Stock Value Analysis Based on the DDM Model: An Example of Company COSCO

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Abstract. The stock market is unpredictable and there are many ways and means to analyze stocks, DDM is still worth to be analyzed and discussed as one of the less common but very basic and important analytical means. This paper, will focus on GGM in DDM and apply it to COSCO Shipping Holding to find out whether DDM is applicable to this stock and whether this stock is worth investing in. In this paper, it obtains the relevant data from the company's annual report as well as the financial data website, calculate and derive the final estimate by using the DDM formula. The estimated value will be compared with the actual value to determine whether the stock is worth investing in or not. In the end, the estimated value calculated by DDM is much larger than the actual stock price, which means that the stock is seriously undervalued and may bring great returns according to the principle of DDM. Combining the actual situation and objective factors, this paper concludes that the principle and formula of DDM are very important, but it is not applicable to all situations. The necessary conditions are more demanding, and they need to be combined with many other theories to analyze many aspects.

Keywords: Dividend discount model; Gordon growth model; Stock value analysis.

1. Introduction

COSCO Shipping Holdings, one of the world's largest container shipping companies, has continued its global expansion efforts. Over the past decade, it has expanded its presence in key international markets, including Europe, the Americas, and Asia [1]. The company has been involved in significant mergers and acquisitions (M&A) activities to strengthen its position in the industry. Notably, COSCO Shipping Holdings acquired Orient Overseas Container Line (OOCL) in 2018, which further solidified its global market share [2]. The company's financial performance has varied over the past decade, influenced by factors such as global economic conditions, shipping industry dynamics, and trade tensions. It experienced both periods of growth and challenges during this time. Like the entire shipping industry, COSCO Shipping Holdings faced challenges related to overcapacity, rate volatility, and disruptions caused by the COVID-19 pandemic. These challenges impacted its financial performance during certain periods. As of September 2023, COSCO Shipping Holding has a market capitalization of $151.37 billion, a profit margin of 22.54% and a return on assets of 10.72% [3]. This shows that despite the impact of the epidemic on the company's business conditions, its strong recovery as a headline company has led to its current still smooth operations and makes it a worthwhile stock choice for investment.

In this paper, it will examine how DDM can help investors to make judgments and choices and discuss whether DDM is applicable to all situations by comparing them. What is the significance of the results computed by DDM, are there better alternatives to DDM, and are there limitations to DDM? These are some of the questions that will be discussed in this paper.

This article will focus on the performance of COSCO shipping holdings in the stock market over the last decade. The selection is driven by several factors. Firstly, this period encapsulates significant economic and market dynamics that have direct implications for COSCO Shipping Holdings' financial performance. Secondly, it offers a comprehensive analysis of the company's recent performance, considering any challenges or opportunities that may have arisen during this time frame.

Investing in COSCO shipping holding requires a value analysis. There are many methods used to analyze the value of a stock, including Dividend Discount Model (DDM), Discounted Cash Flow (DCF) Analysis, Fundamental Analysis, Technical Analysis, and Price-to-Earnings (P/E) Ratio

Analysis. Earnings (P/E) Ratio Analysis and Price-to-Book (P/B) Ratio Analysis [4]. The Dividend Discount Model (DDM) is chosen as the valuation methodology for several reasons. COSCO Shipping Holdings has a history of paying dividends, making it well-suited for DDM analysis. This model allows for the estimation of the stock's intrinsic value by assessing the present value of its future dividend payments, aligning with the company's dividend history and financial structure. Not only that, but the variables and antecedents (r>g) required for the DDM model are all met by the company's data, and then DDM becomes a relatively simple, clear, and usable method of analysis.

This paper will introduce the DDM model, including its fundamental principles, formula, key variables, and a discussion of its advantages and disadvantages. Following this introduction, the DDM model will be applied to analyze the intrinsic value of COSCO Shipping Holdings' stock. Among the several forms of DDM, we choose GGM as the calculation method and focus on how GGM in DDM performs when applied to this stock. The analysis will involve data sourcing, substitution, calculation, and visualization, followed by a valuation summary and conclusion.

For investors or securities firms, DDM has very profound implications. Although its formula is not complex, its underlying logic is an important foundation to help investors make comparative analyses and choices. It may not be applicable to all situations, but the estimates it calculates are certainly informative for investors and help them to have an initial perception of a stock.

2. Using the DDM Model

2.1. Basic Information

The Dividend Discount Model (DDM) is a fundamental approach to valuing stocks. It relies on the principle that the present value of a stock's future dividend payments can determine its intrinsic value. In the case of COSCO Shipping Holdings, this model will be used to estimate the stock's worth based on expected dividend payments. DDM takes the value of time, which is an important factor [5]. It can more accurately predict how much investing in a stock will actually generate for the investor. In practice, the values calculated from the DDM can be used to make comparisons to confirm whether investing in a stock will generate a return. The stock is inexpensive and should be purchased if the DDM value exceeds the market price. [6].

2.2. Formula

2.2.1. Zero Growth Model

The DDM formula can be expressed in many formats. The simplest iteration is when assumes zero growth in the dividend. Then the formula will be:

$$PV_0 = \frac{D}{(1+r)} \tag{1}$$

Here in the formula above, PV_0 represents present value, D is dividends and r represents interest rate.

2.2.2. Gordon Growth Model

In practice, however, zero growth rarely occurs. Then, when there is dividend growth, the formula for DDM will change to the new format, which is familiar as “Gordon growth model (GGM).

If it requires multiple years, for example n years, then the formula will be:

$$PV_0 = \frac{D_1}{(1+r)} + \frac{D_2}{(1+r)^2} + \cdots + \frac{D_n}{(1+r)^n} \tag{2}$$

The other format is given as

$$V_0 = \frac{D_0(1+g)}{(r-g)} = \frac{D_1}{(r-g)} \tag{3}$$

Where V_0 represents present value, which is the price per share. D_0 is the value of this year's dividend. D_1 Is the estimated value of next year's dividend? r Is the company's cost of capital equity? g Is the dividend growth rate that will always be constant [7].

2.3. Advantages and Disadvantages

2.3.1. Advantages

Firstly, DDM is simple and intuitive. DDM is relatively straightforward to understand and apply. Its foundation is the idea that a stock's value is determined by the present value of future dividends, making it accessible to both inexperienced and seasoned investors. Secondly, DDM is income oriented. DDM is especially suitable for income-focused investors who prioritize dividend income. It helps them assess the attractiveness of a stock based on its expected dividend payouts.

Thirdly, DDM has sensitivity analysis. By changing important inputs, such as the growth rate and discount rate, DDM enables sensitivity analysis. This sensitivity analysis aids in determining how various scenarios will affect stock value.

2.3.2. Disadvantages

First of all, DDM is under assumptions and projections. DDM relies heavily on assumptions, such as the dividend growth rate and discount rate. Inaccurate or unreliable projections can lead to flawed valuations.

Moreover, DDM has limited applicability. DDM may not be suitable for valuing companies experiencing significant changes or disruptions in their business models, as it assumes a relatively stable dividend policy.

Finally, DDM has risk based on discount Rate. Determining the appropriate discount rate (required rate of return) is subjective and depends on the investor's risk tolerance. Choosing an incorrect discount rate can lead to inaccurate valuations [8].

3. Calculation and Analysis of DDM's Intrinsic Value

3.1. Data Sources

Since this paper focuses on how GGM behaves as one of the forms of DDM, this paper focuses on obtaining all the data required for GGM and finally using GGM for computation. The GGM analysis will rely on data from various sources, including COSCO Shipping Holdings' financial reports, historical dividend records, industry reports, and market data. Some data were taken from several financial data sites, including Yahoo Finance, Cn. Investing, Gurufocus, etc.

According to the annual report as well as the information gathered from the data site, the share price of COSCO shipping holding on 5th September 2023 was 9.95RMB per share. The company's market capitalization was 151.37 billion, the basic earnings per share was 1.03RMB and the return on capitalization was 9.72%. Since the growth rate of dividends has not remained constant over a ten-year period, from 2012 to 2022, this paper has taken the median of the ten-year data of 9.10% as the g required for the calculation.

3.2. Data Substitution and Calculation

From 3.1, D_0 is 1.03, r is 9.72% and g is 9.10%. Then, we can use equation (3) which is the formula of GGM to calculate the resultV_0, which is the present price of the stock.

$$V_0 = \frac{D_0(1+g)}{(r-g)} = \frac{1.03\times(1+9.10\%)}{(9.72\%-9.10\%)} = 181.246774 \approx 181.25\ RMB \quad (4)$$

4. Discussion

4.1. Reporting Calculated Values

After the third part of the calculation, we finally conclude that the value of the stock calculated by DDM should be 181.25RMB per share. This is calculated under the formula of Gordon Growth Model.

4.2. Comparison of Calculated and Actual Values

According to exchanges as well as data sites, the share price of COSCO shipping holding is at this moment 9.95 RMB. This is a very big difference between the 181.25 RMB calculated by DDM. Although according to the DDM principle this means that the stock is a very good investment and is seriously undervalued, a realistic analysis shows that it is not possible to have such a big difference between the estimated value and the actual value. Therefore, the calculated estimates may not be convincing and other factors may have influenced the calculations, which will be analyzed in depth in the subsequent sections. However, at the very least, such a large discrepancy in the estimate is not convincing without a multi-faceted comparison in conjunction with other analytical methods.

4.3. Reasons for Differences

The case of COSCO Shipping Holding may not be applicable to DDM's Gordon Growth Model. The GGM is under the assumption that the growth rate of dividend is constant [9], however, based on the data acquisition process it can be found that the growth rate of this stock over the decade has actually been changing. This paper just takes the median of the ten years data, which is not an exact value, which can lead to serious errors in the results.

There may be problems or errors in the data. Since most of the data comes from data websites rather than specialized databases, its accuracy may not be guaranteed. Since DDM is very sensitive to each factor in the formula, any error in any piece of data can lead to a large error in the final result [10].

The time span is too long. In this paper, the data status of COSCO Shipping Holding for the last ten years is selected for analysis, including The median or average of ten years' worth of data is used to calculate the company's cost of capital equity and dividend growth rate. Missing data in some years of the ten-year period may lead to discrepancies between the final estimate and the actual value [11].

5. Conclusion

This paper examines and discusses how the DDM model as a stock analysis method is calculated and used and helps the investor to make the final decision. The paper uses the data of COSCO Shipping Holding, a stock for 2012-2022, as an example of a practical budget and validates it by comparing the estimated values with the actual values.

Firstly, this paper chooses DDM as the research method of this paper among many stock analysis methods. Then, this paper understands and introduces the definition, content, formula, and principle of DDM. Subsequently, this paper chooses GGM as the research method of this paper among the many forms of DDM. To verify the validity and persuasiveness of DDM, this paper selects COSCO Shipping Holding as the research object and obtains the relevant financial data of this stock within ten years from various ways, the sources include the company's annual report, data websites and so on. After obtaining dividend, growth rate of dividend, and cost of capital equity, all factors are substituted into the formula to calculate the result. The calculated value is the estimated value obtained by DDM, which is the estimated stock price. Finally, this paper compares and analyzes the calculated estimate with the actual stock price.

After a series of calculations and comparison of results, this paper finds that the estimated value calculated by DDM is much larger than the actual stock price, which according to the principle of DDM, this paper can think that this indicates that this stock can bring a very big gain. This paper finally concludes that COSCO Shipping Holding is severely undervalued, and this is a stock that is

well worth investing in. It will provide investors with great returns, not necessarily in the short term, but it is certainly a very high-quality stock.

There are indeed some limitations with DDM and the whole analysis process. Firstly, in the introduction to DDM it is known that the DDM formula is very sensitive to the data of any of the components. A small error in any of these data can lead to a huge difference in the results. Therefore, the estimates calculated using DDM are not sufficiently accurate when there is no guarantee that the data will be accurate. Secondly, the period for selection is long. A ten-year period can lead to some incomplete data, which is also increasing the possibility of errors in the results. Moreover, DDM is not always appropriate for new companies that have fluctuating dividend growth rates or do not pay dividends at all. Observations from the data over a ten-year period reveal that companies are not guaranteed to pay dividends every year, which can also lead to DDM not being applicable. Finally, there is no guarantee that the data obtained in this paper will be accurate, as some of the data is not disclosed in the company's annual report and can only be obtained from data websites. However, the information from data websites is not authoritative and cannot be guaranteed to be completely accurate.

A three-year cycle could be used instead of a 10-year cycle, which would not be visionary for a shorter period but would ensure accurate data. In terms of data accuracy, one can find ways to access specialized financial databases to obtain certain accurate data. If GGM cannot be applied to COSCO's situation, you can consider using DDM's more complicated formula to calculate the intrinsic value, so that the estimated value obtained will be relatively accurate.

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