Proceedings of the 3rd International Conference on Financial Technology and Business Analysis
DOI: 10.54254/2754-1169/108/20242035

Comparison of CAPM and DVM: Evidence from Costco and Walm

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Abstract: In the financial field, asset pricing models are crucial for investment decisions and enterprise value assessment. This article compares and studies two common asset pricing models, CAPM and DVM. There are differences in parameter estimation and assumptions between the two models. The CAPM offers a theoretical derivation of the relationship between required returns and systemic risk by precisely accounting for a firm's level of systemic risk relative to the entire stock market. However, the assumptions of this model are unrealistic, and the accuracy of variable values cannot be accurately grasped. The calculation process for DVM's conclusion is concise and applicable to most companies. Nevertheless, the input data used in the calculation process may not be accurate. At the same time, it ignores the growth of future returns, ignoring explicitly include risks, and is not applicable to companies that distribute zero dividends. This study is beneficial for providing investors and enterprises with a more comprehensive basis for selecting pricing models, and promoting the development of financial theory and practice.

Keywords: WACC, DVM, CAPM, Beta.

1. Introduction

The cost of capital is an important determinant in the financing decision of a company. Gordon popularized the idea that the cost of capital is the same as the property discount rate [1]. He emphasized that the profitability of a particular investment above (or below) this discount rate will increase (or decrease) the value of that vendor. It can be viewed as the necessary rate of return from the perspective of the investor. The performance of a corporation is usually assessed using the return on invested capital. Thus, an investor-owner (shareholder) assesses the company performance considering the gain of the invested capital value [2].

Shareholders require a paramount rate of return. The cost of equity capital serves as a crucial foundation for decisions about financing and investments [3]. This research study examines and contrasts the Dividend Valuation Model (DVM) and the Capital Asset Pricing Model (CAPM). The roles that the DVM and CAPM models play in the computation of WACC are distinct. The primary use of the CAPM model is to estimate the cost of capital. This cost, in turn, is used to establish the expected rate of return for investors, taking into account market risk premiums and asset beta coefficients. The DVM model offers a cash flow-based approach to valuation that makes it easier for investors to comprehend a company's profitability and room for expansion. Consequently, acquiring a more accurate approximation of the rate of return that equity investors require.

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Comparing dividend valuation models and asset capital pricing models can help investors evaluate asset value and optimize investment portfolio allocation in investment decision-making. In terms of corporate financial management, DVM helps with company valuation and provides a basis for decision-making by enterprise managers such as mergers and acquisitions financing. CAPM helps determine the capital cost of the enterprise, which is crucial for project investment decisions, capital structure optimization, and so on. DVM and CAPM are both important components of asset pricing theory. Comparative research is beneficial for deepening the understanding of the mechanism of asset price formation in financial markets, promoting theoretical progress and effective operation of financial markets.

2. Data and Method

2.1. Methodologies

One important metric that businesses use to evaluate the feasibility of investment plans is the cost of capital. Before choosing to raise funds through the issuance of shares or retained earnings, an organization must be aware of the cost of capital. Thus, the company may select the most advantageous financing package to reduce its overall cost. It is also necessary for valuing businesses. When evaluating the target company's value in a merger or acquisition, the acquirer must take the cost of equity capital into account. Investors find it noteworthy as well. Investors acquire the ability to evaluate the risk and expected return of a stock investment. Based on more precise cost estimations, market participants can make more logical financing and investment decisions, encouraging the effective use of already available resources.

The DVM uses a discounted formula to calculate the cost of capital, assuming the market stock price is true and accurate, neither undervalued nor overvalued. The only cash flow investors receive from a company is dividends. The value of a stock is determined by its expected future dividend flow, discounted to its present value. It is important to understand the frameworks that support the link between an investment's risk and return. Diversification cannot eliminate systematic risk, but it can minimize unsystematic risk if a portfolio is kept well-diversified.

In a project, the cost of capital can be computed by using the CAPM. This figure is contingent on the project's systematic risk and may differ from the firm's overall cost of capital [4]. The systemic risk of any asset reflects the correlation between the returns of that asset and the overall welfare of investors, or more specifically, how little an asset yields during periods of low investor wellbeing [5]. The company's equity beta is used to measure it. The strength of the CAPM's forecasts regarding risk measurement and the relationship between projected return and risk make it appealing [6]. The Weighted Average Cost of Capital (WACC) is one of the important parameters of finance and it helps the firm valuation, capital budgeting analysis, and several other applications.

One of the key financial metrics, the WACC, is used for capital budgeting research, corporate valuation, and many other purposes [7]. WACC determines a weighted average based on the various weightings of the capital structure's costs of capital, accounting for the cost of capital from various sources such as debt and equity. By calculating WACC, companies can determine the feasibility of a project and ensure that the project's rate of return meets their expectations.

For DDM model, it can be described as:

$$P_0 = \frac{Do(1+g)}{r_e - g}, K_e = r_e = \frac{D_0(1+g)}{P_0} + g \quad (1)$$

where, $K_e = r_e = Cost\ of\ equity$; g=Dividend growth rate; D_0 =Dividend to be paid at the conclusion of year 0; P_0=Share price =Ex-dividend share price. Most companies expect dividends to

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increase from year to year. A logical model would assume constant growth. The g, for the given period can be computed as follows:

$$g = \sqrt[n]{\frac{last\ dividend}{first\ dividend}} - 1 \quad (2)$$

Here, N=the number of years of dividend growth. As for Gordon's growth model [8]:

$$g = br_e \quad (3)$$

where r_e =Return on equity (ROE); b=Retention rate=1-dividend pay-out ratio. This model is formulated under following assumptions:

- Retained earnings are the only source of growth in earnings;
- For every future year, the historic return on equity capital will persist;
- The retention rate is constant.

As for Capital Asset Pricing Model [9]:

$$E(r)j = R(f) + \beta\big(E(rm) - R(f)\big) \quad (4)$$

where E(r)j=Required return from the investment; R(f)=Risk-free rate of return; β=beta value of the investment; E(rm)=Average return from market portfolio; E(rm)-R(f)=Equity risk premium. The validity of CAPM's conclusion depends on whether the following assumptions are true:

- Investors utilize the mean variance efficient portfolio in a single period model to gauge the quality of the portfolio;
- Investors consistently anticipate the market's expected return, variance, and covariance;
- Investors are price receivers and have a strong aversion to risk;
- The market is free of taxes, transaction costs, or information barriers, all assets can be market-oriented, and investors can borrow at risk-free rates [10].

2.2. Data

Costco and Walmart were selected to study the comparison of DVM and CAPM. Costco and Walmart are globally renowned retail companies with significant positions and influence in the industry. Their business model, financial condition, and market performance can all reflect the overall characteristics and trends of the retail industry. There is a competitive relationship between the two in the market, and a deep understanding of how companies use different strategies to create value and control risks in a fiercely competitive dynamic environment is of great significance for the validation and application of DVM and CAPM models. As listed companies, both have accumulated a large amount of rich and reliable financial data in their years of operation, and both follow strict financial data disclosure standards, with high information transparency, providing sufficient materials for model parameters and analysis, and reducing the uncertainty and error of research data. Costco focuses on membership based warehousing retail, emphasizing high cost-effectiveness and large packaging sales; Walmart adopts various retail formats, including supermarkets, hypermarkets, etc. The differences in this business model can lead to differences in cost structure, profit sources, and market positioning, thereby affecting its risk and return characteristics, providing rich comparative samples for the analysis of risk factors in the CAPM model. This study adopts Gordon's growth model to calculate dividend growth rate. The data of the two companies is summarized in Table 1, Table 2, Table 3, Table 4, Table 5, Table 6 and Table 7.

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Table 1: Annual data of Walmart and Costco dividend pay-out ratio

Walmart date	2021-01	2022-01	2023-01	2024-01
dividend pay-out ratio	0.46	0.45	0.53	0.40
Costco date	2020-08	2021-08	2022-08	2023-08
dividend pay-out ratio	0.30	0.26	0.26	0.27

Table 2: Walmart and Costco Retention rate

Walmart date	2021-01	2022-01	2023-01	2024-01
Retention rate	0.54	0.55	0.47	0.60
average	0.54			
Costco date	2020-08	2021-08	2022-08	2023-08
Retention rate	0.70	0.74	0.74	0.73
average	0.73			

Table 3: Return on equity Annual Data

Walmart	2021-01	2022-01	2023-01	2024-01
ROE	17.37%	16.66%	14.61%	19.32%
Costco	2020-08	2021-08	2022-08	2023-08
ROE	23.87%	27.94%	30.59%	27.54%

Table 4: Share price

Costco	$845.085 Jul 12, 2024
Walmart	$69.755 Jul 12, 2024

Table 5: Dividend for Walmart

Cash Amount	Declaration Date	Payment Date
$0.56	02/17/2022	09/06/2022
$0.56	02/17/2022	05/31/2022
$0.56	02/17/2022	04/04/2022
$0.55	02/18/2021	01/03/2022

Table 6: Dividend for Costco

Cash Amount	Declaration Date	Payment Date
$0.79	10/13/2021	11/12/2021
$0.79	07/13/2021	08/13/2021
$0.79	04/14/2021	05/14/2021
$0.70	01/21/2021	02/19/2021

Table 7: Annual data of beta coefficient for Walmart and Costco

Date for Walmart	2021-01	2022-01	2023-01	2024-01
β	0.42	0.48	0.53	0.56
Date for Costco	2020-08	2021-08	2022-08	2023-08
β	0.60	0.59	0.63	0.99

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Treasury bonds are often thought to be risk-free, at least from the perspective of credit. Some people also choose short-term banks for 3-5 years. The bond market interest rate is treated as a risk-free rate, which is taken as 4.187% for the US 10-year Treasury bond. Compared with short-term treasury bond interest rate, the term of long-term treasury bond is more consistent with the term of equity investment to be discounted [11]. For average return from market portfolio, this study utilized approximation the Average Return from Market Portfolio as Return on Equity.

3. Results and Discussion

To simplify the analysis, the impact of taxes and inflation is not considered in the calculation. Based on the assumption of the formula, Walmart's retention rate is taken as the average of 0.54 over the past four years, while Costco's retention rate is 0.73. For return on equity, select the most recent data, which is 19.32% for Walmart and 27.54% for Costco. Using the formula □ = □□□ and the data provided above, it is feasible to compute the dividend growth rate: Walmart's dividend growth rate is 10.43%, while Costco's dividend growth rate is 20.10%. Dividend to be paid at the conclusion of year one is the sum of quarterly dividends as shown in Table 8. The cost of equity of two companies can be obtained using the DVM model given in Table 9. By using the CAPM model, the required return from the investment of two companies can be calculated as presented in Table 10.

Table 8: Dividend to be paid for the two companies.

	Walmart	Costco
D1	$2.23	$3.07

Table 9: The cost of equity of two companies

	Walmart	Costco
ke	13.54%	20.46%

Table 10: The required return from the investment of two companies

Walmart	2021-01	2022-01	2023-01	2024-01
	9.72%	10.17%	9.71%	12.66%
Costco	2020-08	2021-08	2022-08	2023-08
	16.00%	18.20%	20.82%	27.31%

The WACC calculated using the DVM model is slightly larger compared to the CAPM model. The WACC calculated by CAPM model and DVM model may differ. This is because the two models are based on different assumptions and constraints, and they have different ways of considering risks. At the same time, the capital market is complex and volatile, full of uncertainty and volatility, and calculations based on historical data may have significant deviations.

In actual investment, how to choose CAPM model and DVM model to calculate WACC depends on multiple factors. Firstly, the stability and growth rate of the company. If the company's cash flow is stable and its growth rate is predictable, the DVM model may be more applicable. In cases where a firm's growth rate exhibits instability or is ill-defined, the CAPM model might be a better fit due to its emphasis on the correlation between market returns and risk. Secondly, specific industries use specific models. The DVM model is more suitable for stable companies in mature industries, while for high-risk or emerging industries, the CAPM model can better reflect risk factors. Data availability must also be considered. It may be simple to estimate the CAPM model's parameters, such as the β, market risk premium, and risk-free rate. The DVM model requires the company's dividend data,

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which may be difficult for some companies to obtain or accurately predict. It is necessary to consider the limitations of both models. The market may behave irrationally and have information asymmetry, despite the CAPM model's assumption that it is efficient. The DVM model relies on predicting dividends, and dividend policies may be influenced by multiple factors.

4. Conclusion

To sum up, this study conducted an in-depth comparison between CAPM and DVM and found that CAPM has an advantage in measuring the impact of systemic risk on asset pricing, while DVM is more accurate in evaluating the value of stable dividend paying enterprises. Meanwhile, there are differences in the applicability of the two under different market conditions and stages of enterprise development, and the rationality of data acquisition and model assumptions also affects their application effectiveness. In the future, it is expected to further optimize these two models or explore new pricing methods that integrate their advantages to more accurately reflect asset value. These results provide a reference for investors and enterprises in asset pricing choices, which helps to enhance the scientific nature of financial decision-making and promote the healthy development of financial markets.

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