

The Application of Discounted Cash Flow Model in Company Valuation

—Taking Gree Electric Appliances as an Example

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Abstract: With the rapid development of the economy and the significant improvement of people's income level, the demand for investment is also becoming increasingly strong. Choosing a scientific valuation model is beneficial to reduce investment risks for investors. Gree Electric Appliances is a well-known household appliance company in the world. Although its growth is currently sluggish, it has stable and sustainable operating capabilities and good operating conditions, can generate a large amount of cash flow, and has a high dividend yield. This paper uses the discounted cash flow model to value the company. Selected financial data of Gree Electric for the years 2018 to 2022 and the company's intrinsic value and share price are assessed based on its annual free cash flow. The expected research results indicate that the valuation model, as a judgmental tool, can help investors to assess the investment value and potential risks of Gree Electric, thus providing data support and expected reference for making investment decisions on Gree Electric's shares.

Keywords: Company valuation, discounted cash flow model, Gree Electric, Capital Asset Pricing Model (CAPM).

1. Introduction

Gree Electric Appliances is a leading home appliance manufacturer in China, renowned for its superior air-conditioning products and technological innovations. As one of the world's largest air-conditioner manufacturers, Gree not only dominates the domestic market, but its brand influence and high-quality products have also won the favour of consumers worldwide. The company's continuous technological innovation, strict quality control and globalised strategic layout have made it a leader in the home appliance industry, and has demonstrated strong potential for diversified development in the fields of smart manufacturing, smart home and new energy [1]. This paper will explore how the DCF model can be used to value a company using Gree Electric as an example, the research will focus on how to determine the market value of a company, which usually involves forecasting the future cash flows of a company and discounting them to their present value. The discounted cash flow model was chosen to value the company because it provides a quantitative assessment that reflects the long-term profitability potential of a company based on projections of its future cash flows. The

discounted cash flow model allows investors to analyse in-depth the financial health and growth prospects of a company, taking into account the value of time and risk factors, thus providing a solid basis for investment decisions and strategic planning.

2. Market Analysis of GREE

Gree Electric, as a leading company in the home appliance industry, is facing unprecedented development opportunities against the backdrop of global economic integration and digital transformation. With the rapid economic growth and urbanisation in developing countries, especially in Asia and Africa, Gree Electric is expected to meet the growing market demand through its high-quality and intelligent home appliances. Meanwhile, benefiting from governments' supportive policies for technological innovation and market expansion, Gree Electric can further consolidate its market position, and the home appliance industry is gradually realising digital transformation with the development of technologies such as 5G, big data and artificial intelligence. Consumers' demand for products has upgraded from basic functions to high quality and intelligence, bringing new growth points for Gree Electric. In summary, driven by market demand, policy support and digital transformation, Gree Electric presents good development prospects and market potential [2-3].

3. Discounted Cash Flow Model

Company valuation methods fall into two main categories: relative valuation methods and absolute valuation methods. The relative valuation method is simple to calculate, intuitive and easy to use, but it cannot accurately assess the long-term growth potential and intrinsic value of an enterprise. The discounted cash flow method is a type of absolute valuation method who analyses the internal and external value of a company by forecasting its future free cash flows. The core principle of the discounted cash flow model is that the value of a firm is equal to the sum of the present values of its expected future cash flows, a principle that captures the time value of a firm's profitability and the cost of capital. The parts of the discounted cash flow model can be specified as follows [4-5].

3.1. Cash Flow Discounting

$$\text{Cash Flow}_i \div (1+r)^i \quad (1)$$

where Cash Flow_i represents the firm's free cash flow in year i . r is the discount rate, which is usually calculated using the weighted average cost of capital (WACC) as the discount rate. $(1+r)^i$ is the discount factor for time, which represents the discounting of the cash flows in year i to their current value.

3.2. Terminal Value

$$\text{Cash Flow}_{\text{Terminal State}} \div (r - g) \quad (2)$$

$\text{Cash Flow}_{\text{Terminal State}}$ is the cash flow in the final year of the forecast, and it is usually assumed that the business will enter a phase of steady growth after the forecast period. g represents the growth rate of free cash flow during the forecast period.

3.3. Weighted Average Cost of Capital (WACC)

$$r = \text{WACC} = E \div (D+E) \times C_e + D \div (D+E) \times C_d \times (1-T) \quad (3)$$

C_e is the cost of equity, which represents shareholders' expected rate of return on their investment. C_d is the cost of debt, which is the interest paid by the firm on its debt. T is the tax rate, which is used to calculate the after-tax cost of debt. E and D represent the equity and debt portions of a firm's market

value, respectively. WACC is the average cost of financing a firm, which captures the risks and costs of a firm's capital structure.

3.4. Capital Asset Pricing Model (CAPM)

The cost of equity (C_e) is usually estimated using the capital asset pricing model.

$$C_e = R_f + \beta \times (R_f - R_m) \quad (4)$$

C_e is the cost of equity, or the required rate of return on equity. R_f is the risk-free rate. β is a measure of the systematic risk of a stock relative to the market, reflecting the volatility of stock returns relative to the returns of the market as a whole. R_m is the market rate of return, usually estimated using the expected return of a broad market index. $(R_f - R_m)$ is the market risk premium, which is the additional return an investor expects to receive for taking on market risk. The cost of equity C_e calculated through the capital asset pricing model can be used as a key input variable in the discounted cash flow model to determine the weighted average cost of capital.

4. Relevant Data Forecasts

4.1. Forecast of Sales Revenue Growth Rate

With the gradual recovery of the global economy and the continuous growth of the domestic consumer market, Gree Electric Appliances, China's leading home appliance manufacturer, has achieved notable performance. The company has achieved remarkable growth in a number of areas, including air conditioners, household appliances and smart equipment. In 2022, Gree Electric's operating revenue was 1890 billion yuan, an increase of 0.6% year-on-year, net profit attributable to shareholders of listed companies was 245 billion yuan, an increase of 6.26% year-on-year, and basic earnings per share was 4.43 yuan, an increase of 9.65% year-on-year, providing the company with a stable cash flow. Gree Electric has been increasing its investment in technological innovation and product diversification, especially in research and development in the fields of smart home and new energy, which is expected to bring new growth points for the company. The company currently owns a number of core technology patents and has established a relatively complete sales and service network worldwide. The company is expected to enter a growth phase in the next five years, with an overall growth rate of 5%, and then stabilise as the market matures [6-7].

4.2. Forecasts of Discount Rates

The discount rate is the rate at which expected earnings over a period of time in the future are discounted to their present value in the year in which they currently reside, and is calculated using the weighted average cost of capital (WACC) : $r = WACC = E \div (D + E) \times C_e + D \div (D + E) \times C_d \times (1 - T)$

The cost of equity (C_e) is calculated using the capital asset pricing model: $C_e = R_f + \beta \times (R_f - R_m)$ R_f is the risk-free rate of return, which is expressed by using the 10-year treasury rate of 2.8% in 2022; R_m is the average risk-required rate of return, and by choosing the long-term return on investment of Gree Electric Appliances, the long-term return on investment is evaluated to be about 10%. β coefficient reflects the reflection of the individual stock's fluctuation in accordance with the price fluctuation of the whole stock market, which expresses the volatility of a certain enterprise to the whole industry, and is evaluated to be 0.88 according to the database.

From the above information, you can calculate the firm's cost of equity capital $C_e = 9.14\%$. The cost of debt is chosen to be 4.35% for the 2022 bank loan benchmark rate and 12.75% for the income tax rate. From the data of Gree Electric's 2022 annual report, the total assets are 3550.3 billion yuan,

the total debts in 2022 are 2531.5 billion yuan, and the total equity is 1018.8 billion yuan, resulting in a weighted average cost of capital (WACC) of 5.26%.

4.3. Forecasts of Terminal Values

The growth rate g should use the GDP growth rate when calculating the terminal value. According to the National Bureau of Statistics of China, the GDP growth rate in 2022 is 3%.

4.4. Forecasting Enterprise Value

Table shows that the enterprise value of Gree Electric is 8034 billion yuan calculated according to the two-stage model, minus the debt value of 2531.5 billion yuan, resulting in an equity value of 5502.5 billion yuan. 30 December 2022, the total number of Gree Electric's shares is 56.3 billion, which calculates the value of each share as 97 yuan, and the enquiry of 30 December 2022 Gree Electric's per share price is 32.32 yuan, which is lower than the stock value, indicating that the current share price is undervalued.

Table 1: Gree Electric DCF model calculations (Unit: billions of yuan)

	2023	2024	2025	2026	2027
Free cash flow	233.4	245.1	257.3	270.2	283.7
Cost of capital (per cent)	5.26	5.26	5.26	5.26	5.26
Present value of growth period	221.7	232.9	244.4	256.7	269.5
enterprise value	8034				

5. Case Studies

Table 2 shows the annual cash flow from operating activities for Greeley. Overall, it is 269.4 billion yuan in 2018, rises to 278.9 billion yuan in 2019 with little change, then falls to 192.4 billion yuan in 2020, drops sharply to 18.9 billion yuan in 2021, but recovers sharply to 286.6 billion yuan in 2022. This suggests that the company faces greater cash flow pressure in 2021, but recovers and improves in 2022.

Table 2: Gree Electric Free Cash Flow Calculator (Unit: billions of yuan)

Year	2018	2019	2020	2021	2022
Net cash flows from operating activities	269.4	278.9	192.4	18.9	286.6
Capital Expenditures	72.7	60.1	62.1	65.3	64.3
Free cash flow	196.7	218.8	130.3	-46.4	222.3

The company's capital expenditures have remained relatively stable over the period, suggesting that the company has continued to make capital investments to maintain or expand its operating capacity.

Free cash flow is calculated by subtracting capital expenditure from cash flow from operating activities. In 2021, there was a significant change in free cash flow to -46.4 billion yuan, which was the only negative number during those years, indicating that the company paid out more cash than it received from operating activities in that year. By 2022, free cash flow increased significantly to 222.3 billion yuan, reflecting a significant improvement in the company's cash flow position. Despite negative free cash flow in 2021, the company recovered quickly in 2022, showing good adaptability and resilience.

2021 will be a challenging year for Greeley as cash flow from operating activities declined by 90%, which is attributed to several key factors. Firstly, the company is facing a decrease in sales revenue, which directly impacts the cash inflow from core business operations. This could be the result of various market conditions such as reduced consumer demand and increased competition. Secondly, the financial results show a 53% increase in inventory, which indicates a significant increase in inventory backlog. Inventory backlog could be due to overestimated market demand, production inefficiencies, or supply chain disruptions that prevented timely sales of finished goods. High inventory ties up funds that could be used for other value-added investments and increases the risk of obsolescence or price reductions, further impacting profitability. In addition, the company has had to pay more cash to maintain production and operations in the face of rising raw material costs, which has exacerbated cash flow constraints. Rising raw material costs may be caused by fluctuations in the global supply chain, imbalances between supply and demand in the raw material market, or macroeconomic factors such as inflation. Such rising costs not only compress profit margins, but also place greater demands on the Company's cash flow management and cost control strategies. While capital expenditures in 2021 remain relatively stable compared to previous years, they are disproportionately high compared to the sharp decline in operating cash flow[8-9].

Gree Electric, as a leading company in China's home appliance industry, has demonstrated solid growth potential and strong market competitiveness, driven by economic recovery and consumer market growth. The Company is expected to achieve an average annual growth rate of 5% over the next five years through technological innovation and product diversification, and gradually stabilise as the market matures. With stable cash flow and profitability, as well as a reasonable capital structure and low financing costs, Gree Electric not only provides a solid foundation for its own development, but also provides investors with investment opportunities that are undervalued by the market. Despite the challenges of fluctuating raw material costs and market competition, the company is expected to achieve sustained growth and create long-term value for shareholders through long-term strategic planning and market adaptation [10].

6. Conclusion

In this paper, the discounted cash flow (DCF) model is used to assess the enterprise value of Gree Electric. By analysing Gree Electric's historical financial data and combining it with reasonable projections of future cash flows, this study calculates the intrinsic value of the company and compares it with the market price. The results of the study show that the value per share of Gree Electric is much higher than its trading price in the market, indicating that the company's shares are undervalued by investors in the current market environment. This finding may be informative for investors and also provides market participants with a basis to reassess Gree Electric's market positioning.

There are some inherent limitations to this thesis. The study's projections of future cash flows are based on a number of key assumptions regarding a company's operational efficiency, market demand, cost control, and overall economic conditions. However, these assumptions may not be as accurate or realistic due to the unpredictability of the market, drastic changes in the competitive environment, and fluctuations in macroeconomic factors. Secondly, the core assumption of the DCF model is that firms can grow indefinitely at a constant perpetual growth rate, which is idealised in theory but often difficult to achieve in the actual business environment. In particular, this assumption may not be applicable to firms in the home appliance industry as the market is slowing down due to near-saturation. The home appliance industry may be affected by factors such as changes in consumer demand, technological innovations, regulations and policies, and globalised competition, all of which may have a significant impact on the long-term growth potential of firms. Directions for improvement and future research could consider introducing more variables and parameters to increase the adaptability and accuracy of the model, such as the introduction of economic cycles, industry

characteristics and firm-specific factors. And multiple model comparisons can be used in subsequent studies, using other valuation methods to compare with the DCF model results to enhance the credibility of the results. In order to verify the accuracy of the DCF model predictions, long-term tracking studies can also be conducted: companies are tracked over time and the model is adjusted according to the actual results.

References

- [1] Liu, F, *Corporate Value Assessment of Home Appliances Industry Based on FCFF Model--Taking Gree as an Example* [D] Dongbei University of Finance and Economics, 2021, pp.115-117.
- [2] Jia, L, *Signs of home appliance market rebound appeared industry optimistic about next year's recovery performance* [N] Securities Daily, 2022(A03).
- [3] Xing, Y, *5G+Industrial Internet Enabling Digital Transformation of Home Appliance Industry Explored* [J] *Information and Communications Technology*, Vol. 16, No.5, 2022, pp.13-17.
- [4] Jiang, N, *The Application of DCF Model in the Implementation Plan of Special Bonds for Infrastructure Construction* [J] *Enterprise Reform and Management*, No.6, 2021, pp.92-93.
- [5] Stig Vinther, M.& Richard, P., *The Role of the Discount Rate in Investment and Employment Decisions* [J] *Journal of Financial and Quantitative Analysis*, Vol.58, No.2, 2023, p914-938. 25p.
- [6] Kang, Y, *China Statistical Yearbook 2023* [J] China Statistics Press, 2023 <https://www.stats.gov.cn/sj/ndsj/2023/indexch.htm>
- [7] Yan, S.X, *Research on the Financial Performance of Diversified Operations of Gree Electric Appliances* [D] Hebei University of Economics and Business, 2022.
- [8] Yu, L, *Solvency Analysis of Gree Electric* [J] *Cooperative Economy and Science and Technology*, No.6, 2022, pp.132-133.
- [9] Wu, J & Lu, Z.K, *Home Furnishing Market Ushered In The Policy "Timely Rain"* [N] *China Business News*, 2023(B13).
- [10] Cui, M.X, *Discussion on the Advantages and Disadvantages of the DCF Model in the Current Era and the Improvement of the Model* [J] *Advances in Economics, Management and Political Sciences*, Vol.26, 2023, pp.61-65. <https://aempublishing.org/article/113f4cc492094a948273d859ed76194e>