Application of DCF Model in Enterprise Value Assessment

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Abstract. With the capital market being increasingly open, people's living standards are being improved day by day. A large amount of capital enters the market, and people's cognition and demand for investment are becoming more and more urgent. In this context, choosing a scientific method of enterprise value evaluation has become an urgent problem for investors to solve. The retail industry has developed in the market for a long time and is relatively mature. Therefore, the value of many retail enterprises is suitable to be evaluated by the Discount of Cash Flow (DCF) model, so as to provide investors with a more complete investment plan. As one of the most creative retail enterprises in the world, Company A is in good condition and has sustainable operation ability. This paper analyzes the application of the DCF model in enterprise value assessment. The author uses the financial statements of Company A over the years to estimate the free cash flow in the next few years, and the intrinsic value of the company in the next few years can be obtained.

Keywords: DCF · Enterprise value · FCFF · WACC

1 Introduction

As an early and mature industry, the retail industry is closely related to people's consumption life and is of great significance to normal social life and economic development. However, due to the rapid development of the Internet economy in recent years, the traditional offline entity business model of the retail industry has been greatly impacted, and the proportion of online retail continues to rise, leading to greater pressure on physical retail [1]. A company was founded in 1932 and has a development history of nearly one hundred years. It faces some bottlenecks, which are urgently needed to be solved in order to maintain the good operating capacity of the company. The valuation combined with the DCF model can provide investors with an assessment of the investment value of this listed company under the current economic background, so as to reduce investment risks and make investment more scientific and standardized. This paper explains the theoretical system of the DCF valuation model, how to calculate free cash flow, and how to evaluate the residual value and intrinsic value of enterprises through the calculated data to make investment more scientific and feasible. Then, combined with the financial statements of A company over the years, the DCF model is applied to evaluate it. Finally, its intrinsic value is obtained and compared with the market. The investment value of A company is judged for investors' reference, so as to reduce the investment risk.

2   An Overview of the Enterprise Valuation Theory

2.1   An Overview of Enterprise Investment Value Evaluation

The methods of enterprise value assessment can be divided into absolute valuation and relative valuation. The relative valuation method is also called the multiplier valuation method. The basic idea behind relative valuation is that, in a well-run stock market, investors should pay the same price for assets with the same expectations of future earnings. In other words, investors will not pay higher prices for assets of the same quality. Common relative valuation methods include the P/E valuation method, P/B valuation method, and EV/EBITDA valuation method. Using comparable companies in the public markets to value unlisted companies is further complicated by the liquidity of equity. As the equity of unlisted companies lacks liquidity compared with typical listed companies, the valuation of companies is at a discount due to the lack of liquidity, which is the main limitation of the relative valuation method [2]. Theoretically, the absolute valuation method is the most advanced valuation method, which is not affected by market sentiment and market fluctuations, and many specific valuation methods are developed on the basis of the absolute valuation method. Among them, DCF is the most essential valuation method. Although DCF involves many valuation assumptions, and the valuation results are very sensitive to parameter setting, which makes DCF very difficult, it is still the most logically rigorous valuation method.

DCF refers to the future operating cash flow that can be predicted by the company. A discount rate that matches the company's risk is selected to discount the future operating cash flow. There are three necessary conditions for using the DCF model to evaluate enterprise value: first, duration, the ability of an enterprise to continue operation, is the basic condition for evaluating enterprise value, so as to determine the intrinsic value of the enterprise; Second, free cash flow mainly refers to the cash flow generated by the business activities of the enterprise. The optimal capital to show the sustainable operation of the enterprise is to generate a large amount of cash flow. Third, the weighted average cost of the capital rate and the choice of the discount rate matching the enterprise risk is the key to scientifically evaluating enterprise value [3].

2.2   DCF Valuation Model Related Theory

Free Cash Flow.
Free cash flow is defined as the additional cash flow generated by a company after the net cash flow from operating activities is subtracted from the capital expenditures required to maintain the company's current production capacity. Free cash flow shows how effective a company is at generating cash. It is also used by investors to measure operating cash flow and whether there is enough money left after capital expenditures to pay dividends to investors or put them to work in the future. The formula for calculating free cash flow is as follows:

$$FCFF = \text{NI} + \text{NCC} + \text{Int} * (1 - \text{Taxrate}) - \text{FCInv} - \text{WCInv} \tag{1}$$

Among them:

FCFF: flow A company's free cash flow
NI: net income attributable to common shareholders
NCC: net non-cash items
Int: interest expense
FCInv: investment in fixed assets
WCInv: investment in working capital [4].

Determination of WACC on Weighted Average Cost of Capital.
Weighted average cost of capital (WACC) is to calculate the average cost of capital acquired by enterprises through various financing methods, with their proportion in the total capital as the weight, reflecting the average cost paid by enterprises to obtain capital. The calculation formula is as follows:

$$WACC = \frac{E}{V} \times Re + \frac{D}{V} \times Rd \times (1 - Tc) \qquad (2)$$

$$V = E + D \qquad (3)$$

Among them:

E/V: ratio of equity to total capital
Re: cost of equity capital
D/V: pre-tax cost of debt capital
Rd: ratio of debt to total capital
Tc: income tax rate

Discount of Cash Flow.
By predicting the future cash flow of an enterprise, a certain discount rate is adopted to determine the value of the enterprise. The calculation formula of the DCF model is as follows:

$$EV = \sum_{i=1}^{n} \frac{Fi}{(1 + WACC)^i} + \frac{Fn}{WACC} \qquad (4)$$

Among them:

EV: company value
Fi: cash flow generated by equity in year i
Fn: cash flow when continuous value is calculated from year n
WACC: weighted average cost of capital [5].

3   The Investment Value Evaluation of a Company

3.1   Company Profile

Founded in 1932, A company has 90 years of development history. It is a successful model of listed retail companies in the world. It mainly focuses on the production and export of building blocks toys and integrates the innovation, research and development,

Table 1. Financial ratio of Enterprise A from 2017 to 2021 (in %) (Data source: Collation of corporate financial statement data from 2017 to 2021).

	2021	2020	2019	2018	2017
Gross margin	69.6	69.7	68.4	67.8	67.1
Operating margin	30.8	29.6	28.1	29.6	29.6
Net profit margin	24.0	22.7	21.5	22.2	22.3
Return on equity (ROE)	50.4	43.4	37.8	38.0	38.3
Return on invested capital (ROIC)	94.0	74.1	68.4	78.9	72.3
Equity ratio	60.7	63.3	63.5	69.1	69.3

manufacturing and after-sales service of building blocks as a large toy production enterprise. In 2018, A company was listed as one of the world's top 500 brands. In the 90 years since its establishment, it has developed into a leader in the global toy industry. Last year, the global retail sales reached 55.3 billion DKK and the operating profit reached 17.0 billion DKK. According to the report released in 2021, A company has become the world's most valuable toy brand.

3.2 Financial Condition of the Enterprise

The return on equity and return on invested capital of Enterprise A from 2017 to 2021 are shown in Table 1. As seen in Table 1, the capital turnover of Enterprise A presents a stable state, indicating that the enterprise has stable operation ability and can sustain development. The steady rise of ROE indicates that the enterprise transformation of A company is good and it has the basic conditions for investors to invest in it.

3.3 Determination of the Discount Rate

The discount rate is the rate at which expected earnings over a period of time are discounted to the present value of the current year.

WACC is used to calculate the discount rate of enterprise A:

$$WACC = \frac{E}{V} \times Re + \frac{D}{V} \times Rd \times (1 - Tc) \tag{5}$$

A company's WACC for 2022 is 5.48%. According to the trend, US risk-free is decreasing, and the current risk-free rate of 3.1% is used, as shown in Table 2. The market premium is RM-RF. RM can use the yield ratio of the market index to go to CSI 300 or S&P500, and RF is the interest rate of the national debt. Beta coefficient is a risk index, used to measure the risk of an asset system, reflecting the volatility of a stock or stock fund against the whole stock market. As for the selection of β coefficient, CSI 300 is taken as the whole market, the retail industry where the target enterprise is located is selected as the sample object, several listed companies in this industry are analyzed, multiple β values are obtained, and finally, arithmetic average is made to obtain the β

Table 2. Evaluation data collation.

		Data source
US risk-free	3.1%	Ychart
Market Premium	3.8%	Rm-Rf
Beta	0.83	
Country Premium	3.4%	model setting
Target D/E Ratio	60.0%	nyu stern
Growth Rate	3.5%	long-run gdp growth – CHECK ROICxIR
Inflation in the base year	1.85%	model setting
Company D/E	66.70%	annual report
Tax Rate	22%	annual report

mean value as the estimate [6]. Objectively speaking, affected by the epidemic, people now spend more time at home than in the past, so toys have become a good choice for them to kill time at home, which leads to the explosive growth of the sales of A company toys since 2019. So, A company has maintained a relatively high growth rate in recent years, with an above-average growth rate of 3.5%. Because of their preference for leasing stores, the company has some implicit composite leverage that we don't base on theirs. Credit wheel to estimate research and development expenses, instead choosing a converted lease metric to estimate what A company might pay under a similar debt load.

3.4   Prediction of the Cash Flow of Enterprise a in the Next 6 Years

As can be seen from Table 3, from 2017 to 2019, the free cash flow of Enterprise A decreased year by year, reached the lowest value in 2019, and then rebounded sharply, exceeding the cash flow in 2017. In 2021, the momentum was not reduced but continued to maintain an upward trend, reaching a new historical peak. From 2017 to 2019, the toy retail market was unprecedentedly prosperous, and A company seized many shares in the market, which resulted in an annual business reduction. After 2019, due to the huge impact of the world economic environment, the retail market experienced a "big reshuffle", and traditional offline retail was impacted. With years of technological innovation and changes in management mode, as manufacturing innovative technology continues to improve and market competitiveness is enhanced, enterprise A's business has ushered in a wave of explosive growth, showing a trend of growth in 2020 and 2021. In general, the free cash flow of Enterprise A tends to grow steadily at the present stage, so 3.5% is taken as the growth rate of free cash flow of Enterprise A in the next few years.

Based on the parameters determined above, we can calculate Company A's expected free cash flow in 2027 and the intrinsic value of the enterprise, discounted by the initial WACC and the end time of Company A's financial statement year [7]. As the company has achieved excellent operational success, we consider it reasonable to adopt a higher growth rate. According to the WACC value, the discount factor data can be obtained, as

Table 3. 2017–2021 Company A's Cash Flow Statement (mDKK).

	2021	2020	2019	2018	2017
Cash flow from operating activities	16,048	13,382	9,557	9,847	10,691
Purchase of property, plant, equipment and intangible assets	(3,159)	(1,891)	(2,173)	(1,502)	(1,529)
Free cash flow	12,892	11,498	7,395	8,355	9,168

seen in Table 4. By multiplying the discount factor by FCF of the same year, the NPV forecast period and the NPV continuation period can be calculated. By adding the NPV of the two, the Enterprise value can be obtained, as shown in Table 5.

According to the comparison between the current stock price of A company per share and the expected stock price, the expected stock price is higher than the current stock price of A company per share, indicating that the current stock price is undervalued and can be bought.

Table 4. Discounted Cash flow of Enterprise A in the expected period (mDKK).

	2022	2023	2024	2025	2026	2027
Net income	21,071	28,676	37,307	47,120	58,298	71,049
Operating profit	21,200	28,851	37,533	47,406	58,651	71,479
NOPLAT	16,536	22,504	29,276	36,976	45,748	55,753
D&A	2,554	2,769	3,031	3,347	3,719	4,154
CAPEX	3,744	4,229	4,783	5,414	6,135	6,958
Change in WC	486	549	621	702	796	903
FCF	14,861	20,494	26,904	34,206	42,536	52,046

Table 5. Enterprise Value of Enterprise A (mDKK) [8].

NPV forecast period	148,793
NPV continuation period	1,243,932
Enterprise value	1,392,726
Value of debt	137
Equity	1,392,589

4   Conclusion

Based on the DCF discount model, this paper analyzes Enterprise A, and it can be seen that in terms of the stock price per share on the base date of evaluation, the stock of Enterprise A is undervalued, indicating that Enterprise A has investment value.

The most important thing for investors to make an investment is to look at the future cash flow that an enterprise can bring, and the DCF discount model provides a reasonable and scientific method for this. Firstly, by analyzing the current operation situation of the company, one can judge whether the enterprise has sustainable operation ability. Secondly, a reasonable prediction of the cash flow during the future operation period can be made. This is a good evaluation of the intrinsic value of enterprise stock, providing an investment basis for investors. But in fact, enterprise value assessment is a very complicated process, and there are many uncertain factors, so the results predicted by the model are not absolute [9].

Even though people are very rational, the DCF valuation method still has many defects. The most common problem is that the company's annual cash flow growth forecast is uncertain, because the DCF model usually predicts value over 5 or 10 years. Analysts may have a good idea of operating cash flows this year and next, but their ability to predict performance and cash flows in the next few years declines rapidly. To make matters worse, cash flow forecasts for any given year are based largely on past records. Perhaps the most controversial aspect of the DCF model is the discount rate and the projection of permanent growth rates. There are a number of ways to assume a discount rate in the DCF stock valuation model. Analysts can use the Markowitz discount rate formula R = Rf + β (RM-RF) or the weighted average cost of Capital (CAPM) as the discount rate. But these two methods are more theoretical and are not very effective tools in practical investment applications. In addition, some investors will use a standard minimum rate of return to evaluate all stocks, which makes all stock evaluations the same. In fact, no discount rate forecast method is foolproof [10]. So, no matter what method is used to predict the results, investors should invest rationally and prudently.

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