

Automobile Business Valuation Analysis: Taking Three Automobile Companies as Analysis Samples

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Abstract. Automobile industry makes considerable contributions to the worldwide economic annually. However, the industry is experiencing a significant evolution. Many leading companies are exploring their ways to survive under the changing environment and are improving their strategies. Thus, examining the impacts of such actions on company value should be meaningful to investors when making investment decisions. In this paper, Ford, Tesla, and Ferrari are chosen to value due to their differences in features and similarities in future developing plans. This study first analyzes financial ratios, and then drawing on the previous studies of corporate valuation, the discounted cash flow (DCF) model is utilized to value each stock, and the capital asset pricing model (CAPM) is adapted to calculate discount rates. By comparing the resulted intrinsic value per share with the actual market price, the author concludes that Ford is undervalued while Tesla and Ferrari are both overvalued. Following the empirical research, some investment suggestions are given to investors, and some limitations are pointed out at the end of this paper, together with several improvement advice.

1. Introduction

The automobile industry comprises a wide range of organizations and entities involved in designing, manufacturing, and marketing motor vehicles. The vehicle business is one of the largest economic sectors in the world in terms of revenue, so a healthy development of this industry is essential. For many decades, the USA has led this industry, but according to information provided by the Boston Consulting Group, the automotive industry is slowing down in many developed countries. At the same time, the demand in BRIC (Brazil, Russia, India, and China) markets is rising.

Considering such significant changes, many companies are changing their future strategies. It is highly possible that these activities will influence the future performance and value of those companies. Hence, this paper aims to evaluate and to compare three representative companies in the automobile industry, by using financial ratio analysis and valuation models, in a gesture to predict their future company value and to provide specific investment suggestions. The three companies analyzed in this paper are Ford Motor Company (Ford), Tesla Motor, Inc. (Tesla), and Ferrari N.V. (Ferrari). The main reason for choosing these companies as samples for analysis is because they are all well-established automobile companies but operate in different market segments.

The intrinsic value of the equity share is often significant to investors. If the perceived intrinsic value is higher than the share price, the investors will probably conduct the investment. The inherent value of the share is not fixed but, instead, depending on many factors, such as the profitability, the growth rate, and the risk exposure of the company [1].

This study uses the DCF model to estimate the intrinsic value, with particular reference to financial ratios. The financial ratios can affect each other. Thus, treating them as a whole provides a more precise and more comprehensive view of the companies' performance. The profits of the following five years are estimated by priority when employing the DCF model to value each stock. Next, the future profits are adjusted to future cash flows, which are then discounted to present value using WACC. The WACC is measured by utilizing the CAMP model. The final step is to divide the net present value (NPV) by shares outstanding and to compare the resulted intrinsic value per share with

the actual stock market price. Then, this paper assesses whether the stocks are overvalued or undervalued, and particular investment advice are given for future development of the industry.

2. Background of the three companies

The three companies analyzed in this paper are Ford, Tesla, and Ferrari. Ford is one of the largest automotive manufacturers in the world, the company produces cars, sport utility vehicles, and commercial trucks, and it distributes automobiles across six continents [2]. Compared to Ford, Tesla is a relatively young company that is professional in electric vehicles. The innovative idea of CEO Elon Musk, together with a large amount of public support, has motivated Tesla to grow rapidly [3]. Ferrari is famous for building sports cars. The performance of its racing team in Formula 1 World Championship gave an impressive image to the public [4].

These three companies have different origins and features. Nonetheless, there are some overlaps in their future strategies because all of them have realized the revolution in technology. For example, Ford is developing smart cars, smart roads, and smart parking systems. Tesla is focusing on clean energy generation and energy storage products. Ferrari is attempting to hybridize its cars and to enhance energy efficiency. As a result, regarding the three companies' esteemed position in the automobile industry, it is meaningful and necessary to compare their investment value for the future development of the business.

3. Financial ratio analysis

Financial ratios include profitability, liquidity, working capital, leverage, and operating return ratios. These interrelated variables describe the performance of each company comprehensively. To be specific, financial ratios are quantitative indexes used to assess the financial performance of companies. Each index can measure a particular aspect of a firm. Meanwhile, these indexes are correlated with each other. For instance, the high leverage ratio may lead to high profitability but can affect the liquidity negatively. Therefore, this research will consider these ratios as a whole to evaluate the three companies.

3.1 Data collection

The data involved in analysis are provided by the annual reports of each company from 2014 to 2018. These data are measured in millions, USD. Although the financial reports of Ferrari were prepared in Euros, the numbers have been transferred into USD using the exchange rates given in the annual reports. Furthermore, the quoted share price of each company is the close price of 14th April 2019[5][6][7].

3.2 Profitability

Gross profit margin and net profit margin have been calculated for comparing the profitability of these three companies. On the one hand, it can be seen clearly from the line chart of gross profit margin that Ferrari always earned the highest margin. At the same time, the margin of Tesla has decreased 8.74% over the five years. Moreover, Tesla's net profit margin has never been positive, and the margin fluctuated heavily. On the other hand, Ferrari is the first-ranked company in net profit margin line graph too. Thus, it is reasonable to claim that Ferrari is the most profitable company, while Tesla is the least at present.

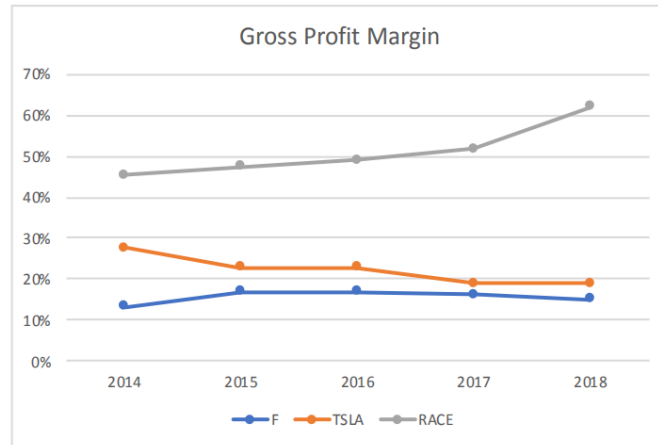


Fig. 1. Gross profit margin of sample companies

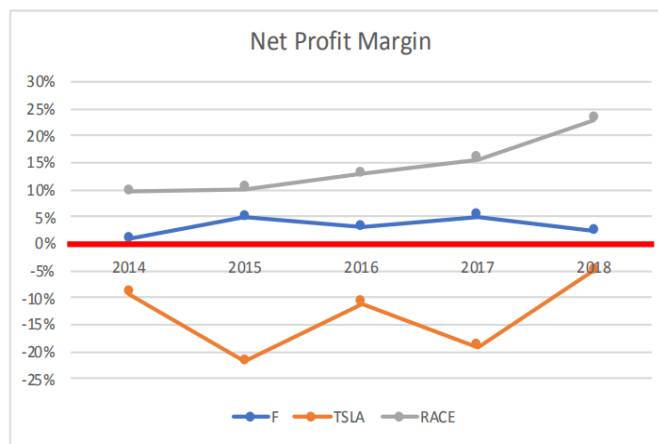


Fig. 2. Net profit margin of sample companies

3.3 Liquidity

Current ratio and quick ratio are the two most common indicators to measure the liquidity of companies. It seems that Ford performed the best among the three companies because the quick ratio of Ford always maintained between 1 and 2. It means that this company had sufficient current assets to cover its current liabilities and can pay back short-term debts without selling inventories. At the same time, the current assets did not occupy too much company capitals. On the contrary, the quick ratio of Tesla is much lower. From 2015 to 2018, its quick ratio was even lower than 0.8, meaning that Tesla faced a high risk of repaying debts in short-run. Thus, Tesla can only be ranked third concerning liquidity.

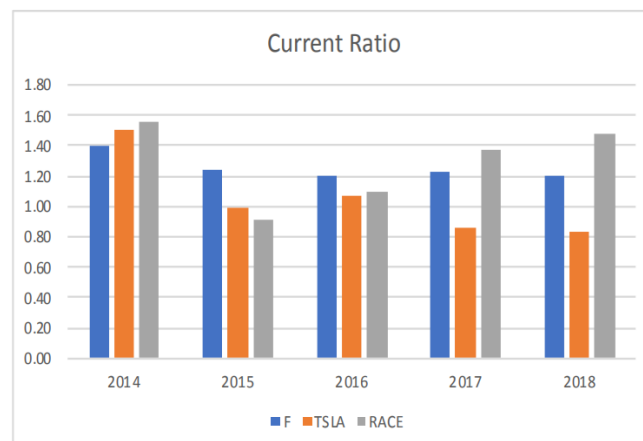


Fig. 3. Current ratio of sample companies

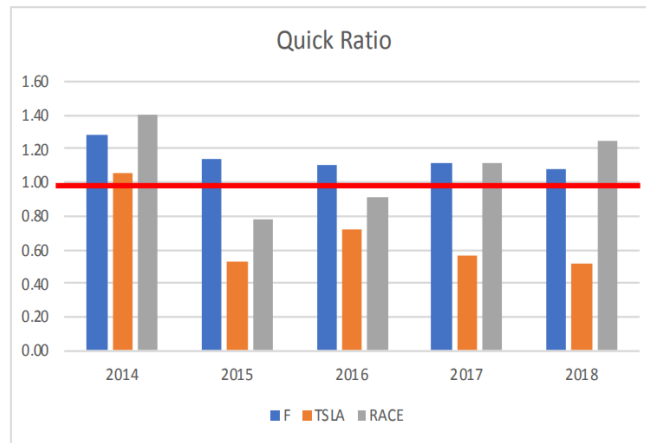


Fig. 4. Quick ratio of sample companies

3.4 Working capital

By observing Figure 5, noticeably, all of these three companies had reasonable account receivable days less than 30 days. Particularly, the receivable day of Tesla was the shortest. When it comes to account payable days, Ferrari had the longest payable days, and there is an increasing trend. Such long payable period might affect the relationships with its suppliers in a negative way. By contrast, the payable days of Tesla largely decreased after 2016. On the one hand, this decrease might be unexpected because payable can be treated as a kind of interest-free financing channel, and Tesla is giving up such benefit. On the other hand, Tesla is winning some trust from the supplier due to its improvement in payable management. Thereby, it is still appropriate to rank Tesla the first under working capital and rank Ferrari the third.

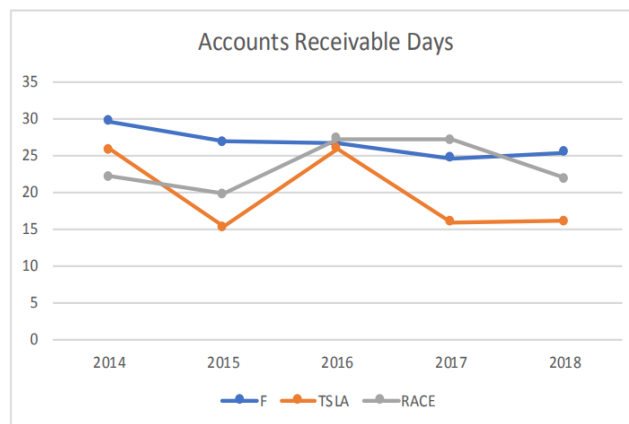


Fig. 5. Account receivable days of sample companies

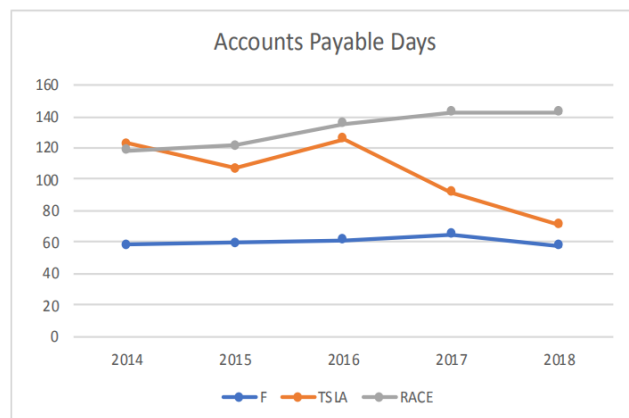


Fig. 6. Account payable days of sample companies

3.5 Leverage

The leverage ratios of Ferrari fluctuated dramatically because the equity of Ferrari was negative in 2015. Therefore, although the ratios returned to a normal level in the following three years, Ferrari can only be ranked last due to its instability. When comparing the debt-equity ratio and equity multiplier of the other two companies, Ford always had higher results than Tesla. Hence, Ford relied more on debts, and it borrowed more money from the external creditors generally. As a result, Ford had to undertake the higher risk of paying back the interests and debts while such risk to Tesla was relatively low.

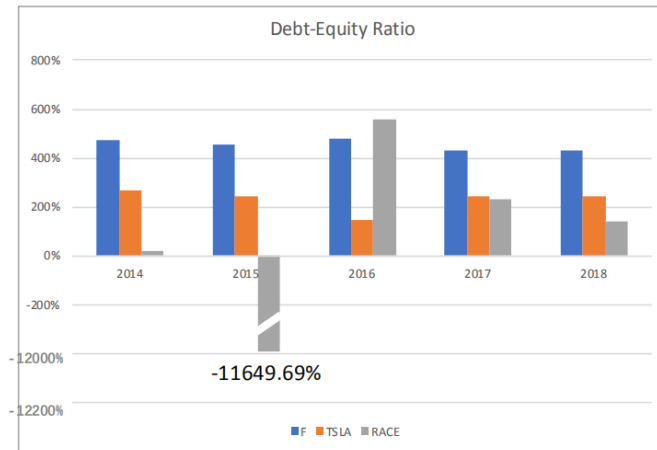


Fig. 7. Debt-equity ratio of sample companies

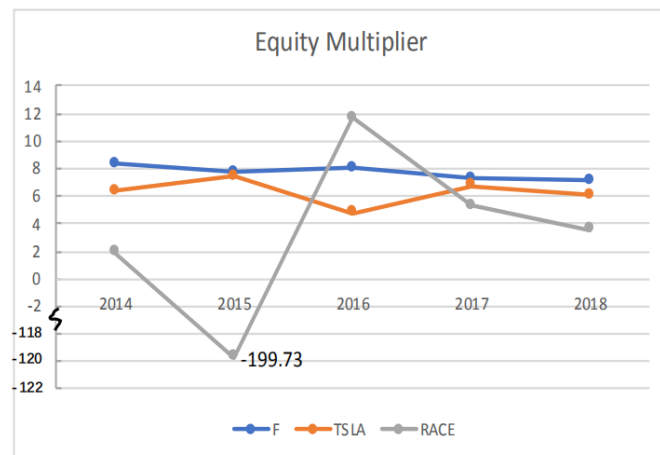


Fig. 8. Equity multiplier of sample companies

3.6 Operating return

Operating return ratios are used to evaluate the efficiency of investments made by companies. It is evident from the line charts of return on equity and return on assets that Tesla always performed the worst considering those negative results. There are two possible explanations for such a situation. Firstly, the management team of Tesla often made inefficient and unwise investment decisions. Secondly, most of the projects Tesla invested in were long-term projects, so this company needs more time to realize positive returns. Nonetheless, no matter which explanation is more accurate, the operating profit of Tesla can only be ranked third at the stage. Moreover, Ferrari should be listed first due to its high returns.

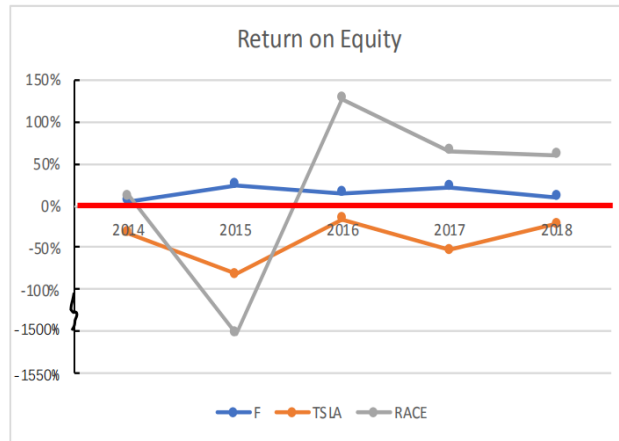


Fig. 9. Return on equity of sample companies

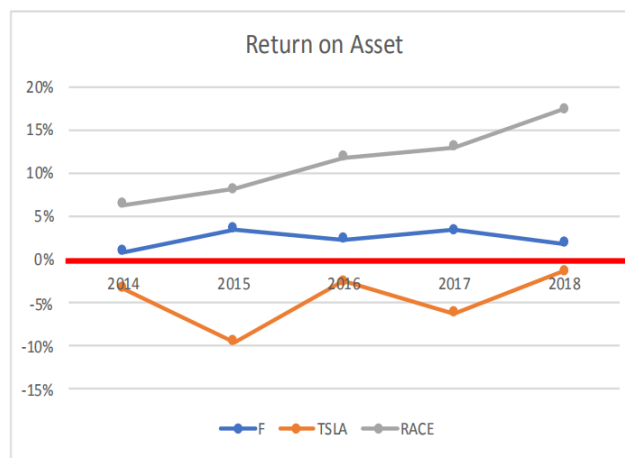


Fig. 10. Return on asset of sample companies

4. Valuation model

This section reviews previous literature on corporate valuation models as the theoretical background and explains why these models are suitable for this research. The two most generally used corporate valuation models are Relative Valuation Method and Discounted Cash Flow Model. The former estimates the value of a company by looking at the pricing of comparable assets relative to a common value such as earnings or sales while the latter relates the value of a company to the present value of expected future cash flows. Additionally, the empirical research of the sample companies is described in this section by using the appropriate model.

4.1 Discounted cash flow valuation model

The present value of all future cash flows can reflect the intrinsic value of an asset directly. According to Panda's 2013 article, there are two cash flow based valuation approaches: (1) Dividend Discount Model (DDM); (2) Discounted Cash Flow (DCF) Model [1]. The Dividend Discount Model assumes that the future cash flows received by an investor are cash dividends. However, this approach is not applicable when dividends are not expected in the near future [8]. Therefore, DDM cannot be used because Tesla has never paid any dividend yet and does not plan to pay dividends in the following years. As a result, DCF seems to be more appropriate in this case.

The value of a firm is obtained by a forecast of a company's accumulated future cash flows discounted to the present at the weighted average of capital (WACC). This valuation is based on the idea that a company's value is driven by its ability to generate cash flow over the long-term, and its long-term growth drives such ability.

The formula for calculating the net present value (NPV) for the infinitive period will be expressed as:

$$NPV = CF_0 + \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \dots$$

Alternatively, for a limited period, the NPV can be calculated as below:

$$NPV = CF_0 + \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \dots + \frac{CF_t}{(1+r)^t} + \frac{T_t}{(1+r)^t}$$

$$T = \frac{CF_t}{r-g}$$

Where CF_t =cash flow at time t, T =terminal value at t, r =WACC, and g =growth rate of the cash flow under the assumption of stable growth [9].

$$WACC = K_e \frac{E}{E+D} + K_d(1-t) \frac{D}{E+D}$$

Where K_e =cost of equity, K_d =cost of debt, and t =corporate tax rate.

$$K_e = R_f + \beta(R_m - R_f)$$

Where R_f =risk free rate, R_m =expected market return, β =equity beta.

The calculation from profit after tax to cash flow will be expressed using variables from a company's income statement as:

Profit after tax (PAT)

-Increase in operating working capital

-Capital expenditure

+Depreciation

Cash flow (CF)

One of the main disadvantages of this method is that it consists of a diverse set of variables that are based on assumptions of the future. Therefore, even the most careful and detailed valuation cannot provide a precise estimate of the value. Given this consideration, large companies with stable revenues and well-known markets will naturally be possible to value with greater precision than smaller or younger companies involved in new technologies or projects with an uncertain future. To be more specific, Tesla, in this case, might be valued less accurately.

4.2 Relative valuation model

Relative valuation model uses multiples to estimate the value of a company by looking at the pricing of comparable assets relative to common variables like earnings (P/E), book value (P/B), and sales (P/S). These models assume that the market prices the companies correctly on average and that the company being valued is comparable to other companies in the industry.

The most frequently applied ratios are P/E ratio, P/B ratio, and P/S ratio. P/E ratio is a price-to-earnings ratio and can be used to determine the stock price of a company. It is simple to calculate and easy to understand. However, it can only be employed by those companies who produce positive earnings. Moreover, the volatility of earnings results in changes in the P/E ratio, reducing the reliability of P/E ratios. Below is the expression:

$$\frac{P}{E} = P/EPS$$

Where P =share price, and EPS =earnings per share.

The second ratio is P/B ratio, which measures the price to book value of equity. It is the simplest way to compare the value of a company since book values are stable and often possible to compare to market prices. It can still be applied even with a negative earning. Nonetheless, due to the restrictions in accounting standards and principles, it is difficult to compare companies in different countries by P/B ratio.

The last one, P/S ratio is a price-to-sale ratio. This multiple is employed generally to new companies that invest heavily in the beginning and earn negative cash flows for the early years. Since the sales amount is unlikely to be manipulated and less likely to be influenced by accounting decisions, this ratio can provide a relatively fair value of a company.

All of the three multiples above consider market price as an important factor so that they can be expressed as the market’s estimate of growth and risk for the specific type of business. On the other hand, they say nothing about whether the stock is undervalued or overvalued. They only show how the market price relates to the current valuation of similar companies.

4.3 Empirical research

In this section, the author conducts a more specific comparative analysis of these three companies. Each company will be valued using the DCF model to test whether the company is undervalued or overvalued. Additionally, relative valuation method will be adopted, and then a clearer picture of the companies’ performance can be received.

4.3.1 Data collection

Financial values provided by the companies’ annual financial statements and corresponding closing prices retrieved from Yahoo Finance have to be investigated before calculating the intrinsic value of these three companies. This study covers five years from the beginning of 2014 to the end of 2018, which is long enough to provide sufficient data that lead to meaningful analysis. When calculating beta, the monthly share price of each company and the S&P 500 close value were used. The risk-free rate of the market equals the yield of 10-year American Treasury Bond (2.53%).

4.3.2 Valuation of sampling companies using relative valuation model

The first index is the price/earnings (P/E) ratio. The current and forward P/E ratios of Ford company are both lower than those of Ferrari, meaning that Ford stock is relative cheaper than Ferrari stock. As to Tesla, this company’s earning was negative in 2018, so its P/E ratio is meaningless. Moreover, price-earnings to growth (PEG) ratio is a more advanced and dynamic index because it also considers the earning per share growth rate. However, only Ferrari has a positive PEG ratio in this case, so it has to be ignored.

Next, market-to-book (P/B) ratios are calculated. Still, Ford has the lowest P/B ratio, while the other two companies have much higher P/B ratios. Therefore, Ford can be classified as a cheap stock, and the other two can be treated as quality stocks.

Thirdly, the lowest current and forward price/sales (P/S) ratios of Ford demonstrate again that it should be regarded as a cheap stock. Furthermore, when taking sales growth rate into account, Tesla obtains the lowest P/S per sales growth ratio due to its substantial growth in sales. Such low P/S per sales growth ratio and its relatively low P/B and P/S ratios make Tesla surpass Ferrari. Hence, Ford is the top stock that is worth investing, and Tesla is the second.

Table1. Valuation ratios of sample companies using relative valuation model

Current P/E Ratio				Forward P/E Ratio			
	Price	Annual EPS	Current P/E		Price	Annual EPS	Forward P/E
F	9.45	1.29	7.33	F	9.45	1.21	7.81
TSLA	267.7	-1.58		TSLA	267.7	6.14	43.60
RACE	138.57	3.95	35.08	RACE	138.57	3.98	34.82

Market-to Book Ratio (P/B Ratio)				Current P/S Ratio			
	Price	BV per share	P/B		Price	Sales per Share	P/S
F	9.45	9.20	1.03	F	9.45	37.95	0.25
TSLA	267.7	28.50	9.39	TSLA	267.7	124.25	2.15
RACE	138.57	8.25	16.80	RACE	138.57	21.20	6.54

Forward P/S Ratio				P/S per sales growth			
	Price	Sales per share	P/S		P/S	Sales growth	P/S per sales growth
F	9.45	37.25	0.25	F	0.25	-1.8%	
TSLA	267.7	164.18	1.63	TSLA	2.15	32.1%	6.70
RACE	138.57	22.38	6.19	RACE	6.54	5.6%	117.44

4.3.3 Valuation of sampling companies using DCF model

According to the analysis above, the DCF Model is the most suitable approach to value these three companies. In the first step, the author uses financial modelling technique to predict the financial

statements of each company for the future five years. And then, the profit after tax values is adjusted to reach the free cash flow amount. The next step is to discount the future cash flow into present value using WACC.

When calculating WACC, Capital Asset Pricing Model (CAPM) is used to measure the cost of equity. The CAPM can be written as the following expression that relates the required return of an investment to systematic risk and the relevant cost of equity is simply the rate of return expected. In this expression, the rate on a treasury bill is taken as the risk-free rate. For the year 2019, the risk-free rate is 2.53%. Beta (β), is the systematic risk of a company's common equity, and it represents the sensitivity of a company's return to the variations in the return rates of the overall market. In order to measure the general performance of the entire market, the S&P 500 index is employed. The three tables below show the WACC of each company.

Table 2. WACC, Ford

Rf(%)	Rf-Rm(%)	β	Ke	Kd(1-t)	E/(E+D)	D/(E+D)
2.53	11.8	0.78	0.11695	0.05139	0.12	0.88
WACC = 5.92						

Table 3. WACC, Tesla

Rf(%)	Rf-Rm(%)	β	Ke	Kd(1-t)	E/(E+D)	D/(E+D)
2.53	11.8	0.61	0.09745	0.06827	0.70	0.30
WACC = 8.87						

Table 4. WACC, Ferrari

Rf(%)	Rf-Rm(%)	β	Ke	Kd(1-t)	E/(E+D)	D/(E+D)
2.53	11.8	1.18	0.16476	0.00962	0.84	0.16
WACC = 14.03						

Based on the WACC above, terminal value and the NPV can then be calculated using Excel. Below are the calculation results:

Table 5. Intrinsic value per share, Ford

Year	2019	2020	2021	2022	2023
FCF	9,523	4,657	4,658	4,655	4,649
Terminal value					383,908
Total	9,523	4,657	4,658	4,655	388,557
NPV					147,432
Number of shares outstanding, Dec, 2018 (million)					3907.7
Intrinsic value per share					37.7

Table 6. Intrinsic value per share, Tesla

Year	2019	2020	2021	2022	2023
FCF	(2054)	(1562)	(955)	375	3044
Terminal value					80093
Total	(2054)	(1562)	(955)	375	83137
NPV					38,398
Number of shares outstanding, Dec, 2018 (million)					173
Intrinsic value per share					222.0

Table 7. Intrinsic value per share, Ferrari

Year	2019	2020	2021	2022	2023
FCF	437	789	939	1132	1384
Terminal value					15755
Total	437	789	939	1132	17138
NPV					9,388
Number of shares outstanding, Dec, 2018 (million)					188
Intrinsic value per share					49.9

Therefore, compared to their market price, both Tesla and Ferrari were overvalued because their share prices were \$332.8 and \$99.44, respectively. Also, Ford was understated since its actual share price was only \$7.65. The deviations can be explained since Ford is a well-established company and DCF is the most suitable model for it, regarding its stable performance. Meanwhile, valuation for Tesla and Ferrari may involve imprecise data, because the former involves in new technology and its performance is still fluctuating heavily, and the latter one sales luxury goods, so it is more easily to be affected by the macro-market and customer preference. Hence, this paper suggests investors, to invest in Ford company.

5. Comparison results

This paper analyzed the profitability, liquidity, working capital, leverage, and operating return of each company in the overall sample. These ratios are necessary to build a comprehensive understanding of the overall performance of the three companies considering the interrelationships among these variables. In addition, the DCF model and the relative valuation method were employed. All of the three companies have been established for more than five years and occupied the leading position in the industry. They have also met the requirement to apply the DCF model.

From the perspective of both financial ratio analysis and DCF model, Ford should be the first choice if a person can only invest in one stock. Since Ford not only ranked first under financial ratio analysis but is also undervalued, this company is the most investment-worthy company among these three. In a word, Ford is the most stable company who keeps on generating positive earnings. Although the other two companies are making some improvements, it might not be the right time to invest in them due to their current high market price. Furthermore, according to the DCF model, both Tesla and Ferrari were overvalued.

6. Conclusion

In conclusion, this paper values three representative companies – Ford, Tesla, and Ferrari – by using financial ratios and two valuation models. Based on the analysis results, Ford is regarded as the most investment-worthy company at present. Therefore, investors are recommended to invest in the stock of Ford Company.

While the models used in this research are cost-effective and are easy to implement, there are still some inherent limitations. Firstly, the DCF valuation model consists of a diverse set of variables that are based on assumptions of the future. Thus, even the most detailed and careful valuation cannot provide an absolute precise estimate of value. Secondly, among the three companies analyzed, Tesla is a unique example because of its nature. It deals with new technology and its revenue is highly related to customers' enthusiastic support for the group CEO, Elon Musk.

Hence, this paper can be improved by applying several alternative valuation models for each company to find the best-suited model. Also, it can be helpful to identify the most reasonable model under specific conditions of each company or each industry.

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