Analysis of the Differences between DDM and DCF Models in Enterprise Valuation: A Case Study of Apple Inc

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Abstract. In today's complex and changeable financial market, it is very important for investors, managers and other stakeholders to accurately evaluate the value of enterprises. This paper takes the discounted dividend model (DDM) and discounted cash flow model (DCF) as the research object, and takes the world-famous Apple Company as the research object, and deeply analyzes the differences between the two in the application of enterprise valuation. By elaborating in detail on the basic ideas, development history and application scenarios of the two models, the relevant financial data of Apple Inc. are collected and processed, and the DDM and DCF models are respectively used to value it. The research results show that due to differences in model assumptions, cash flow selection and other aspects, there are significant differences between the two in the valuation results of Apple Inc. This research helps investors and business managers to have a clearer understanding of the characteristics of these two models, thereby enabling them to make more reasonable choices of valuation models in actual decision-making and enhancing the scientific and accuracy of decision-making.

Keywords: Enterprise valuation, DDM model, DCF model, Apple Inc.

1. Introduction

1.1. Research Background

Since its establishment in 1976, Apple has gradually grown from a small enterprise specializing in personal computer manufacturing to a global leader in the technology industry, thanks to its innovative product concepts and outstanding marketing strategies. In terms of products, from the early Apple II that initiated the popularization process of personal computers, to the later launch of the iPod that changed the way of music listening, to the epoch-making iPhone that redefined the smart phone, and to the iPad that opened up the tablet computer market, every product of Apple has triggered a consumption craze worldwide. It has profoundly changed people's ways of life and work. In terms of market performance, Apple's market value has been soaring and has long remained among the top globally, becoming a focus of high attention for investors. However, accurately assessing the value of Apple Inc. is no easy task, and the choice of enterprise valuation models has a significant impact on the valuation results. Therefore, it is of great practical significance to deeply explore the application differences of different valuation models in the valuation of Apple Inc.

1.2. Literature Review

Research on enterprise valuation models has a long history. In terms of the Dividend discount Model (DDM) model, Williams and Gordon proposed the DDM in 1938, laying the theoretical foundation for the quantitative analysis of virtual capital, assets and company value [1]. However, this model has certain limitations, such as poor applicability to new companies with fluctuating dividend growth rates or no dividend distribution at all, and it is highly sensitive to input parameters [2,3]. For the Discounted Cash Flow Model (DCF) model, it assesses the enterprise value by predicting the future free cash flow of the enterprise and discounting it, comprehensively considering the cash flow generated by the enterprise's operating, investment and financing activities [4]. However, this model also faces challenges, such as the difficulty in predicting future free cash flows, the subjectivity in choosing discount rates, and different discount rates may lead to significant differences in evaluation results [5]. Although existing studies have analyzed these two models, in-

depth comparative studies on the differences between them in the valuation of large technology enterprises like Apple are relatively scarce.

1.3. Research Objectives and Significance

This article aims to clearly demonstrate the advantages and limitations of the DDM and DCF models through the analysis of their differences in the valuation application of Apple Inc. From a theoretical perspective, it helps to further improve the theoretical system of enterprise valuation, enrich the understanding of the characteristics of different valuation models, and provide a more in-depth perspective for subsequent related research. In terms of practical significance, it can provide investors with more accurate valuation references, helping them make wiser decisions when investing in Apple's stocks. Meanwhile, enterprise managers can also draw on the research results of this study to more reasonably apply valuation models to assess the value of their own enterprises, providing strong support for strategic planning, financing decisions, etc.

2. Methods

2.1. DDM Model

2.1.1. Basic idea

The core idea of the DDM is that the value of a stock is equal to the sum of the present values of its expected dividends in all future periods. This model assumes that the purpose of investors purchasing stocks is to obtain future dividend income. Therefore, the intrinsic value of stocks is calculated by converting dividends from different future periods to the current moment at a certain discount rate. The basic formula is as follows:

$$V = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t} \quad (1)$$

Where V represents the intrinsic value of the stock, Dt is the expected dividend per share in the t-th period, and r is the necessary rate of return (discount rate) required by the investor. This formula indicates that the value of a stock depends on the amount of dividends to be distributed in future periods and investors' expectations of risk (reflected through the discount rate).

2.1.2. Development situation

The DDM model was first proposed by John Burr Williams in his book "Value Investing Theory" published in 1938, but it was not widely applied at that time. It was not until 1956 that McLaren J. Gordon proposed a transformed form of this model, the "Gordon Growth Model", assuming that dividends continue to grow at a fixed rate g, making the model more operational in practical applications, that DDM gradually gained wide acceptance in the investment community [1]. With the development of the financial market and the deepening of research, the DDM model has been continuously improved. Subsequently, variants such as multi-stage growth models that take into account different growth stages have emerged to adapt to more complex market conditions and enterprise development stages.

2.1.3. Application scenarios

The DDM model is mainly applicable to enterprises that have stable profits and continuously distribute dividends. For such enterprises, due to their relatively stable dividend policies, by making reasonable predictions of future dividends, the DDM model can be used to accurately assess the enterprise value. For instance, some mature public utility companies usually have stable cash flows and relatively fixed dividend distribution policies, which meet the application conditions of the DDM model. However, for some enterprises in the technology industry that are in a stage of rapid growth, with significant profit fluctuations and unstable dividend payouts or no dividend payouts at all, the applicability of the DDM model will be greatly reduced [6].

2.1.4. Classification

Zero-growth model: When it is assumed that dividends for each future period will be distributed in a fixed amount, that is, the dividend growth rate is 0. This model is applicable to companies with stable operating conditions, almost no changes in profitability and dividend distribution, such as some traditional public utility companies. Their businesses are less affected by market fluctuations, and their earnings and dividends are relatively stable.

Constant growth Model (Gordon Growth Model): Assuming that dividends increase at a fixed growth rate g, the formula is:

$$P_0 = \frac{D_1}{r-g} \tag{2}$$

Where D1 is the expected dividend for the next period, and D1 equals D0 multiplied by 1 plus g, D0 is the dividend for the current period, and P0 is the current price. This model is often applied to companies in a stable growth stage, such as some mature consumer enterprises. As their market share steadily expands and their products continue to sell well, their profits and dividends can maintain a stable growth trend.

Multi-stage growth model: Applicable to companies where dividend growth shows phased changes. For instance, a company might be in a stage of rapid growth in the early stage and then enter a stage of stable growth. Take the two-stage growth model as an example. Suppose that the dividend increases at the growth rate g1 within time T and then at the growth rate g_2 after T. The formula is given by:

$$V = \sum_{t=1}^{T} \frac{D_0(1+g_1)^t}{(1+r)^t} + \frac{D_T(1+g_2)}{(r-g_2)(1+r)^T} \tag{3}$$

$$D_t = D_0(1+g_1)^T \tag{4}$$

The multi-stage growth model takes into account the dividend changes of a company at different development stages and is more in line with the actual situation of some companies with complex development processes. For instance, some technology companies achieve rapid growth through technological innovation in the early stage of development, but as the market gradually matures, the growth rate slows down.

2.2. DCF Model

2.2.1. Basic idea

The DCF method can be used to calculate the enterprise value of an item or a company. Its core is based on the discounting belonging to the company's future Free Cash Flow to Firm (FCFF). Discount the cash flow at the weighted Average Cost of Capital (WACC); It can also be used to calculate the Equity value of a project or company, that is, to discount the Cash Flow based on the Cost of Equity (CoE) according to the discounted future Free cash flow attributable to shareholders (FCFE) [7]. The DCF model holds that the value of an enterprise depends on its ability to generate free cash flow in the future. By discounting the free cash flow of each future period to the present, the intrinsic value of the enterprise is determined. This method comprehensively takes into account the cash flows generated by the enterprise's operating activities, investment activities and financing activities, and more comprehensively reflects the economic essence of the enterprise.

2.2.2. Development situation

The development of the DCF model is closely related to the continuous evolution of financial theory and practice. Since its inception, with the in-depth analysis of enterprise cash flow and the improvement of discount rate calculation methods, the DCF model has been increasingly widely applied in enterprise valuation. The early DCF model was relatively simple in cash flow prediction and discount rate selection. As the complexity of the financial market increased, scholars and practitioners continuously improved the model, introducing more accurate cash flow prediction

methods and discount rate calculation models that take into account multiple risk factors, making it more reliable in the valuation of different industries and enterprise types [8].

2.2.3. Application scenarios

The DCF model is applicable to the valuation of all types of enterprises. However, in practical applications, for enterprises with a stable operating history and predictable future cash flows, its valuation effect is more ideal [9]. Whether it is a traditional manufacturing enterprise or a technology enterprise in a stable development stage, as long as the future free cash flow can be reasonably predicted, the DCF model can be used for valuation. However, for some emerging industry enterprises, due to the considerable uncertainty in their future development and the difficulty in accurately predicting cash flow, more caution is needed when using the DCF model, and a comprehensive judgment should be made in combination with other valuation methods [10].

3. Enterprise Valuation Based on Two Methods

3.1. DDM Valuation Results

To value Apple Inc. using the DDM model, it is first necessary to collect the dividend payout data of Apple Inc. over the past few years. Through the analysis of historical data, it is found that Apple's dividends have shown a certain growth trend in recent years (see Figure 1). Suppose that Apple's dividends will continue to grow at an annual rate of g in the future (where g is estimated based on historical data and a comprehensive judgment of the company's future development), and the required rate of return demanded by investors is r. Calculate the equity value of Apple Inc. based on DDM as: 22.36 USD.

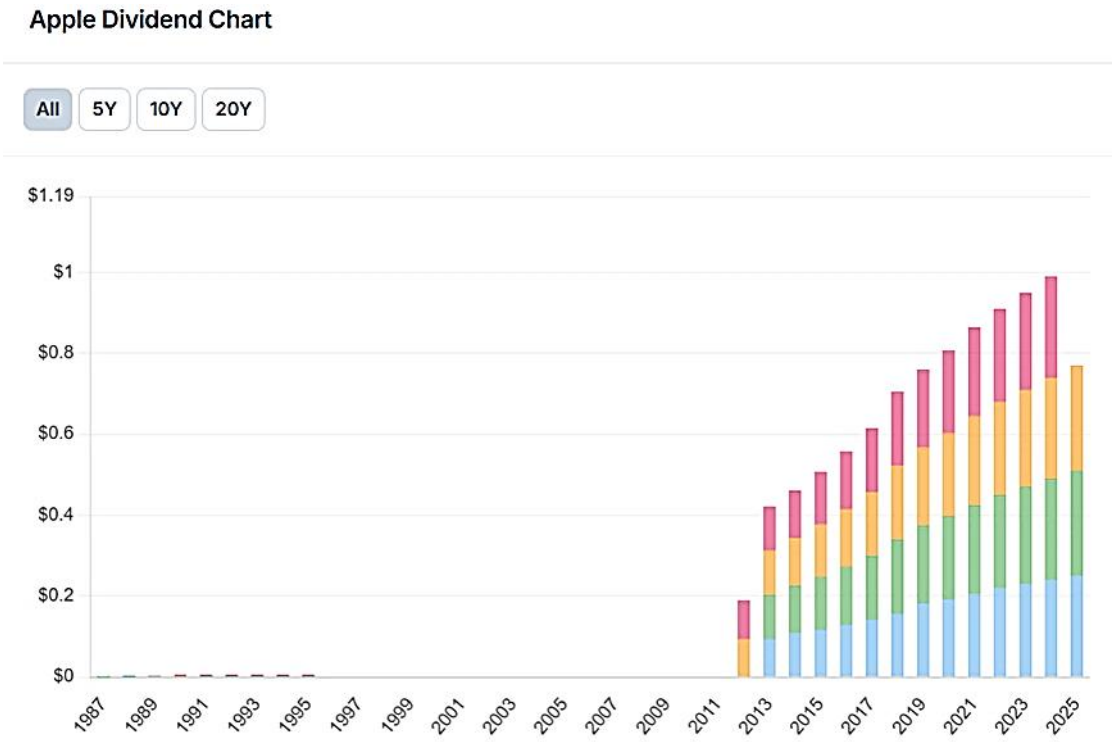

Fig. 1 The historical dividend trend of Apple Inc. and the future dividend forecast trend based on the assumed growth rate

According to the Gordon Growth Model (a common variant of DDM), the intrinsic value V of Apple Inc.'s stock can be calculated as follows: the latest quarterly dividend is $0.26 per share (announced by the board of directors on July 31, 2025, and paid on August 14, 2025), which annualizes to $1.04 based on data from Apple Press Release and Investor Relations; the yield on the 10-year US Treasury bond as of August 25, 2025, is 4.28%(Rf); AAPL's 5-year monthly Beta is 1.16

(ß, from Yahoo Finance); and the equity risk premium (ERP) for the United States is 4.00% (from Damodaran's latest annual table with updated values as of January 2025).

First, the required rate of return r is calculated as:

$$r = R_f + \beta \cdot ERP \tag{5}$$

Substituting the values, the author gets:

$$r = 4.28\% + 1.16 \times 4.00\% = 8.92\% \tag{6}$$

Apple Inc. currently pays an annual dividend of $1.04 per share, offering a dividend yield of 0.45%, with the next dividend payout date not yet announced; having achieved 13 consecutive years of dividend growth, Apple has steadily increased its payout at an average annual rate of 4.08% (g), demonstrating a consistent commitment to rewarding investors.

Let D0 = $1.04, the next year's dividend D1 is calculated as:

$$D1 = \$1.04 \times 1.0408 = \$1.082432 \tag{7}$$

The intrinsic value P0 of the stock is then calculated using the Gordon Growth Model, and substituting the values, the author gets:

$$P0 = \$1.082432 / (0.0892 - 0.0408) = \$22.36 \tag{8}$$

Far away from the current price of $232.14. At present, it is generally believed that as a leading technology company, Apple's stock price still has room to rise, which indicates that the valuation of this model is not accurate enough.

3.2. DCF Model Valuation Results

When valuing Apple using the DCF model, it is necessary to first calculate Apple's free cash flow. Free cash flow is divided into corporate free cash flow (FCFF) and equity free cash flow (FCFE). Here, Taking FCFE as an example for calculation. First, collect the financial statement data of Apple Inc., including information such as operating income, operating costs, capital expenditures, and changes in working capital. Calculate Apple's FCFE year by year, start with Apple's net profit for the year. Then, add the depreciation and amortization amount from the same period. Next, subtract the year's capital expenditure and the changes in working capital. Finally, add any new debt incurred during the year and subtract the debt repayment made within that period. The result of these steps will be Apple's FCFE for that year. Suppose that Apple's free cash flow maintains a specific growth pattern for a certain period of time in the future, then enters a stable growth stage, and the weighted average cost of capital is (WACC). By applying the multi-stage DCF model and discounting the FCFE of each future period to the present according to WACC, the equity value of Apple Inc. based on the DCF model is calculated as: 268.39 USD.

The growth rate g is 3.15%, which is close to the long-term growth rate of the US GDP; Apple's free cash flow (FCF) stands at 109 billion US dollars, with its FCF having grown at a rate of 13.7% over the past ten years, though it is assumed that this growth rate will be 10% (G) over the next decade. It is expected that in the future, Apple may increasingly rely on borrowing rather than operating cash flow as a source of funds for stock repurchases, which could lead to a slowdown in its growth, and the discount rate (WACC) is assumed to be 8%. FCF values for the coming years will be calculated using the following formula and presented in Table 1.

$$\mathrm{FCF_n} = \mathrm{FCF_0}(1 + G)^n \tag{9}$$

Then the present value (PVn) of FCF per year can be calculated in Table 1 using another formula.

$$PV_n = \frac{FCF_n}{(1+WACC)^n} \tag{10}$$

Table 1. The results of FCF and PV

Year (n)	Calculate	FCF value	WACC ($1/1.08^n$)	Real Value (PV)
1	109×1.10^1	119.90	0.9259	111.02
2	119.90 × 1.10	131.89	0.8573	113.18
3	131.89 × 1.10	145.08	0.7938	115.17
4	145.08 × 1.10	159.59	0.7350	117.21
5	159.59 × 1.10	175.55	0.6806	119.48
6	175.55 × 1.10	193.11	0.6302	121.79
7	193.11 × 1.10	212.42	0.5835	124.04
8	212.42 × 1.10	233.66	0.5403	126.25
9	233.66 × 1.10	257.03	0.5002	128.56
10	257.03 × 1.10	282.73	0.4632	131.06
Total	—	—	—	1197.76

Subsequently, the total value (TV) of the company in the sustainable growth stage can be calculated:

$$TV = \frac{FCF_{10}(1-g)}{(WACC-g)} \tag{11}$$

Substituting the data yields the result:

$$\text{TV} = 282.73 \times (1 + 3.15\%) / (8\% - 3.15\%) = 6{,}013.14 \text{ B USD} \tag{12}$$

Then convert it to present value:

$$\text{PV(TV)} = 6{,}013.14 \times (1 + 8\%)10 = 2{,}785.29 \text{ B USD} \tag{13}$$

The total enterprise value is calculated as the sum of the present value of FCF over the previous 10 years and the present value of sustainable value. When these two figures, 1,197.76 billion US dollars and 2,785.29 billion US dollars, are combined, the total enterprise value equals 3,983.05 billion US dollars. Equity value is determined using the formula where equity value equals total enterprise value minus debt plus cash, with a simplified calculation that assumes debt and cash offset each other. The per-share price is found by dividing the equity value by the total share capital. When 3,983.05 billion US dollars is divided by 14.84 billion shares, the result is 268.39 US dollars. This amount is higher than the current price of 232.14 US dollars, which indicates that the stock price is still undervalued and has room for growth.

4. Comparative Analysis and Suggestions

4.1. Comparative Analysis Results

By comparing the valuation results of Apple Inc. obtained based on the DDM and DCF models, it is found that there are significant differences between the two. The numerical gap between DDM and DCF model reflects the differences between the two models in terms of assumptions, cash flow selection, and understanding of enterprise value. From the perspective of assumptions, the DDM model mainly values based on dividend distribution, assuming that the company's profits are mainly returned to shareholders in the form of dividends. The DCF model, on the other hand, pays more attention to the overall free cash flow of an enterprise, taking into account the capital flow used by the enterprise for its own development and debt repayment, among other aspects. In terms of cash flow selection, DDM only considers dividend cash flow, while DCF covers all relevant cash flows generated from the company's operating, investment and financing activities. This makes the DCF

model more comprehensive in assessing the company's value. Further analysis of the reasons for the differences reveals that as a technology company, Apple's profits are not only used for dividend distribution but also heavily invested in research and development, market expansion, and other aspects. This makes the DDM model based on dividends may not fully reflect its full value, while the DCF model can better capture the overall economic activity value of the enterprise.

4.2. Suggestions

Based on the above comparative analysis results, for investors, when using valuation models to assess the value of Apple Inc., they should avoid using only the DDM or DCF models. Given the industry characteristics and business model of Apple Inc., it is recommended to comprehensively apply multiple valuation models and verify them with each other to obtain more accurate valuation results. For instance, while referring to the DDM and DCF models for valuation, combined with relative valuation methods such as the price-earnings ratio (PE) and price-to-book ratio (PB), the value of Apple Inc. can be examined from different perspectives. For business managers, if they hope to optimize strategic decisions through valuation, they should have a deep understanding of the focuses of different valuation models. When enterprises focus on shareholder returns and hope to enhance enterprise value through reasonable dividend policies, they can pay close attention to the information reflected by the DDM model. If an enterprise is in an expansion stage and pays more attention to its overall cash flow generation capacity and long-term development potential, the DCF model can provide more valuable references. Furthermore, whether investors or managers, when applying valuation models, they should fully consider the differences between the model assumptions and the actual situation, and carefully adjust the model parameters to enhance the accuracy and reliability of the valuation.

5. Conclusion

This paper takes Apple Inc. as the research object and conducts an in-depth analysis of the application of DDM and DCF models in enterprise valuation. By elaborating in detail on the basic ideas, development history and application scenarios of the two models, the valuation of Apple Inc. is conducted respectively using relevant data, and the valuation results are compared and analyzed. The research found that due to the differences in model assumptions and cash flow selection, there are significant differences in the valuation results of Apple between the DDM and DCF models. The DDM model is based on dividend cash flow and has good applicability to enterprises with stable profits and continuous dividend payouts. However, for technology companies like Apple, due to the diversity of their profit distribution, it may not fully reflect the enterprise value. The DCF model comprehensively considers the overall free cash flow of an enterprise and can more comprehensively assess the value of Apple Inc.

However, this study also has certain limitations. During the application of the model, the prediction of future cash flows and the selection of discount rates are not accurate enough, which may affect the accuracy of the valuation results. At the same time, taking only Apple as an example for research, the sample is relatively single and may not be fully extended to other enterprises. Future research can further optimize cash flow forecasting methods and discount rate determination approaches to reduce the impact of subjectivity on valuation results. In addition, expanding the research sample and conducting extensive studies on enterprises in different industries and at different development stages will help to more comprehensively reveal the application rules and differences of the DDM and DCF models in enterprise valuation.

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