

Comparison of DCF Valuation and DDM Valuation of Stock Price of Boyd Gaming Corporation

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Abstract. The valuation of a company is done through different approaches and models by analysts. The common models utilized by the analysts are the dividend discount model (DDM) and discounted cash flow model (DCF). Some analysts rely on the dividends to analyze the stocks and some analysts rely on the free cash flows to analyze different stocks. The following report determines the accuracy of the two models. The models have been analyzed using the Boyd Gaming Corporation, a publicly listed stock on the New York Stock Exchange. The stock exchange is one of the biggest and most developed markets. Therefore, the market is efficient and states that the market price reflects the true share price or intrinsic share price as per the efficient market hypothesis. The DMM model stated that the stock is underpriced and the DCF model stated that the stock price is overpriced. The results of the study concluded that the discounted cash flow model is more accurate in determining the market price of the share in comparison to the dividend discount model.

Keywords: DCF, DDM, FCFF, CAPM, WACC

1. Introduction

Different approaches are used in the market to analyze the intrinsic value of the company. The most common measures used are the cash flow models namely the dividend discount model and discounted cash flow model using the free cash flow to the firm (FCFF). The discounted cash flow model finds the present value of the cash flows to find the intrinsic value and the DDM model uses and forecasts dividends to find the intrinsic price of the share. There is still a research lag for the investors to understand which financial model to use for their investment purposes as both models have their own shortcomings. Therefore, this research will be prepared to analyze the intrinsic value of the company Boyd Gaming Corporation using the two cash flow models and the results will be compared with the market price of the share that prevailed on the New York Stock Exchange to analyze which model is the best fit.

The value of a stock is the result of the present value of the future cash flows or dividends. The present value represents the intrinsic valuation of the share that is being analyzed. There are two different cash flow-based valuation approaches including the dividend discount model and the discounted cash flow model. The same assumptions are to be applied to both models in order to get identical valuations [1]. In this way a better comparison of both the models would be done to identify which model results in more close intrinsic valuation to the market price of the stock.

There have been different studies that were performed in the past on these intrinsic valuation methods. The efficient market hypothesis states that the stock price of a company inherits all the available information in the market which makes the market price of the stock the true intrinsic value of the stock. The stock market of the United States is one of the most developed and traded markets in the world. The stock market of the United States has evolved over the years and is an efficient market. In fact, the indexes of the United States are used by analysts to compare with other markets. The market of the United States is also found to be consistent with the efficient market hypothesis [2].

According to a study by the research on the dividend discount model (DDM) and discounted cash flow (DCF) model, it has been found that the DDM model is more accurate than the DCF model [3]. According to the DCF model, the fair value yield is much higher than the current stock price. On the other hand, another study on appraisers in Bulgaria showed that the analysts use

relative valuation followed by the DCF valuation model. Among these models, the DCF model is intensively utilized by the analysts whereas analysts have less confidence in the relative valuation [4]. In another study, the dividend discount model and free cash flow model were applied to firms of different sizes. The results of the study were remarkably the same for both valuation models [5].

A study was conducted on the Macedonian Stock Exchange to find the effectiveness of the dividend discount model. The results of the study indicated that there have been specific stocks where using the dividend discount model was useful in estimating the intrinsic valuation. Moreover, the research stated that there are problems with the dividend discount model leading to differences between the stock prices and intrinsic values. Therefore, it resulted that using the dividend discount model is only useful as an additional model besides the discounted cash flow model [6]. Contrary to this, another study on Indian stocks was conducted using the discounted cash flow model of free cash flows. The study was conducted to analyze whether the model is capable of capturing the market price of the stock or not. The results of the study concluded that the discounted cash flow model is useful and robust in capturing the market price of the stock. Therefore, using the correct values and technique the valuation can be done and the true value can be determined [7].

This research topic is focused on the valuation models used by analysts in order to derive the intrinsic valuation of the share price. This report aims to compare the predictive power inherited in both the valuation models including the DCF model and DDM valuation model. To derive the intrinsic valuation, a US stock exchange-listed company named Boyd Gaming Corporation is listed on NASDAQ with a ticker of BYD. The share price of the company as of the reporting date of the last annual report (31 December 2023) will be used for the comparison which is USD 62.61. The company has been operating as a multi-jurisdictional gaming company in different geographies including Illinois, Iowa, Louisiana, Missouri, Ohio, Indiana, etc. It was founded in 1975 and has been one of the finest and largest casino entertainment companies in the United States.

2. Method

2.1. DCF Model

The firm's free cash flows for the next five years are forecasted based on past financial statements and assumptions. Then the discounted cash flow model is used to estimate the intrinsic value per share.

The discounted cash flow model finds the intrinsic value of the share by discounting the forecasted future cash flows of the company. Firstly, different constituents of the financial statements of the company are analyzed and forecasted. These constituents majorly include the revenue, selling general, and administrative expenses are deducted from the revenue to find the earnings before interest tax depreciation and amortization (EBITDA). Thereafter, the depreciation, interest, and tax are deducted from EBITDA to get the net profit of the company after tax. Further, the depreciation is added to the net income, capital expenditure is deducted, and working capital is also deducted to find the free cash flows of the firm (FCFF). Since it is a large-cap company, the company will be assumed to grow at a constant rate after five years as it will enter a mature phase, this long-term rate will be used to find the terminal value of the company for the foreseeable future.

To find the discount rate to get the present value of free cash flows of the firm, the company's capital structure is analyzed to find the weighted average cost of capital.

$$WACC = Kd \times Wd \times (1 - tax) + Ke \times We \quad (1)$$

This involves the cost of debt (Kd), cost of equity (Ke), weight of debt (Wd), weight of equity (We), and tax rate. The cost of equity is estimated using the Capital Asset Pricing Model (CAPM):

$$Re = Rf + Beta(Rm - Rf) \quad (2)$$

Here, Re is the cost of equity, Rm is the return on market, Rf is the risk-free rate, and Beta is the sensitivity of or risk of the company associated with the overall market. Beta is also known as

systematic risk. The cost of debt will be analyzed and estimated using the past debt and interest payments of the company. Finally, this weighted average cost of capital will be used to discount the forecasted future cash flows of the company and the terminal value to the present value. After this, the current debt of the company will be reduced from the net present value of free cash flows and the cash and equivalents of the company will be added to get the total equity of the company at the present. This equity value will be deducted from the total shares outstanding of the company at present to get the intrinsic value of the stock price of the company. This intrinsic value will be used for further analysis in the report and comparison with the dividend discount model.

2.2. DDM Model

The dividends of the company for the next five years are forecasted using past dividends and assumptions. Thereafter, the intrinsic value of the company is estimated through the dividend discount model.

The dividend discount model uses the dividends paid by the company to find the intrinsic value of the share price. It is a quantitative model stating that the fair price of the company refers to the sum of expected dividends and each dividend expected in the future is discounted back to the present value. The model uses different assumptions based on the past dividends paid by the company. These assumptions include the growth rate of dividends for the next five years and the terminal growth rate of dividends after five years. The dividend discount model is a simple model that calculates the intrinsic or fair price of the stock. This model is only suitable for companies that have a recent history of paying regular dividends. The formula for the dividend discount model using the two-stage dividend discount model is as follows:

$$P_0 = D1/(1 + r) + D2/(1 + r)^2 + D3/(1 + r)^3 + D4/(1 + r)^4 + (D5 + T5)/(1 + r)^5 \quad (3)$$

Here, the D refers to the forecasted dividends that the company is expected to pay in the next five years. The T here refers to the terminal value of the forecast after the company grows at a long-term growth rate that will be related to the GDP growth rate forecast as it is expected to enter the maturity phase after five years of growth higher than the GDP growth rate. Therefore, the dividends of the company are expected to grow initially for five years at unsustainable and higher growth rates and thereafter, it is expected to grow at a long-term sustainable growth rate. The dividends each year are forecasted using the assumed growth rate based on market analysis of future growth of the industry in which the company operates and the past dividends paid by the company. The dividend each year is calculated using the following formula:

$$Dt = D(t - 1) \times (1 + g) \quad (4)$$

Here, the Dt refers to the dividend in year t, D(t-1) refers to the dividend in the last year, and g refers to the growth rate at which the dividends of the company are expected to grow. Further, after five years as the dividends will grow at a long-term rate, the model calculates the terminal value. This is the value of the dividends over the long term over the foreseeable future. The formula to find the terminal value is:

$$T5 = D6/(r - g) \quad (5)$$

Since the dividends of the company are paid by the earnings of the company after paying off the debt. The dividends are paid to the shareholders of the company and therefore, the discount rate used to calculate the present value of the dividends or the intrinsic value of the share price of the company the required rate of return on equity is used.

Using this formula, the Beta of the company is calculated as the sensitivity of the returns of the share of the company over the past years to the overall market. Beta is also known as the systematic risk, the risk that cannot be diversified away by the company or the shareholders. The investors expect the returns on the shares for undertaking the systematic risk. Therefore, using the dividend discount model and the formulas mentioned above, the intrinsic valuation of the share price of Boyd Gaming Corporation will be calculated.

3. Results

To compare the dividend discount model and the discounted cash flow model, firstly the differences between the two models are compared theoretically as shown below in Table 1.

Table 1. Difference between DCF and DDM model

Discounted Cash Flow Model	Dividend Discount Model
It is based on expected future cash flows to find the present value of the share.	It is based on the expected future dividends to find the present value of the share.
It uses the weighted average cost of capital as the discount rate.	It uses the cost of equity as the discount rate.
It can be used based on financial statements and assumptions.	It can only be used for companies paying dividends.
Terminal valuation is difficult to estimate and has a significant effect on valuation.	It requires a lot of speculation to forecast future dividends.

Ahead, the results will first analyze and compare the results from DDM and DDF with the market price of the stock. This will help to determine the differences that caused the results to be different from the market share price. The FCFF forecasting assumptions are stated in Table 2 below.

Table 2. FCFF forecasting assumptions

	2020	2021	2022	2023	Average
Revenue growth rate		43.62%	5.36%	5.02%	18.00%
COGS as percentage of revenue	47.61%	42.51%	44.02%	46.01%	45.04%
SG&A as percentage of revenue	20.76%	13.97%	13.52%	13.33%	15.39%
Depreciation as % of PP&E	8.13%	8.17%	8.01%	7.70%	8.00%
PP&E as percentage of revenue	158.58%	97.29%	90.70%	89.23%	108.95%
Current Assets growth		-10.15%	6.00%	24.73%	6.86%
Current Liabilities growth		6.11%	5.09%	1.72%	4.31%

The revenue is forecasted based on the average growth rate of revenue in the past 4 years and the cost of goods sold and the selling, general and administrative expenses have been forecasted based on a percentage of revenue over the past four years. Ahead, to increase revenue the company would need to increase its assets, therefore, the PP&E has been estimated based on the average of past PP&E as a percentage of revenue. Using the PP&E forecast the depreciation is also forecasted to be the average of past PP&E and carried to the forecasted period.

Further, it is assumed that the company will follow the same capital structure, and the same ratio of equity and debt will be used to finance the assets further. The interest expense is taken at the same growth rate as in the past two years as the company has reported a lot of variation in the interest expenses and therefore using the current scenario is the best estimate possible. Also, to estimate the working capital, the average growth of current assets and current liabilities have been taken over the past.

$$\Delta \text{ in Working Capital} = [(Working\ capital)]_t - Working\ Capital_{t-1} \quad (6)$$

$$Working\ Capital = Current\ Assets - Current\ Liabilities \quad (7)$$

$$Capital\ Expenditure = PP\&E_t - PP\&E_{t-1} + Depreciation_t \quad (8)$$

The tax rate is taken to be 22.9% as it is the effective tax rate faced by the company for continuing operations [8]. To calculate the weighted average cost of capital, the risk-free rate is taken as a 5-year government bond rate of 4.47%. The financial statements and beta of the company have been taken from Yahoo Finance. The market return is taken as the rate of return for the S&P 500 index. The rate of return is calculated from 31 December 2018 to 31st December 2023 and annualized [9].

Further, the long-term growth rate for terminal value is taken to be 2.6 percent which is the estimated GDP growth rate of the United States in 2030 [10]. As a result, the WACC of the company is estimated to be 5.606% as shown in Table 3.

Table 3. WACC Estimation

Total Debt	2915498
Total Equity	1744102
Cost of Debt	5.87%
Beta	1.65
Market Return	10.46%
Risk-free rate	4.47%
Cost of equity	7.406%
Tax	22.90%
Weight of Debt	62.57%
Weight of Equity	37.43%
WACC	5.606%

The industry of gambling has been growing due to its increasing popularity and the rising gambling platforms online. The revenue in the industry has been growing at an increasing rate (Fig. 1).

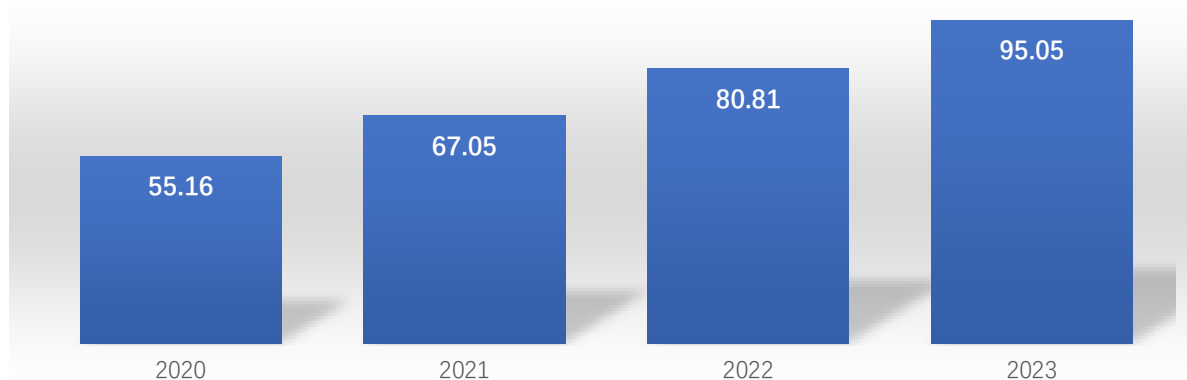


Fig 1. Online Gaming Growth

Further, the industry is expected to reach from USD150.29 billion in 2024 to 191.36 billion in 2029. Therefore, the company is expected to grow at a high growth rate initially till 2029 and after that the sustainable growth rate of the foreseeable future, as stated in Table 4.

Table 4. FCFE Forecast

	2024	2025	2026	2027	2028	2029
Revenue	\$4,411,483	\$5,205,624	\$6,142,724	\$7,248,517	\$8,553,372	\$10,093,123
COGS	\$1,986,759	\$2,344,409	\$2,766,442	\$3,264,448	\$3,852,104	\$4,545,547
Gross Margin	\$2,424,724	\$2,861,215	\$3,376,282	\$3,984,069	\$4,701,268	\$5,547,576
SG&A	\$679,136	\$801,392	\$945,656	\$1,115,890	\$1,316,769	\$1,553,809
EBITDA	\$1,745,588	\$2,059,823	\$2,430,626	\$2,868,180	\$3,384,500	\$3,993,767
Less: Depreciation	\$384,587	\$453,819	\$535,514	\$631,915	\$745,670	\$879,904
Interest expense	\$192,512	\$216,418	\$243,293	\$273,505	\$307,469	\$345,650
Taxable Income	\$1,168,48	\$1,389,58	\$1,651,81	\$1,962,75	\$2,331,36	\$2,768,213

	9	6	9	9	1	
Tax payable	\$267,584	\$318,215	\$378,267	\$449,472	\$533,882	\$633,921
Net Profit After Tax	\$900,905	\$1,071,371	\$1,273,553	\$1,513,287	\$1,797,479	\$2,134,292
Add: Depreciation	\$384,587	\$453,819	\$535,514	\$631,915	\$745,670	\$879,904
Less: Working Capital	-\$53,379	\$20,875	\$22,991	\$25,282	\$27,760	\$30,441
Less Capex	\$1,855,008	\$1,319,028	\$1,556,475	\$1,836,666	\$2,167,297	\$2,557,447
Free Cash Flows	-\$516,138	\$185,287	\$229,600	\$283,254	\$348,092	\$426,308
Total FCF	-\$516,138	\$185,287	\$229,600	\$283,254	\$348,092	\$14,979,251

The results of the DCF model state that the share price of the company is underpriced by \$22.38 (\$84.99-\$62.61) as the intrinsic value is higher than the market value of the share as shown in Table 5. In 2019, the company paid a total dividend of \$0.27 and then the dividends were halted for 2020 and 2021 as there were no dividends paid by the company in these two years. As per the annual reports, on 25th March 2020, the company announced that it would not be paying dividends to help mitigate the financial effect of the COVID-19 pandemic. Thereafter, the dividend payout restarted in 2022.

Table 5. Intrinsic value with DCF Valuation

Growth rate	2.60%
Discount rate	5.606%
FCF 2024	\$426,308
Terminal Value	\$14,552,943
NPV	\$11,095,297
Cash & Cash equivalents	\$304,270
Debt	2915498
Equity Value	\$8,484,069
No. of Shares Outstanding	99824.75
Intrinsic Price per share	\$84.99

The dividends of the company increased from \$0.27 in 2019 to \$0.60 in 2022. Thereafter, the dividend further grew by 6.67% in 2023. Therefore, using the annualized growth rate of an average of 18.58%, the dividends are forecasted as shown in Table 6.

Table 6. Intrinsic value with DDM Valuation

	2024	2025	2026	2027	2028	2029
Dividends	0.759	0.900	1.067	1.265	1.501	1.779
Terminal value	-	-	-	-	-	37.989
Total cash flows	0.759	0.900	1.067	1.265	1.501	39.769
Share price	\$30.25	-	-	-	-	-

Therefore, the Dividend discount model states that the share price of the company is overvalued by \$32.36 and the true intrinsic value of the share should be \$30.25.

4. Discussion

The difference between the intrinsic value and the market value of the share prices states that none of the models analyzed were close to the market value of the share but in terms of closeness the

discounted cash flow model is better than the dividend discount model. The dividend discount model has been far from the market price of the share of the company by \$32.36 whereas the discounted cash flow model has been far from the market price of the share of the company by \$22.38. The results are aligned with the majority of past literature discussed above.

Both the models have their own limitations as shown in Table 7 below.

Table 7. DCF and DDM limitations

Discounted Cash flow model	Dividend Discount Model
It is a complex model to be used as it needs a lot of data and assumptions relating to revenue expenses, cash flows, working capital expenditure, etc.	Although it is comparatively easy to use, the assumptions to forecast the dividends may be different from the dividends to be paid.
The model is very sensitive to the assumptions used and variables estimated including the discount rate, growth rate, and cash flows.	The model is only based on the dividends paid by the company and therefore it is difficult to apply to unstable companies.
It ignores the valuation of peers and the behaviour of the analysts may dominate the results leading to errors and less reliable assumptions.	The assumptions of growth rate and required rate of return may not be accurate leading to misleading results.

5. Conclusion

The comparison of the dividend discount model and the discounted cash flow model based on the Boyd Gaming Corporation concluded that the discounted cash flow model is more accurate than the dividend discount model. The dividend discount model resulted in the share price of the company being overpriced whereas the discounted cash flow model resulted in the share price of the company being underpriced. Hence the dividend discount model is giving the buy recommendation and the discounted cash flow model is giving the sell recommendation. The intrinsic value derived from the dividend discount model is not close to the market value of the share in comparison to the discounted cash flow model. Therefore, the discounted cash flow model has better predictable power than the dividend discount model.

There are different limitations associated with this study as the assumptions and inputs in both models can lead to different results as the models are based on historical data, industry outlook, and forecasts based on assumptions. The study is based on a single stock of the New York Stock Exchange. Further, the study lags the analysis of other stocks and different stock markets which may lead to different results.

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