

The Application Of DCF Model in the Enterprise Value Assessment: A Case Study of Tesla, Inc

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Abstract: With the rapid development of today's society and economy, more and more public investors are not satisfied with bank financial products, which have lower value-added, but turn their attention to the capital market. The quantitative technique of DCF model combined with qualitative analysis to assess the intrinsic value of enterprises provides an effective reference for public investors. Tesla, a company that produces new energy vehicles, has shown rapid growth in recent years and is suitable for valuation using DCF models. This paper predicts the growth rate of Tesla's operating income in the next five years based on its historical financial data, and uses the percentage of sales method combined with qualitative analysis to calculate the present value of the enterprise's free cash flow in the next five years, and also calculates the present value of the enterprise's future perpetuity based on the assumption of the enterprise's going concern, and the two are added together to obtain the intrinsic value of Tesla Inc. as \$5160.95 billion. The total market value of Tesla Inc. on November 22, 2022 (valuation point in time) is \$5365.34 billion (data source: <https://www.msn.cn>). The intrinsic value of the enterprise is lower than the market price, and investors are advised not to buy.

Keywords: Enterprise Value Assessment, DCF Model, Discounted Free Cash Flow, Tesla Inc

1. Introduction

With the advancement of the social economy and the expansion of capital market openness, investment diversification has become the preferred method for ordinary investors to allocate their assets. Stocks, as a high-risk, high-return investment, necessitate investors to conduct quantitative research on enterprise value in order to select enterprises with a higher intrinsic value than the market price in order to profit in the future. The DCF (Discounted Cash Flow) model, based on the income approach, is a valuation tool that has a better application in enterprise value assessment. In this paper, the DCF model is used to evaluate the intrinsic value of Tesla Inc. by applying the discounted future free cash flow (DCF) method [1].

2. Theoretical Framework and Data Sources

2.1. Introduction to the DCF Model

The DCF model valuation method is also known as the discounted free cash flow method in the income approach, where enterprises generally go through roughly two stages of rapid growth and relatively stable business maturity, predict the enterprise's free cash flow in two segments, then calculate the future discount rate, and finally calculate the appraised value of the enterprise through the model [2]. In this paper, we adopt the two-segment model of corporate free cash flow discount model in the DCF model for the overall enterprise value assessment of Tesla Inc.

$$OV = \sum_{t=1}^n \frac{FCFF_t}{(1+WACC)^t} + \frac{FCFF_{n+1}}{(WACC - g) * (1+WACC)^n}$$

Where:

OV: Overall Enterprise Value

$FCFF_t$: Free cash flow of the enterprise in year t

WACC: Weighted average cost of capital

g: Fixed growth rate

Tesla has been growing at a fast pace in recent years and will enter a smooth operating phase afterwards, so the results of its assessment using the DCF model's discounted corporate free cash flow model will be valid.

2.2. Data Sources

The data used in this paper is derived from Tesla's public financial statements for the past few years (<http://ir.tesla.com/>).

3. Application of the DCF Model in the Valuation of Tesla Inc

3.1. Company Profile

Tesla Inc is an American electric vehicle and energy company founded in 2003 that designs, develops, manufactures and markets high-performance electric vehicles and advanced electric vehicle power system components. Listed on the Stark Exchange in the US in June 2010 under the ticker symbol "TSLA", it closed at US\$169.91 on November 22, 2022 with a total market capitalization of US\$5365.34 billion.

3.2. Using the DCF Model to Forecast the Future Free Cash Flows of the Business and Calculate the Assessed Value of the Business

3.2.1. Forecasting Enterprise Free Cash Flow

Enterprise free cash flow = EBITDA - working capital increase - capital expenditure + depreciation and amortization.

The forecast of enterprise EBITDA starts with the forecast of future sales revenue, based on the enterprise's past sales performance, and estimates the operating revenue for the forecast period.

Table 1: Business revenue growth from 2017 to 2021 (Unit: US\$ billion).

Accounting period	2017	2018	2019	2020	2021
Operating revenue	117.59	214.61	245.78	315.36	538.23
Operating revenue growth rate	68%	83%	15%	28%	71%

The average growth rate of Tesla's operating income in the past 5 years is 53%, and the growth rate of operating income in the base period of 2021 as the forecast period is 71%. Through the analysis of the overall business situation, the authors believe that the growth rate of the base period is not sustainable, and therefore make appropriate adjustments to the growth rate of operating income in the forecast period, and forecast the growth rate and perpetual growth of the next 5 years and its corresponding operating income in the following table [3].

Table 2: Future operating income of the business for the forecast period (Unit: US\$ billion).

Forecast year	2022	2023	2024	2025	2026	...
Operating revenue growth rate	60%	50%	40%	20%	10%	6%
Operating income	861.17	1291.75	1808.45	2170.14	2387.16	2530.39

This section forecasts the free cash flow of the business, using the percentage of sales to forecast the relevant financial data. The percentage of sales method is a method of forecasting the amount of funds needed based on the dependency relationship between the relevant items in the balance sheet and income statement and operating income [4]. That is, assuming that there is a stable percentage relationship between relevant assets and liabilities and operating revenues, then projecting relevant assets and liabilities based on projected operating revenues and corresponding percentages, and finally determining operating costs, working capital requirements, etc. In this paper, 2022-2026 is the forecast period, and 2027 is the first year of perpetuity to forecast the free cash flow of the enterprise in the following table.

Table 3: Corporate free cash flow projection table (Unit: US\$ billion).

Forecast year	2022	2023	2024	2025	2026	...
Profit after interest and tax	126.49	189.73	265.63	318.75	350.63	371.66
Depreciation and amortization	37.87	36.87	35.87	34.87	33.87	32.87
Increase in working capital	44.37	59.16	70.99	49.70	29.82	19.68
Increase in capital expenditure	82.52	34.9	1.69	(2.52)	2.88	3.87
Corporate free cash flow	37.47	132.54	228.82	306.44	351.8	380.98

3.2.2. Calculating the Discount Rate

In this paper, the Tesla business valuation uses corporate free cash flow to assess the overall value of the business, and therefore requires the calculation of the weighted average cost of capital for the business [5].

The principle of the WACC discounted cash flow method is a tool that uses the weighted average cost of capital (WACC) to calculate the present value of funds flowing to all capital providers for valuation purposes.

$$WACC = \frac{E}{D+E} * R_e + \frac{D}{D+E} * R_d * (1-T)$$

R_e : Return on investment in equity capital

R_d : Return on investment in debt capital

T: Enterprise income tax rate

$\frac{D}{D+E}$: the capitalization ratio

$\frac{E}{D+E}$: the gearing ratio

(1) Calculation of the cost of equity capital

In enterprise valuation, the cost of equity capital is calculated using the capital asset pricing model, which was proposed by William Sharpe in 1964 and which, for the first time, made it possible to quantify the degree of risk in the market and to price risk specifically [6].

$$R = R_f + \beta(R_m - R_f)$$

R_f : Risk-free rate of return

R_m : the required rate of return for the average stock

β : a measure of the risk of a capital flow

In this paper, the beta coefficient is calculated using the formula for solving the regression equation $y = a + bx$ coefficient

$$b = \frac{n \sum_{i=1}^n X_i Y_i - \sum_{i=1}^n X_i * \sum_{i=1}^n Y_i}{n \sum_{i=1}^n X_i^2 - \left(\sum_{i=1}^n X_i \right)^2}$$

Tesla Inc. is listed on the NASDAQ exchange in the U.S. The calculation of beta in this paper selects measured returns at monthly intervals for 2021 and calculates a beta of 2.66 [7].

R_f using US 5-year Treasury rate of 3.6%

R_m using 2021 NASDAQ average market yield of 11.58%

R_d using US five-year loan rate of 4.9%

$$R_e = 3.6\% + 2.66(11.58\% - 3.6\%) = 25\%$$

T=15% (Tesla is a high-tech enterprise, which can enjoy policy support in taxation, and the corporate income tax is levied at a rate of 15%.)

Companies tend to have a 50/50 level of equity and debt in 2021, and this paper uses 2021 as the base period with a 50/50 ratio of debt and equity.

$$WACC = 50\% * 25\% + 50\% * 4.9\% * (1 - 15\%) = 15\%$$

WACC is equal to the return required by all investors (including creditors, preferred shareholders, and common shareholders), and each year the company's capital structure may change. Tesla Inc long-term borrowing and financial leasing business growth begins in 2017, with a significant increase in equity issuance in 2020 for factory and production line expansion, and repayment of long-term borrowing beginning in 2021. As capacity expands, Tesla Inc. will increase its working capital borrowings, and the current corporate gearing ratio is around 50%. The capital structure of the enterprise is forecasted to change, with an increase in current liabilities and an increase in the proportion of assets and liabilities, and the weighted average cost of capital of the enterprise will decrease, with a forecasted perpetual weighted average cost of capital of 11%. In using the second stage of the enterprise free cash flow discount model to evaluate the enterprise with indefinite income, according to the competitive equilibrium theory, the sales growth rate in perpetuity is roughly equal to the growth rate of UK GDP, US GDP 2.26% in 2017, 2.92% in 2018, 2.29% in 2019, -3.4% in 2020 and 5.9% in 2021, with an average GDP growth rate of 2%. 6% is used in this paper as the perpetuity growth rate for business development..

3.2.3. Calculating the Overall Assessed Value of the Business

Table 4: Overall assessed value of the business (Unit: US\$ billion).

Forecast period	2021	2022	2023	2024	2025	2026	...
Free cash flow over the forecast period		37.47	132.54	228.82	306.44	351.8	380.98
Weighted average cost of capital		15%	15%	15%	15%	15%	11%
Discounted residual		0.8696	0.7561	0.6575	0.5718	0.4972	0.5942
Total present value over the forecast period	633.38						
Present value over the perpetual period	4527.57						
Valuation value of the business	5160.95						

Enterprise free cash of the company will increase in the next few years, indicating that its intrinsic value will continue to grow. The present value of the forecast period is \$633.38 billion, the present

value of the sustainable period is \$4527.57 billion, and the enterprise appraisal value is \$5160.95 billion [8].

4. Analysis of DCF Model Limitations

(1) The quantitative assessment of enterprise value focuses on the value created by the enterprise in the future, and investors also look at future earnings. The discounted free cash flow model is conceptually and theoretically sound, and is widely used. However, based on the uncertainty of the future, the uncertainty of business operations also exists objectively. As a high-tech enterprise producing new energy vehicles, its technological leadership and innovation ability, as well as the company's overall strategy, are non-quantitative factors that have a crucial impact on the enterprise, which cannot be shown in the evaluation process of the DCF model.

(2) In terms of the specific valuation process of the DCF model, valuation parameters such as the discount rate and long-term growth rate in perpetuity have a great impact on the enterprise valuation results, and small changes in these parameters may cause significant fluctuations in the valuation results [9]. Therefore, the selection of these parameters is crucial to the valuation results, Such as reasonable discount rate, capital structure, etc. [10] which requires the appraiser to understand the internal information of the enterprise or more detailed external information, and the verification of the information is also a long-term process.

5. Conclusion

Applying the DCF model to Tesla Inc. in this paper, it can be seen that the total market capitalization of \$5365.34 billion on the valuation base date (November 22, 2022) is higher than the valuation value of \$5160.95 billion, and Tesla Inc. stock is overvalued and investors should not buy the stock.

The advice given in this paper is not absolute, although the DCF corporate free cash flow discount model is widely used in the valuation of listed companies, however, corporate operations are affected by a variety of factors and the uncertainty of their future operations is objective. Coupled with the limitations of my professional level, there is still a lack of in-depth grasp of the evaluation elements, and the selection of parameters may have deviations, so the quantitative results given have errors are inevitable, but the evaluation process presented in this paper can still provide reference to the majority of investors. After the release of Tesla's 2022 financial statements, the authors will test and correct the assessment process to enhance the authors' professional analysis.

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