

# ***Application Analysis of DCF Model in Enterprise Value Evaluation: A Case Study of Midea***

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**Abstract:** With the development of markets of household electric appliances and the extinct sales performance of Midea, Midea should be viewed as a good example to explore. Many company values are overstated or understated, which has caused major problems for the stability of markets. Therefore, the author made an effort to determine the company's value so that it could be compared to its market capitalization to determine whether it is underpriced or overpriced. And in order to do that, the company was examined using the discounted cash flow (DCF) model. It was discovered that the market price of Midea should be around 384.92 billion CNY, which is slightly higher than its actual market capitalisation. As a result, although there might be some deviations made by some other factors, that might indicate that Midea has been marginally underpriced in the market.

**Keywords:** midea, discounted cash flow model (DCF), value evaluation, market capitalization

## **1. Introduction**

An important issue in the formation of managerial decisions on value is the selection of an approach to evaluating the value of enterprises. And among a variety of methods, the DCF model was selected to use for the assessment of Midea. Even though this strategy has a lot of benefits, it also has certain drawbacks, all of which will be covered in this article. In order to determine whether Midea has been overpriced or underpriced in the capital markets, this paper will use the company as a case study and provide a clear explanation of how the DCF model was used to evaluate the firm. It will then use this estimated value to compare with its market capitalization. However, there are certain additional issues that should be taken into account when using the DCF model, such as the absence of precise statistics and the arbitrary estimation of some cash flows.

## **2. Theoretical Framework and Data Sources**

### **2.1. Theoretical Framework**

The term "discounted cash flow model" refers to a method of valuation that calculates an investment's worth based on its anticipated cash flow, which implies it aids in estimating an investment's present value depending on how much money it will earn in the future [1]. And when it comes to applying it to businesses, future cash flows that are anticipated to be produced by those businesses will be discounted using the weighted average cost of capital (WACC) to determine their present value.

DCF has many advantages. To begin with, the DCF model might initially be used in more contexts. Since distinct divisions have their own cash flows to manage, it might be used for both full firms and their individual divisions rather than just the entire company as a whole. Furthermore, because it is based on cash flows rather than dividend payments, it can be utilised in businesses regardless of whether they pay dividends or not, unlike the dividend growth technique or residual income (RI) approach. Also, it is easier to apply for high-growth companies [2].

There are, however, certain drawbacks as well. The necessity of forecasting a full set of financial statements rather than just dividend growth forecasts makes it difficult to start with. Moreover, the DCF model has a degree of subjectivity. This is due to the fact that future cash flows are dependent on a number of variables, including market demand, economic conditions, technology, rivalry, and unanticipated threats or opportunities. These elements are difficult to quantify precisely, which increases the likelihood that the estimation result will be unpredictable [3].

## 2.2. Data Sources

Most of the statistics used in the process of modeling Midea come from the annual reports, which include all four charts, balance sheet, income statement, statement of cash flows, and statement of equity. Besides, some other resources, such as Yahoo Finance, were also used.

## 3. Application of the DCF Model to the Valuation of Midea Corporation

### 3.1. Company Profile

Midea Group is a global electrical home appliance manufacturer. It is headquartered in Guangdong, China, and listed on the Shenzhen Stock Exchange. It employs approximately 150,000 people in China and overseas, with 200 subsidiaries and over 60 overseas branches. It is comprised of four major business segments: the Smart Home Business Group, the Electro-Mechanical Business Group, the Building Technologies Division, the Robotics and Automation Division, and the Digital Innovation Division [4]. Apart from its main product, air conditioners, the company also manufactures other household appliances, including refrigerators and washing machines, and sells a variety of smaller equipment, like kettles and microwave ovens.

### 3.2. Application of the DCF Model in the Valuation of Midea

#### 3.2.1. Sales Growth Rate

Revenues are predicted to increase following a formula:

$$\text{Revenue} = \text{revenue of the base year} * \text{inflation rate} * \text{sales growth rate} \quad (1)$$

And the revenue for the base year, 2021, is split into five distinct product categories, with one category labeled "other items" to include any remaining products not included in the five main categories.

Even if the sales growth rates fluctuate from year to year over the forecasting period, they are believed to be the same when applied to various goods. The growth rates from 2021 to 2024 were suggested by Datayes! [5]. Therefore, the provided information served as the base rate upon which the growth rates were later modified. Due to the effects of the pandemic, the sales growth rate between 2022 and 2024 began at a fairly low level and progressively increased as the economy began to recover from COVID-19. Then, during 2025 to 2026, revenues are anticipated to expand at a greater rate, as determined by averaging the growth rates of the four years prior, since the markets will be less influenced by the pandemic.

Although the variety of different products also affects growth rates, the gaps are filled by other factors, making the differences less obvious. For instance, the market for air conditioners is maturing at a slow rate of development while still enjoying high popularity, and the gaps are filled by the high growth rates of other products that are in the development stage.

### 3.2.2. Costs

It is presumed that the cost of revenue will grow at the same rate as revenue. This is such that if income rises, additional raw materials and associated costs will also need to be incurred. The selling, general, and administrative costs are projected to increase at a basic rate of 1.5% less than the growth rate of sales volume. The reason is that while the other four industries have stable and long-term consumers and do not require a significant portion of the total selling, general, and administrative expenses, home appliance sales require more of these types of expenses, and the growth rate of sales volume is adjusted by 2%. Although the other four divisions don't require as many of these costs, their increased sales volume should still have an impact on their growth. As part of Midea's plan to build its brand identity and align with the direction of the Internet and intelligent manufacturing, it is anticipated that the growth rate of research and development will increase dramatically. For high-tech items, the Midea Group must increase its research and development spending.

### 3.2.3. Capital Expenditure (CAPEX)

The formula used to predict CAPEX is:

$$\text{CAPEX} = \text{Revenue} * \text{Investment rate} \quad (2)$$

It is estimated that the investment rate for the years 2022 and 2023 will be the average between 2020 and 2021, and that the investment rate for the years 2024 and 2026 will be the average between 2018 and 2021.

As the rate clearly increased between 2020 and 2021, this could be attributed to the pandemic's lockdown, which might lead Midea to invest in new machinery to make up for the shortage of workers.

### 3.2.4. Property, Plant, and Equipment (PP&E)

The formulas used to calculate the net total PP&E are:

$$\text{Net PP\&E} = \text{Net PP\&E of the previous year} - \text{Accumulated depreciation} + \text{Capital expenditure} \quad (3)$$

$$\begin{aligned} \text{Accumulated depreciation} = & (\text{Accumulated depreciation of the previous year}) + \\ & (\text{Accumulated depreciation of the previous year} * \text{Growth rate}) \quad (4) \end{aligned}$$

Accumulated depreciation in the predicted period is predicted to increase as the average growth rate of the past four years between 2018 and 2021.

Table 1: Historical data of accumulated depreciation (Unit: Million CNY) [6-9].

|                          | 2018      | 2019      | 2020      | 2021      |
|--------------------------|-----------|-----------|-----------|-----------|
| Accumulated depreciation | 20,082.70 | 22,452.98 | 24,875.47 | 27,024.83 |

Table 2: Predicted data of accumulated depreciation (Unit: Million CNY).

|                                    | 2022      | 2023      | 2024      | 2025      | 2026      |
|------------------------------------|-----------|-----------|-----------|-----------|-----------|
| Predicted accumulated depreciation | 29,838.31 | 32,944.70 | 36,374.48 | 40,161.34 | 44,342.43 |

The accumulative depreciation was practically increasing a similar rate. Hence, it is plausible to forecast that the company's expansion plan will cause the accumulated depreciation of Midea to keep rising at a similar growth rate, which is about 10.41% [6][7][8][9].

Next, it is assumed that both the account payables and the receivables will increase at the same rate as the revenue does. And the formula for working capital is:

$$\text{Working capital} = \text{account receivables} - \text{account payables} \quad (5)$$

### 3.2.5. Current and Long-Term Debt

Table 3: Historical data of current and long-term debt (Unit: Million CNY) [6-9].

|                | 2018      | 2019      | 2020      | 2021      |
|----------------|-----------|-----------|-----------|-----------|
| Current debt   | 970.14    | 5,701.84  | 9,943.93  | 5,560.50  |
| Long-term debt | 32,091.44 | 41,298.38 | 42,827.29 | 19,734.02 |

Table 4: Predicted data of current and long-term debt (Unit: Million CNY).

|                          | 2022      | 2023      | 2024      | 2025      | 2026      |
|--------------------------|-----------|-----------|-----------|-----------|-----------|
| Predicted Current debt   | 6,000.35  | 7,220.70  | 9,681.08  | 14,523.62 | 24,379.96 |
| Predicted Long-term debt | 21,295.04 | 25,626.00 | 34,357.79 | 51,543.81 | 86,523.61 |

According to the statistics, from 2018 until they started to decline between 2022 and 2021, both short-term and long-term loans continued to rise year after year. This could lead to a prediction that, starting in 2021, both types of debt will decline [6][7][8][9]. Nonetheless, the unique circumstance brought on by COVID-19 should be taken into account, as it may result in a reduction in the corporation's spending and a consequent reduction in the requirement for borrowing. The macroeconomic environment is therefore gradually beginning to return to its pre-pandemic level as a result of the pandemic's effects having a tendency to diminish. Due to an increase in production and sales, it is anticipated that both types of debt would expand during the next five years. Also, they will grow at the same rate as revenue.

The formula used to predict current and long-term debts is:

$$\text{Long-term debt} = \text{Debts} * \text{Net changing rate of revenue} * \text{Inflation rate} \quad (6)$$

Debts = debts in the previous year

Net changing rate of revenue = growth rate of revenue

Table 5: Historical data of interest rate [6-9].

|               | 2018  | 2019  | 2020  | 2021  |
|---------------|-------|-------|-------|-------|
| Interest rate | 2.13% | 1.87% | 2.47% | 5.37% |
| Average       |       |       |       | 2.96% |

Table 6: Predicted data of interest rate.

|                         | 2022  | 2023  | 2024  | 2025  | 2026  |
|-------------------------|-------|-------|-------|-------|-------|
| Predicted interest rate | 2.96% | 2.96% | 2.96% | 2.96% | 2.96% |

It is anticipated that the interest rate will be roughly 2.96%, which was the average for the preceding four years. Although there was a significant increase in interest rates from 2020 to 2021, which should be attributed to the impact of the pandemic, it is anticipated that the interest rate in 2021 will be taken into consideration for the prediction for the following four years because COVID is still having and will continue to have an impact on the national economy for a while, especially in China.

### 3.2.6. Assets

As it is thought that the corporation should set aside some liquid cash flows to prepare for substantial expenditures necessitated by the huge sales volume, cash, and short-term investments are anticipated to expand along with the growth rate of sales. As for the inventory, it is anticipated to rise along with rising output and sales. Inventory should increase at the same pace as the growth rate of sales volume since it acts as a buffer for the selling items.

According to the firm's assertions of future goals in its annual report, it is thought that the company may enhance its brand and patent via further development and research to generate new goods. Thus, the growth rate of their sales is used as their growth rate. Long-term investments are likewise expected to rise at the same rate as revenue growth. Since non-current assets made up a significant portion of the company's assets over the past four years, it is assumed that the company may have more money to invest in long-term investment projects. As a result, the amount of money invested in these projects is anticipated to be correlated with sales. In addition, it is expected that long-term receivables would rise in tandem with long-term investments and will do so at a pace equal to that of sales volume growth.

### 3.2.7. Equity

As Net Profit Attributable to Equity serves as a measurement of a company's profitability and the effectiveness with which those profits are produced, it could be regarded as an implication of equity changes. According to the prediction from Datayes [5], the year-on-year growth rate of the first three years is anticipated after slight adjustments, and in the final two years, it is assumed to rise as the following formula:

$$\text{Growth rate} = \text{Average growth rate} * \text{Growth rate of the previous year} \quad (7)$$

Table 7: Net Profit Attributable to Equity [5].

|  | 2022  | 2023   | 2024   |
|--|-------|--------|--------|
| Net Profit Attributable to Equity year on year | 5.39% | 13.62% | 11.48% |

Table 8: Predicted data of growth rate of retained earnings [5].

|   | 2021    | 2022    | 2023    | 2024    | 2025    | 2026    |
|---|---------|---------|---------|---------|---------|---------|
| Predicted growth rate of retained earnings year on year |         | 5.82%   | 12.53%  | 13.31%  | 14.14%  | 15.02%  |
| Rate  | 100.00% | 105.82% | 119.08% | 134.93% | 154.01% | 177.14% |
| Average rate  |         |         |         | 106.23% |         |         |

This means from 2025 to 2026, the retained earnings are expected to increase at the same growth rate as the average of those between 2023 and 2024 [5].

### 3.2.8. Rates

The risk-free rate utilised in the company's valuation is the yield on a 10-year government bond issued by China (2.89%). Additionally, because it is a listed firm, the website provided both the company beta (0.94) and the market premium (13.87%) [10].

As to the inflation rate, since Midea is a publicly traded company and conducts the majority of its business in China, the inflation rate utilised in the valuation model is predicated on the expected Chinese inflation rate for the period 2022 to 2027. According to the prediction from Statista (2022), the inflation rate used will be around 2%, which represents the mean of the inflation rates for the subsequent six years starting from 2021 [11].

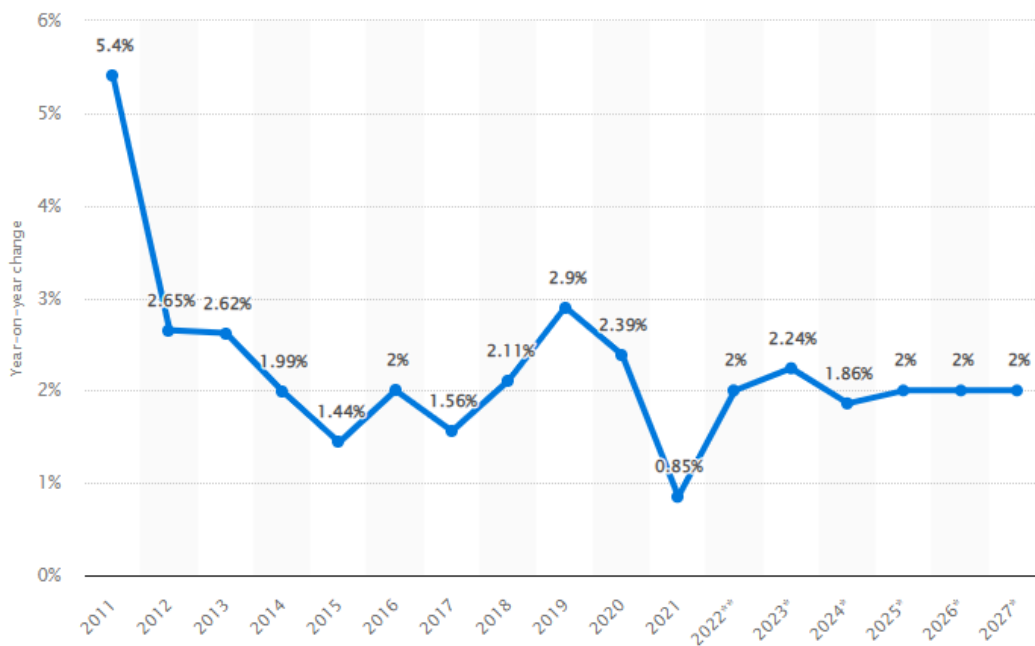


Figure 1: Inflation rate growth assumption [11].

Additionally, it is expected that the corporate growth rate will be the same as the average GDP of the predicted GDP number for the subsequent four years (2022-2027), yielding a result of about 4.34% [12].

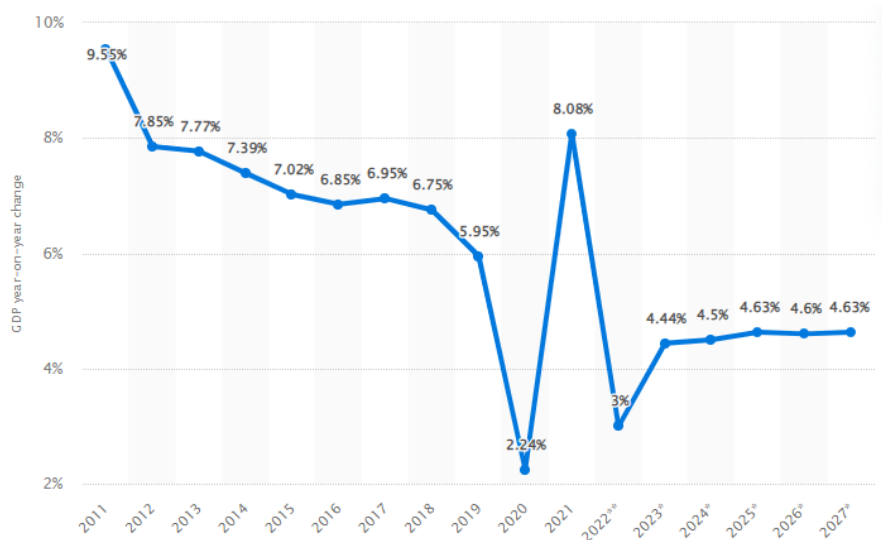


Figure 2: Growth rate growth assumption [11].

Then, according to the CAPM, the formula used to get the cost of equity is:

$$\text{Cost of equity} = \text{risk-free rate} + \text{company Beta} * \text{market premium} \quad (8)$$

And the cost of debt:

$$\text{Cost of debt} = \text{interest rate} * (1 - \text{tax rate}) \quad (9)$$

After determining the values of Debt and equity, the weighted average cost of capital (WACC) is calculated by using the following formula:

$$\text{WACC} = (E/V * Re) + (D/V * Rd * (1 - Tc)) \quad (10)$$

E = Market value of the firm's equity

D = Market value of the firm's debt

$$V = D + E \quad (11)$$

Re = Cost of equity

Rd = Cost of debt

Tc = Corporate tax rate

Therefore, the free cash flows (FCF) of the company could be formulated by using the formula:

$$\text{FCF} = \text{NOPLAT} + \text{D\&A} - \text{CAPEX} - \text{Change in Working Capital} \quad (12)$$

$$\text{NOPLAT} = \text{Operating income} * (1 - \text{income tax rate}) \quad (13)$$

And the discounted cash flow (DCF) could be generated by using:

$$\text{DCF} = \text{FCF} * \text{Discounted Factor} \quad (14)$$



The total net present value (NPV) of all the future cash flows can therefore be used to calculate the enterprise value. The discounted cash flows of the five forecasting years are, in other words, the present value of the cash flows in those five years, and the NPV of the following five years would be calculated using the formula:

$$\text{NPV Continuation Period} = \text{DCF1} * (1 + g) / (r - g) \quad (15)$$

DCF1 = DCF in 2026

g = growth rate of the company

r = WACC of the company

### 3.2.9. Result

According to the calculations above, it could be anticipated that the market capitalization of Midea should be about 384.92 billion CNY.

### 3.3. Variances Analysis

The predicted enterprise value of around 384.92 billion CNY, as opposed to the market capitalization of around 370.36 billion CNY [13], seems to indicate that Midea has been slightly underpriced in the market. Yet, there are still a lot of other possible reasons why the outcome could be inaccurate. First, there's a chance that a lack of resources is to blame. For instance, the value of the firm's depreciation and amortization in 2021 is calculated using the information from the prior years because the company did not reveal it. The high standards for prediction accuracy and variable selection, such as choosing inflation and interest rates and forecasting the growth rates of revenues and expenses, may also contribute to certain issues.

As a consequence, despite the use of proper formulas and a large amount of exact data, there are still many uncertainties that contribute to the inaccurate nature of the outcome. These uncertainties can either be found in the model itself or be brought on by the statistics that were utilized.

## 4. Conclusion

The DCF model might be used as a method to calculate a company's capitalization. And based on the model's output, Midea has been slightly undervalued in the market compared to its firm worth. Nevertheless, as is evident from this model, the company's research is constrained by a lack of resources, leading to certain statistics included in the base years being approximated, which may have an influence on the result's accuracy. Therefore, it is expected that the model could be developed by reducing the number of assumptions and arbitrage predictions in the future.

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