan, and the number of employees increased from 177,624 to 703,504. The industry-leading ROE level means that it will attract more investors to buy its stocks, and the company's market value will increase. In its first year of listing, BYD's market value was less than 100 billion yuan, but as of the end of 2023, BYD's market value had exceeded 800 billion yuan. Over the past decade, its market value has increased by more than 10 times, and shareholder wealth has also been steadily increasing with BYD's rapid development. The ability to create corporate value has been proved by improving shareholder returns, driving employment, and enhancing the overseas influence of Chinese enterprises.

However, from Figure 3, BYD's Tobin Q value time trend, it can be found that since 2021, the long-term value of the company has been declining year by year. Tobin's Q value is the ratio of a company's stock market value to asset reset cost, which can be used to measure whether the market value of an asset is overvalued or undervalued. A decrease in Q value means that the company's value has been overvalued before, so it will show a process of decline. Now, the total market value of BYD is hovering around 700 billion yuan, and there is no more market value that once exceeded one trillion yuan in 2022. The growth of the company's market value has fallen into a downturn. What are the influencing factors and which ones are worth our attention? This article takes this as the starting point for research.

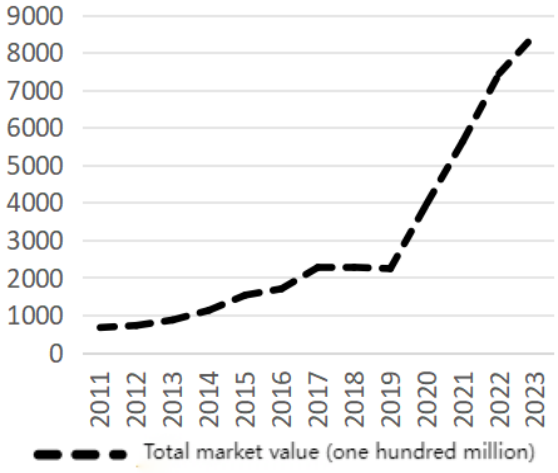

Figure 1. Market cap time trend chart.

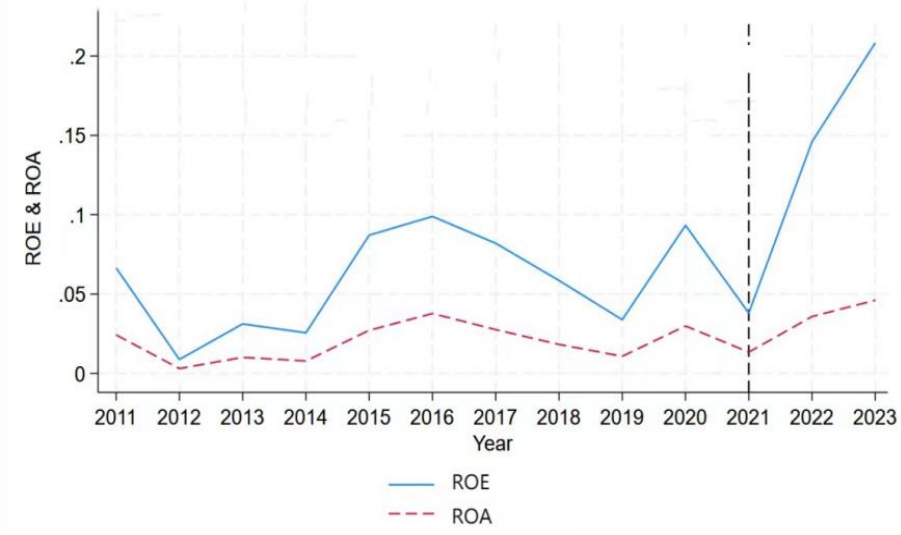

Figure 2. ROE & ROA time trend chart.

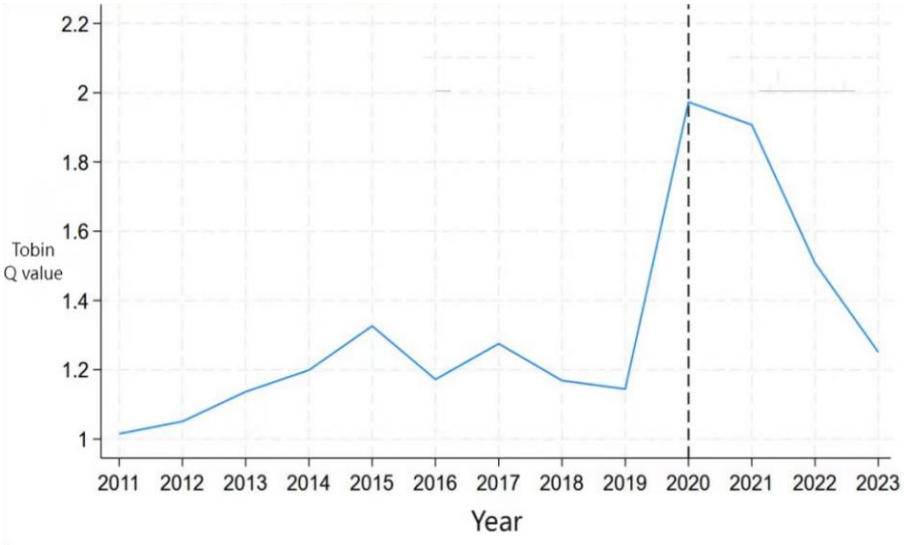

Figure 3. BYD Tobin Q time trend.

Analysis of Influencing Factors of BYD Valuation Model

Enterprise Fundamentals

In the fierce competition in the automobile market, profitability is directly related to the intrinsic value and market performance of new energy automobile enterprises. On one hand, higher R&D investment, technology upgrading, and market promotion all need profitability as support. Continuous improvement of profitability can not only enhance the short-term financial performance of enterprises, but also provide a solid foundation for their long-term strategic layout and sustainable development. In the capital market, those companies that show sustained profitability and growth potential are also more likely to gain investors' favor. In this way, the stock price of enterprises can be increased, and the market value of enterprises can be increased. On the other hand, high profitability can provide sufficient cash flow and profits to enhance the financial health of the enterprise. Sufficient cash flow and effective cash flow management can ensure the normal operation of various business

activities of enterprises, while the shortage of cash flow may limit the development potential of enterprises and even cause financial risks.

The comprehensive situation of listed companies obtained through financial data can reflect their investment value to a certain extent. However, there are many indicators that affect the investment value of listed companies, such as profitability, solvency, asset management ability, development ability, equity structure, etc. These factors are related to their investment value. It is impossible to include all evaluation indexes when establishing investment value evaluation model. If some indicators that have little influence on the investment value of the company or have large duplication of information are selected, the correlation between the factors in the evaluation system is strong, which is easy to lead to the distortion of the evaluation results. On the other hand, if only a few indicators are used subjectively, it is easy to cause the omission of some important indicators, which is likely to lead to one-sided investment decisions. Therefore, the selection of evaluation index is the key to correctly evaluate the investment value of listed companies. Han and Xie (2004) believe that corporate value is mainly determined by factors such as shareholder return ability, debt repayment ability, profitability and return ability, asset management ability, and growth ability. Therefore, 12 financial indicators are selected from various dimensions as the index system to evaluate the investment value of listed companies.

Investor Behavior and Psychology

In addition to the above factors related to corporate finance or fundamentals, the behavior of investors also plays a crucial role in the value of enterprises. Behavioral finance emphasizes the important role of human irrationality and psychological bias in investment decisions (Yi & Mao, 2009). Behavioral finance research shows that people show the following psychological characteristics in the investment process: (1) Overconfidence: Investors often overestimate their analytical ability and comprehensiveness of information, and then make overly optimistic investment decisions. (2) Loss aversion: Compared with the same amount of income, investors feel more strongly about loss, resulting in excessive risk aversion in decision-making or excessive risk appetite in the face of loss. (3) Herd effect: Investors are easily influenced by the behavior of other market participants, rather than making decisions based on sexual analysis. This behavior can lead to herding in the market and wild swings in asset prices. (4) Limited rationality: Investors have limited cognitive resources and ability to process information, and they cannot comprehensively analyze and understand all available information, so they can only make decisions based on part of the information. (5) Emotion-driven: The two emotions of fear and greed often rotate in the market, and extreme market sentiment often causes asset prices to deviate significantly from their fundamentals. Behavioral finance believes that investors' psychological and emotional factors are closely related. Emotion will affect the decision-making behavior of investors; especially when the emotion is very social, people's behavior will tend to be consistent under the role of social interaction mechanism, resulting in everyone making the same mistake, the phenomenon of market mispricing.

In addition, this paper takes the shareholding of institutional investors as a factor to examine. The majority of investors in China's stock market are retail investors. Due to information asymmetry and low market transparency, many investors are more inclined to short-term operation and frequent trading. Individual investors are easily affected by market news, policy changes, and social public opinion and other factors, resulting in irrational investment behavior. Therefore, the stock market of our country often shows a strong herd effect, leading to the deviation of stock value and its rise and fall sharply (Wen et al., 2014). Institutional

investors often have rich investment experience and professional knowledge and can also directly participate in and influence corporate governance through board seats or direct communication with management, so as to maintain the stability of corporate stock prices. The investment decision of institutional investors is also often regarded as an important signal of the market. If institutional investors significantly increase the shares of a company, it is usually interpreted by the market as an affirmation of the future development of the company, thus attracting more investors to follow up and buy, and improving the market recognition and valuation of the enterprise.

The Figure 4 plots the changes of China's Investor Sentiment Index (CICSI) (Chen & Yang, 2022) and China's A-share composite market index over the years. It can be found that the two are highly correlated in the trend and direction of volatility, which indirectly indicates that investor sentiment may affect the value of the stock market and enterprises.

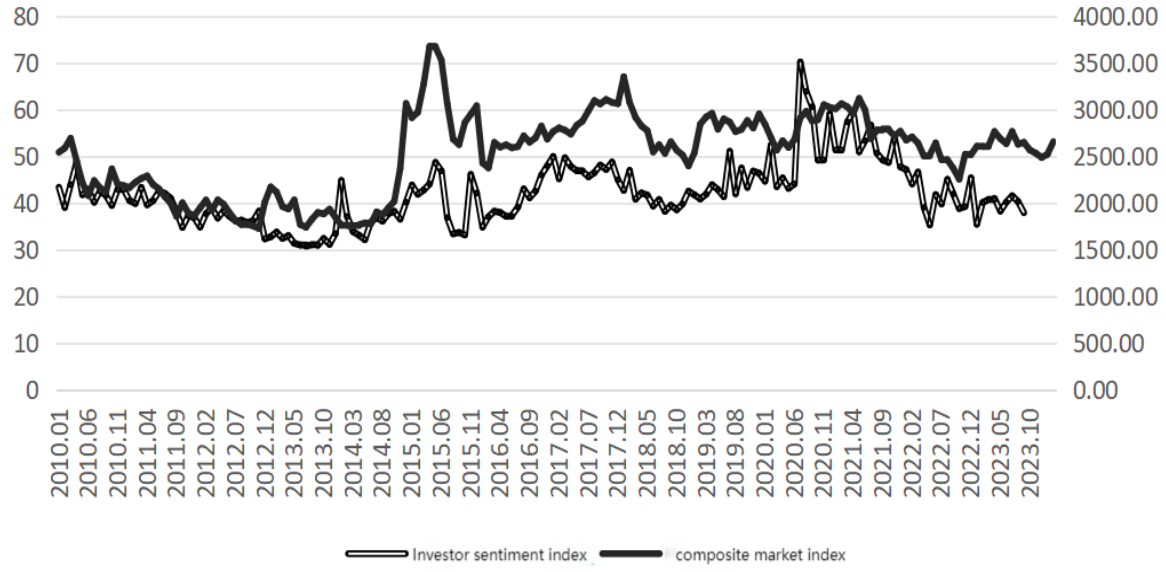

Figure 4. Investor sentiment index and composite market index.

Macroeconomic Policy Uncertainty

When making various investment behaviors, people will also predict the future economic policy in order to make the best decision to conform to the economic policy. Economic policy uncertainty (EPU), that is, the unpredictable part of economic policy changes, has caused great trouble for people's investment decisions. When the EPU rises, investors' ability to predict future economic policies is significantly weakened, and they are unable to make the best decision to comply with economic policies, so they usually delay or postpone investment decisions (Wang, 2021). This phenomenon has depressed asset prices and disrupted the normal order of asset markets. Asset market downturn has always been an important factor leading to financial crisis and economic recession. In recent years, the uncertainty facing the world has become increasingly prominent. In order to maintain economic and financial stability, more and more studies have begun to pay attention to the negative impact of EPU on asset prices. Numerous studies have shown that EPUs reduce stock prices and returns.

In this paper, the M2 year-on-year growth rate is also considered as a macroeconomic factor. M2 broad money supply includes cash in circulation, demand deposits, time deposits, and other highly liquid financial assets. Adequate M2 means that there is sufficient liquidity in the market, and companies can more easily obtain financing, maintain daily operations, and invest in expansion. In addition, sufficient money supply will push up asset prices and even trigger inflation, which can increase the value of corporate assets. Finally, when the money supply in the market is sufficient, investors may increase their investment in financial assets such as stocks, resulting in an increase in the market value of enterprises (Xing & Lai, 2011).

As can be seen from Figure 5, the following annual change chart of China's economic policy uncertainty index (EPU) and China's A-share composite market index, it shows a certain correlation in the volatility trend and direction. Economic policy uncertainty has a certain lag and predictability on the stock market. For example, the steep decline of economic policy uncertainty in 2015 preceded the plunge of China's stock market. This indirectly suggests that economic policy uncertainty can also affect the stock market and the enterprise value. See Figure 5.

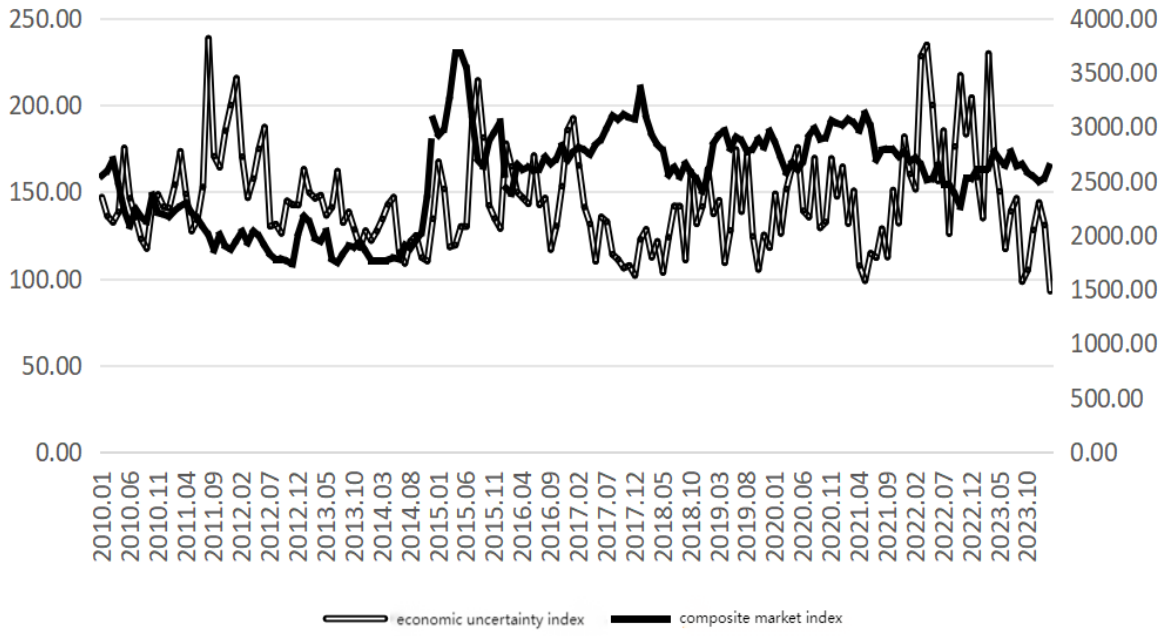

Figure 5. Economic uncertainty index and market index.

Preliminary Examination

Table 1 shows the correlation coefficient matrix of some variables in this article. From the perspective of correlation, it can be found that the market value of a company is related to financial indicators and is significantly positively correlated with the institutional investor shareholding ratio, investor sentiment index, and money supply (M2) examined in this article. It is also significantly negatively correlated with the economic policy uncertainty index. This preliminarily proves the hypothesis of this article and indicates that there is a statistically significant correlation between enterprise value and macro and investor psychological factors. Next, this article conducts further research through multiple regression analysis to explore the influencing factors of enterprise value.

Table 1

Correlation Coefficient Matrix

	Value	ROE	PE	Indep	CICSI	M2	EPUI
Value	1						
ROE	0.001**	1					
PE	-0.112***	-0.027***	1				
Indep	0.018***	-0.00200	0.028***	1			
CICSI	0.083***	-0.00300	-0.042***	0.032***	1		
M2	0.103***	-0.00200	0.133***	-0.00400	0.054***	1	
EPUI	-0.031***	-0.00200	-0.014***	0.00100	-0.171***	0.438***	1

Establishment of Enterprise Value Valuation Model

Sample Description

Based on the data of Shanghai and Shenzhen A-share listed companies from 2011 to 2023, this paper makes an in-depth analysis of the influencing factors of enterprise value. Data are from the CSMAR database and the Office for National Statistics. On this basis, the original data are processed as follows: Abnormal or seriously missing data are eliminated, and 1% and 99% indentation processing are carried out for continuous variables. Take the natural logarithm of variables such as market value, total assets, total compensation of the top three management, and number of employees, and divide the variables such as economic policy uncertainty index and accounts receivable turnover by 100. The purpose of the above processing is to unify the dimension and increase the stability of the data. Finally, 28,776 valid samples were obtained. The software used is Stata 18.0.

Model Setting

$$\mathrm{Value}_{it} = \alpha_0 + \alpha_{i,1}\mathrm{X}_{i,t} + \alpha_2\mathrm{INST}_{i,t} + \alpha_3\mathrm{M2}_t + \alpha_4\mathrm{EPU}_t + \alpha_5\mathrm{CICSI}_t + \mathrm{IND}_i + \mathrm{PRO}_t + \varepsilon_{it}$$

Definition and Description of Variables

Explained variable: The explained variable is enterprise value (Value_{it}), which is measured by the current stock closing price multiplied by the number of outstanding shares.

Explanatory variables: $\mathrm{X}_{i,t}$ represents control variables at the fundamental level of the enterprise, respectively, are net profit margin on net assets: an indicator that measures the efficiency of a company's asset operations, that is, to determine how much money a company can earn. The formula is: net profit/net assets. The higher the index, the higher the utilization efficiency of the company's assets and the stronger the profitability. Accounts receivable turnover: measures how efficiently a company converts accounts receivable into cash during a given period of time. The formula is: operating income/average accounts receivable. The higher the index, the faster the company can recover accounts receivable and the better the liquidity of funds. Current assets ratio: A measure of a company's current assets as a percentage of its total assets. The formula is current assets/total assets. The higher the current asset ratio, the stronger the short-term solvency of the company. Earnings per share: The net profit earned by a company per share. The formula is: net profit/number of outstanding shares. EPS (earning per share) is one of the important indicators to evaluate the profitability of a company. Number of employees: refers to the total number of people currently employed by the company. The number of employees can reflect the size and labor intensity of the company. Price-earnings ratio: The price-earnings ratio is the ratio of a company's current stock price to its earnings per share. The formula is: market price/earnings per share. The P/E

ratio is often used to compare whether stocks at different prices are overvalued or undervalued. Total assets: The total amount of all assets owned by a company, including tangible and intangible assets, is a key factor in determining the market value of a company. Nature of property rights: refers to the ownership structure of the company, such as state-owned, collectively owned, private or foreign capital. The nature of property rights will affect the business decisions and the scope of application of policies, and thus affect the value of enterprises. Proportion of independent directors: This refers to the proportion of directors on a company's board. The existence of independent directors helps to improve the objectivity and transparency of corporate decision-making. Dual roles: This refers to whether the CEO of a company also serves as the chairman of the board. Such arrangements may affect the corporate governance structure and management efficiency. Total top three executive compensation: This refers to the total compensation of the top three highest-paid executives in the company. This data can reveal the level of investment companies which are making in attracting and retaining talent. Profit share of financial activities: refers to the proportion of profits obtained from financial activities in the total profit of the company. (Financial activity profit ratio = (investment income + fair value change income + exchange income) / (total profit).)

In addition, taking into account macroeconomic factors and investor behavior and psychological factors, this paper also controls the institutional investor shareholding ratio (INST): refers to the proportion of institutional investors holding company shares, indicating the degree of institutional investors' optimism and recognition of the company. M2 year-on-year growth rate: The broad money growth rate reflects changes in China's economic activity and monetary policy. Economic policy uncertainty index (EPU): The EPU index constructed by Baker et al. based on the news index such as the South China Morning Post has been widely recognized (Baker, Bloom, & Davis, 2016). This paper adopts this index to measure the economic policy uncertainty in China by weighted average of the monthly economic policy uncertainty index. Investor sentiment index (CICSI): The Chinese Stock Market Investor Sentiment Index (CICSI) has been published on a monthly basis since February 2003. In this paper, the weighted average of the monthly investor sentiment index is used to measure the annual investor sentiment, and represent industry fixed effect and province fixed effect respectively.

The Table 2 is the descriptive statistics of variables, which describes the sample size, mean value, standard deviation, minimum value, median value, and maximum value of each indicator of the selected sample. The value size accords with the actual economic significance, indicating that the selected data are correct.

Table 2

Descriptive Statistics of Variables

VarName	Obs	Mean	SD	Min	Median	Max
Value	28,776	22.8763	1.214	19.99	22.70	30.73
ROE	28,776	0.0506	0.041	0.00	0.04	0.21
Recei	28,776	0.3864	1.502	0.01	0.05	12.40
Liquidity	28,776	0.5744	0.202	0.09	0.59	0.95
EPS	28,776	0.5399	0.631	0.01	0.34	3.76
Employee	28,776	7.7036	1.248	4.74	7.62	11.22
PE	28,776	78.3220	136.500	4.78	36.26	964.50
Size	28,776	22.2980	1.317	19.95	22.10	26.44
SOE	28,776	0.3500	0.477	0.00	0.00	1.00
INST	28,776	0.4442	0.248	0.00	0.46	0.92

Table 2 to be continued

Salary	28,776	14.6036	0.706	12.94	14.57	16.56
Dual	28,776	0.2836	0.451	0.00	0.00	1.00
FIN	28,776	0.2413	0.653	-0.46	0.04	4.59
Indep	28,776	0.3753	0.053	0.33	0.36	0.57
CICSI	28,776	43.0456	5.984	32.12	41.24	52.71
M2	22,450	8.6867	5.626	1.50	8.60	21.40
EPUI	28,776	1.4606	0.180	1.25	1.41	1.85

Regression Results

This paper adopts the stepwise regression method. Firstly, the financial and fundamental factors of enterprises are added to the regression equation, and then macroeconomic variables, investor behavior, and psychological variables are added respectively to investigate the changes in the regression equation after adding the corresponding variables.

Fundamentals and macroeconomic variables. Taking M2 year-on-year growth rate and economic policy uncertainty index as macroeconomic variables, although economic policy uncertainty affects investor behavior, the change of macroeconomic environment is still the source of transmission.

From Table 3, Column (1) represents the regression results considering only the fundamentals of the firm, (2) adds the macroeconomic variable M2 supply and economic policy uncertainty index, but does not control the industry and province, (3) adds the fixed effect of industry and province on the basis of (2) regression. The fitting r2 values of the model are 0.894, 0.903, and 0.923, respectively.

The fitting value gradually increases, which indicates that after adding macroeconomic variables and controlling variables such as industry and province, the fitting accuracy of the model is improved compared with only considering enterprise fundamental information. M2 supply has a significant positive impact on enterprise value at 1%, while economic policy uncertainty has a significant negative impact on enterprise value at 1%. The regression results prove that the study of the factors affecting enterprise value needs to consider the variables at the macroeconomic level. The increase of M2 year-on-year growth rate will increase the overall value of enterprises, while the increase of economic policy uncertainty will decrease the value of enterprises.

Table 3

Fundamentals and Macroeconomic Variables

	(1)	(2)	(3)
	Value	Value	Value
ROE	5.190***	5.009***	4.947***
	(46.91)	(38.22)	(43.05)
Recei	-0.00145	-0.00155	0.00273
	(-0.85)	(-0.91)	(1.63)
Liquidity	0.0120	-0.0149	-0.00653
	(0.90)	(-1.00)	(-0.44)
EPS	-0.0125*	-0.0168	-0.0302***
	(-1.65)	(-1.63)	(-3.47)
Employee	0.0152***	0.0139***	0.0157***
	(5.81)	(5.06)	(4.49)

Table 3 to be continued

PE	0.00131***	0.00113***	0.00105***
	(40.19)	(34.34)	(33.68)
Size	0.875***	0.860***	0.854***
	(272.19)	(238.24)	(222.27)
SOE	0.0113**	0.0308***	0.0361***
	(2.16)	(5.53)	(6.40)
Salary	0.0683***	0.0770***	0.0524***
	(17.50)	(17.64)	(12.34)
Dual	0.0174***	0.0132**	0.00414
	(3.28)	(2.33)	(0.75)
FIN	-0.0339***	-0.0224***	-0.0213***
	(-8.41)	(-5.44)	(-5.36)
Indep	0.284***	0.341***	0.210***
	(6.15)	(6.91)	(4.61)
M2		0.0230***	0.0232***
		(47.34)	(52.08)
EPUI		-0.356***	-0.380***
		(-16.39)	(-19.28)
_cons	1.777***	2.320***	3.063***
	(25.09)	(25.44)	(31.73)
N	28776	22450	22450
r2	0.894	0.903	0.923
IND	No	No	Yes
PRO	No	No	Yes

Fundamentals and investor behavior variables. The shareholding of institutional investors and investor sentiment are included in the regression model as variables of investor behavior, and the changes of the model after addition are investigated.

From Table 4, Column (4) represents the regression results that only consider the fundamentals of the enterprise, (5) add investor behavior and psychological variables: institutional investor shareholding and investor sentiment index, but do not control the industry and province, (6) add the fixed effect of industry and province on the basis of (5) regression. The fitting values r2 of the model are 0.894, 0.896, and 0.914, respectively, and the fitting values gradually increase, which indicates that the fitting accuracy of the model is improved when investor behavior and psychological variables are added and variables such as industry and province are controlled. At the level of 1%, institutional investor shareholding has a significant positive impact on enterprise value, and investor sentiment index has a significant positive impact on enterprise value at the level of 1%. The regression results prove that the investigation of the factors affecting enterprise value needs to consider investor behavior and psychological variables. The increase of institutional investors' shareholding will enhance the overall value of enterprises, and the improvement of investor sentiment index will increase the value of enterprises. When market sentiment is optimistic, investors may overestimate future cash flows, driving asset prices higher than their true value. On the contrary, when the market sentiment is pessimistic, investors may

underestimate the future cash flow, resulting in asset prices lower than their true value, which is the true embodiment of emotion-driven in behavioral finance theory.

Table 4

Fundamentals and Investor Behavior Variables

	(4)	(5)	(6)
	Value	Value	Value
ROE	5.190***	5.039***	4.935***
	(46.91)	(45.75)	(48.64)
Recei	-0.00145	-0.00129	0.00219
	(-0.85)	(-0.76)	(1.33)
Liquidity	0.0120	0.0188	-0.0304**
	(0.90)	(1.41)	(-2.16)
EPS	-0.0125*	-0.0158**	-0.0212***
	(-1.65)	(-2.07)	(-3.11)
Employee	0.0152***	0.0164***	0.0161***
	(5.81)	(6.35)	(4.89)
PE	0.00131***	0.00129***	0.00120***
	(40.19)	(40.20)	(39.21)
Size	0.875***	0.861***	0.859***
	(272.19)	(262.01)	(236.05)
SOE	0.0113**	-0.0176***	-0.0152***
	(2.16)	(-3.21)	(-2.74)
Salary	0.0683***	0.0549***	0.0262***
	(17.50)	(13.52)	(6.61)
Dual	0.0174***	0.0211***	0.0100*
	(3.28)	(4.01)	(1.96)
FIN	-0.0339***	-0.0317***	-0.0323***
	(-8.41)	(-7.94)	(-8.14)
Indep	0.284***	0.306***	0.161***
	(6.15)	(6.65)	(3.76)
INST		0.209***	0.248***
		(19.01)	(23.08)
CICSI		0.00526***	0.00669***
		(12.16)	(18.07)
_cons	1.777***	1.962***	2.666***
	(25.09)	(27.68)	(33.09)
N	28776	28776	28776
r2	0.894	0.896	0.914
IND	No	No	Yes
PRO	No	No	Yes

Fundamentals, macroeconomic variables and investor behavior variables. Institutional investor shareholding and investor sentiment are taken as investor behavior variables, and M2 supply and economic policy uncertainty indicators are taken as macroeconomic variables, and the changes of the model after inclusion are investigated.

From Table 5, Column (7) represents the regression results that only consider the fundamentals of the firm, (8) add macroeconomic variables, investor behavior, and psychological variables at the same time, but do not control the industry and province, (9) add the fixed effect of industry and province on the basis of (8) regression. The fitting r2 values of the model are 0.894, 0.904, and 0.925, respectively. After adding all macroeconomic variables, investor behavior and psychological variables, and controlling industry and province, the model has the highest fitting accuracy and the strongest explanatory power for enterprise value. Indicators such as institutional investor stock ownership, investor sentiment index, economic policy uncertainty index, M2 year-on-year growth rate are still significant at 1% significance level.

Table 5

Fundamentals, Macroeconomic Variables and Investor Behavior Variables

	(7)	(8)	(9)
	Value	Value	Value
ROE	5.190***	4.863***	4.804***
	(46.91)	(37.26)	(42.17)
Recei	-0.00145	-0.00194	0.00295*
	(-0.85)	(-1.14)	(1.77)
Liquidity	0.0120	-0.00919	-0.00990
	(0.90)	(-0.61)	(-0.67)
EPS	-0.0125*	-0.0190*	-0.0333***
	(-1.65)	(-1.82)	(-3.87)
Employee	0.0152***	0.0134***	0.0160***
	(5.81)	(4.91)	(4.58)
PE	0.00131***	0.00111***	0.00102***
	(40.19)	(34.25)	(33.58)
Size	0.875***	0.847***	0.839***
	(272.19)	(229.63)	(215.89)
SOE	0.0113**	0.00270	0.00499
	(2.16)	(0.46)	(0.85)
Salary	0.0683***	0.0710***	0.0402***
	(17.50)	(15.70)	(9.35)
Dual	0.0174***	0.0186***	0.00851
	(3.28)	(3.29)	(1.57)
FIN	-0.0339***	-0.0203***	-0.0190***
	(-8.41)	(-4.96)	(-4.81)
Indep	0.284***	0.370***	0.230***
	(6.15)	(7.52)	(5.09)
M2		0.0230***	0.0231***
		(47.59)	(52.15)
INST		0.199***	0.238***
		(16.81)	(20.89)
CICSI		0.00242***	0.00422***
		(4.64)	(9.76)

Table 5 to be continued

EPUI		-0.378***	-0.404***
		(-17.39)	(-20.53)
_cons	1.777***	2.538***	3.347***
	(25.09)	(27.85)	(35.06)
N	28776	22450	22450
r2	0.894	0.904	0.925
IND	No	No	Yes
PRO	No	No	Yes

Summary

In the financial market, the evaluation of enterprise value is one of the core issues of concern to investors and researchers. To gain a more thorough understanding of this complex phenomenon, this paper conducted a study that builds a comprehensive enterprise value valuation model based on detailed data of Shanghai and Shenzhen A-share listed companies from 2011 to 2023. This model not only covers the fundamental factors of the enterprise, but also considers the macroeconomic environment effects, as well as the investor behavior effects. Through rigorous statistical analysis, we found that the fitting accuracy of the model was significantly improved, which indicates that our model is able to more accurately predict and explain the changes in enterprise value. Specifically, the research results show that the M2 money supply is positively correlated with enterprise value. This may be because an increase in the money supply usually stimulates economic activity and improves companies' ability to acquire funds and investment opportunities, thus increasing their market value. On the other hand, the uncertainty in economic policy has a negative impact on corporate value. In the uncertain policy environment, enterprises' investment decisions and operational activities may be suppressed, leading to a decline in their value. This finding underscores the importance of policy stability and predictability for business operations. In addition, we also found that institutional investor shareholding ratio and investor sentiment have a significant impact on corporate value. Institutional investors usually have more professional analytical skills and stronger risk tolerance, and their increased shareholding ratio may increase the market's evaluation of enterprise value. At the same time, investor sentiment, such as overly optimism or pessimism, can also affect market pricing, thus affecting corporate value.

These findings provide a new perspective for understanding the influencing factors of enterprise value, emphasizing the importance of the macroeconomic environment and investor behavior in enterprise value assessment. For investors, this means that in addition to focusing on the fundamentals of companies, they need to consider the broader economic environment and market sentiment when making investment decisions. For policy makers, this suggests that they need to pay more attention to policy transparency and stability in order to reduce the adverse impact on corporate value.

Model Examination

This part examines the role of the multivariate linear model established above in enterprise valuation. From the model established and the regression results, the fitting value r2 of the model reaches 0.925, indicating that the model has a high degree of fitting, which has certain practical significance for predicting the market value of enterprises. Now, we will further exam this model. On one hand, this paper compares the valuation of BYD with the actual value to verify the predictive ability of the model. One the other hand, this paper collected the financial

fundamental data of BYD (0002594.SZ) from 2011 to 2023, as well as macroeconomic variables and investor sentiment variables of corresponding years, and brought them into the model to compare the estimated ranking and actual ranking to further verify the accuracy of the model.

BYD Market Value Valuation

From Table 6, the analysis shows that the valuation trend of BYD Company (0002594.SZ) between 2011 and 2023 is consistent with the actual market value, and the valuation value is roughly consistent. Therefore, we are reasonable to make a reasonable assessment of the company's market value based on this. The correctness of the model has been further proven.

Table 6

Financial Fundamentals Data, Macroeconomic Variables and Investor Sentiment Variables for the Corresponding Year, and Model Results

Stock abbreviation	Stock code	Year	Province	City	Industry name	Whether it is a state-owned enterprise	Total market value	Current ratio
BYD	0002594	2011	Guangdong	Shenzhen	Other manufacturing industries	No	66.621 billion	0.326
BYD	0002594	2012	Guangdong	Shenzhen	Automotive industry	No	72.188 billion	0.319
BYD	0002594	2013	Guangdong	Shenzhen	Automotive industry	No	86.815 billion	0.370
BYD	0002594	2014	Guangdong	Shenzhen	Automotive industry	No	112.707 billion	0.433
BYD	0002594	2015	Guangdong	Shenzhen	Automotive industry	No	153.163 billion	0.471
BYD	0002594	2016	Guangdong	Shenzhen	Automotive industry	No	170.032 billion	0.539
BYD	0002594	2017	Guangdong	Shenzhen	Automotive industry	No	227.130 billion	0.577
BYD	0002594	2018	Guangdong	Shenzhen	Automotive industry	No	227.412 billion	0.592
BYD	0002594	2019	Guangdong	Shenzhen	Automotive industry	No	223.866 billion	0.547
BYD	0002594	2020	Guangdong	Shenzhen	Automotive industry	No	396.609 billion	0.555
BYD	0002594	2021	Guangdong	Shenzhen	Automotive industry	No	564.113 billion	0.562
BYD	0002594	2022	Guangdong	Shenzhen	Automotive industry	No	744.601 billion	0.488
BYD	0002594	2023	Guangdong	Shenzhen	Automotive industry	No	849.970 billion	0.445

Year	Financial activity profit ratio	ROE	Accounts receivable turnover rate	P/E ratio	Total assets	Earnings per share	Executive compensation
2011	0.292	0.024	0.089	33.649	24.907	0.678	16.50
2012	-0.146	0.003	0.075	225.027	24.953	0.090	16.11
2013	-0.058	0.010	0.069	114.327	25.059	0.330	16.47
2014	0.078	0.008	0.042	127.670	25.267	0.299	16.44
2015	0.324	0.027	0.037	50.811	25.472	1.267	16.43
2016	-0.113	0.038	0.025	24.732	25.700	2.009	16.58
2017	-0.058	0.028	0.020	36.093	25.906	1.802	16.63

Table 6 to be continued

2018	0.055	0.018	0.026	39.125	25.994	1.304	16.63
2019	-0.329	0.011	0.029	61.378	26.000	0.777	16.63
2020	-0.047	0.030	0.038	88.141	26.027	2.204	16.63
2021	-0.002	0.013	0.060	196.744	26.413	1.363	16.63
2022	-0.032	0.036	0.109	42.233	26.926	4.100	16.63
2023	0.051	0.046	0.097	18.390	27.124	4.100	16.63

Year	Executive compensation	Duality	The proportion of independent directors	Employee	EPU	Investors sentiment
2011	16.50	Yes	0.5	177,624	1.66	39.82
2012	16.11	Yes	0.5	166,411	1.56	36.69
2013	16.47	Yes	0.5	159,440	1.41	32.12
2014	16.44	Yes	0.5	187,028	1.25	37.00
2015	16.43	Yes	0.5	196,026	1.51	41.24
2016	16.58	Yes	0.5	193,842	1.52	40.31
2017	16.63	Yes	0.5	200,949	1.29	47.41
2018	16.63	Yes	0.5	220,152	1.28	41.21
2019	16.63	Yes	0.5	229,154	1.37	44.27
2020	16.63	Yes	0.5	224,280	1.49	52.25
2021	16.63	Yes	0.5	288,186	1.32	52.71
2022	16.63	Yes	0.5	570,060	1.85	42.14
2023	16.63	Yes	0.5	703,504	1.44	39.63

Year	Investor shareholding ratio	M2 growth rate	Estimated value (logarithmic)	Actual value (logarithm)
2011	0.42	17.32	25.02	24.922284
2012	0.43	14.39	25.19	25.002536
2013	0.43	13.59	25.16	25.187043
2014	0.46	11.01	25.37	25.448056
2015	0.47	13.34	25.48	25.754768
2016	0.49	11.33	25.67	25.859255
2017	0.49	8.11	25.87	26.14879
2018	0.51	6.99	25.90	26.150032
2019	0.49	8.88	25.95	26.134316
2020	0.48	10.01	26.04	26.706217
2021	0.52	9.08	26.50	27.058521
2022	0.52	11.66	26.66	27.336115
2023	0.51	9.70	26.87	27.468467

Further Examination

After that, the paper also randomly selected 14 listed companies in different industries in 2023 and compared the market value rankings to further verify the prediction accuracy of the model. The following are the selected companies, market capitalization and ranking.

From Table 7, it can be found that the model valuation ranking is highly similar to the actual value ranking, which verifies the accuracy of the model.

Based on this, we can estimate the value of the enterprise and determine whether the stock price is overvalued or undervalued. If the estimated value of a firm is larger than the actual value, the stock price is undervalued. And, if the estimated value of a firm is smaller than the actual value, the stock price is overvalued. By comparing real values to model valuations, investors can make more informed investment decisions to find undervalued stocks or avoid overvalued ones.

Table 7

Market Capitalization Ranking of Listed Companies

Actual value ranking	Enterprise abbreviation and code	Industry name	Actual value (logarithmic)	Model valuation (logarithmic)	Model valuation ranking
1	Tiger Medicine 300347	Hygiene	25.28692	24.72758	1
2	Shenzhenye A000006	Real Estate	23.442601	23.74241	2
3	Longpan Technology 603906	Manufacturing of Chemical Raw Materials and Chemical Products	23.240081	22.40121	10
4	Anhui Wei High-Tech 600063	Chemical Fiber Manufacturing	23.213809	23.45387	3
5	Bear Electric 002959	Electrical Machinery & Equipment Manufacturing Industry	23.154101	22.78577	7
6	Kunming Pharmaceutical Group 600422	Pharmaceutical Manufacturing	23.033656	23.4073	4
7	Yuanda Environmental Protection 600292	Ecological Protection and Environmental Governance Industry	22.987991	23.28047	5
8	Fei Rongda 300602, China	Manufacturing of Computers, Communications and Other Electronic Equipment	22.951774	22.8495	6
9	One Network One Creation 300792	Internet and Related Services	22.816143	22.60449	8
10	*ST Sha Gong 600815	Special Equipment Manufacturing	22.523156	22.43039	9
11	Huatai, Yanggu 300121	Manufacturing of Chemical Raw Materials and Chemical Products	22.337597	22.08786	11
12	Huijin Technology 300561, China	For Services to Software and Information Technology	21.677176	21.40274	13
13	Megaloong Interconnect 300913	Manufacturing of Electrical Machinery and Equipment	21.281797	21.48628	12
14	Ruixin Technology 300828	Metal Products industry	21.06635	21.2368	14

Conclusion

The results of SWOT analysis show that BYD's advantages lie in its unique technology and innovative and diversified strategy, which enables it to maintain its leading position in the industry, while its disadvantages are mainly reflected in technological innovation, brand building, and cost control. The opportunities BYD faces are macro environmental factors such as national strategic support and favorable policies, while the threats it faces mainly come from competitors and macroeconomic changes.

Combined with the results of SWOT analysis, a multiple regression model is established by selecting three influencing factors: corporate fundamentals, investor behavior and psychology, and macroeconomic policy uncertainty. The results of gradual regression show that the increase of institutional investors'

shareholding ratio, the increase of investor sentiment index, and the increase of M2 year-on-year growth rate will increase the overall value of enterprises. The increase of economic policy uncertainty will cause the value of enterprises to decline. It is proved that in addition to the fundamental factors of enterprises, the macroeconomic environment and investor behavior have an important impact on the value of enterprises. By stepwise regression method, the goodness of fit of the model reaches 0.925, showing strong explanatory and predictive power. For the model examination, the accuracy of the model is verified by comparing the actual market value of BYD from 2011 to 2023 with the predicted value of the valuation model. Furthermore, this paper verifies the validity of the model in enterprise value estimation by comparing the market value rankings of different enterprises. For the application of this model, we can estimate the enterprise value and through comparing with actual market value, we can also determine whether the stock price is overvalued or undervalued.

Limitations

This study has some inherent limitations when evaluating the corporate value of BYD. First, despite the use of a variety of quantitative and qualitative methods, rapid changes in market conditions can cause some of our forecasts to deviate from actual market performance. In addition, the research focuses primarily on the Chinese market and may not adequately consider the potential impact of global market dynamics on BYD's corporate value. Future studies can overcome these limitations by broadening the sample size, considering broader market conditions, and including an international perspective.

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