

Is it worth to invest in Tesla?

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Abstract. There are many well-known brands in today's automotive industry, such as BMW and Mercedes-Benz. On the contrary, there are abundant unpopular brands as well. Among numerous car brands in the global market, Tesla attracted almost everyone's attention in an extremely short period of time, notwithstanding the fact that it is a newly established company. This paper analyzes the financial status of Tesla and makes predictions about its future performance based on historical data to decide whether investing in Tesla is a reasonable idea.

1. Introduction

This paper uses Tesla as an example to conduct a thorough analysis because it is a representative sample and top runner in the electric vehicle industry. Although many car companies have entered the green car market such as Toyota and Ford, Tesla is the only company who devotes all its effort to the environmentally-friendly car market. It is known to all that fossil fuels are non-renewable, and they will become exhausted in the foreseeable future. Nowadays, people tend to put more attention on environmental issue and choose to buy products with a "green" label. Thus, the future of the automobile industry is relying on consuming renewable energy, such as solar energy. In order to analyze this leading company accurately, this study employs the Discounted Cash Flow Model to estimate Tesla's value based on its cash flows in the expected future. This model incorporates fundamental changes in the company's strategies, which allows the estimation to be more reasonable and rational.

2. Background of Tesla

Two American entrepreneurs, Martin Eberhard and Marc Tarpenning, founded Tesla together in the year 2003. Their biggest fund source was gained from the co-founder of PayPal, Elon Musk, who has been serving as CEO of Tesla since 2008. Tesla was initially established to manufacture automobiles, not until 2016 when it merged the solar panel company SolarCity, the company changed its name and began to sell solar energy products. Tesla has launched several excellent cars among the years such as electric Roadster in 2008, Model S sedan in 2012, and Model X in 2015, they all possessed with extraordinary performance and sleek appearance. Besides cars, Tesla also built superchargers in the US and Europe aim at providing sustainable power to the auto batteries for the customers. A particular aspect that deserves to be mentioned, Elon Musk, the CEO of Tesla, is making great effort to provide the general population an exceptional auto with affordable price [1].

3. Current financial performance

Analyzing the historical data of Tesla gives an overall comprehension of the current financial status of the company. Table 1 shows several factors, which can demonstrate what financial condition the company was undergoing during the period from 2013 to 2017[2].

3.1 Revenue and revenue growth rates

Firstly, it can be observed from the table that the revenue is constantly increasing year by year. Additionally, remarkable rates of revenue growth remain every year. Nonetheless, the high revenue

growth of Tesla was mainly attributed to the fact that Tesla is the strongest performer in the electric automobile industry. Moreover, this new company has drawn increased attention among the public, owing to its environmental concerns. People nowadays are tending to buy environmentally-friendly products and cars made by Tesla perfectly match with the public psychology. Another significant reason for the high growth rate is that during 2016, Tesla accomplished the acquisition of the SolarCity, this event supports the company's revenue growth rate by solving the problem of sustainable power supply for the electric cars and saving the costs by integrating the value chain as well as reducing a potential competitor[3].

3.2 Gross profit margin, R&D and SG&A expenses

With respect to the gross profit margin, a general decrease can be found, which means the company was experiencing a higher cost. Furthermore, R&D and SG&A expenses are both rising quickly and significantly. However, the substantial increase in R&D and SG&A expenses can be explained by investigating the business plan of Tesla. It is common knowledge that Tesla always launches new cars every 5 to 8 years. In other words, more money should be invested in research and development department for the company to bring new products to the public since the most advanced technology and the most exceptional design will be applied on the cars. The Tesla Autopilot, for example, a function that allows semiautonomous driving was implemented on Model S in the year 2014. This kind of high-tech development requires a large amount of capital. At the same time, Tesla is about to break ground on the Gigafactory in Shanghai, which means the company will hire more engineers and employees, the cost of company spending on employee's salary will be increased. Once the project of the Gigafactory starts, the enormous expenditure would be spent on buying raw materials [4][5].

3.3 Earnings before interests and taxes

EBIT, as a critical item displayed in the table, demonstrates the financial performance of the company, is generally decreasing. Tesla's EBIT is decreasing sharply year over year, which means that daily operating expenses rise at a greater pace than the revenue growth rate.

3.4 Net investment

The historical data indicates that the net investment of Tesla was continuously rising during the period between 2013 and 2017. This trend implies that Tesla may do the procurement of a large number of properties, plants, and equipment. According to the report of the Gigafactory is being constructed in Shanghai, it can infer that Tesla has bought a large quantity of equipment to support the upcoming mass production [6].

3.5 Net working capital

It can be noticed that the item of Increasing in Net Working Capital was keeping positive in the beginning four years of the period shown. However, the figure dropped under zero during the last year. Tesla may have more accounts receivable, inventory than accounts payable under this circumstance. In the year 2017, Increase in NWC is presented in negative numbers, and it indicates the company has a cash inflow, which is good for the company as it can have extra money to reinvest.

3.6 Free cash flow

Kieso and other scholars (2013) define FCF as "discretionary cash flow", otherwise cash available for a company to "purchase additional investments, retire its debt, purchase treasury stock, or simply add to its liquidity" [7]. In this case, an obvious decrease over the years can be discovered. Investors use free cash flow to judge whether the company has the ability to pay dividends, manage daily operations, and wipe off its debt. For Tesla, the substantially increased R&D and SG&A expenses may cause shrinking free cash flow. Unlike other mature companies, it is reasonable to say that the reduction in the free cash flow of Tesla is only temporary. As a newly developed company, it takes time to balance revenue and expenses. However, Tesla should make plans to increase its free cash flow by any means since having a negative cash flow would decrease the confidence of the investors.

There are effective ways to allow free cash flow surging include reducing costs and improving efficiency.

Table 1. Historical Data. (Tesla, Inc. 2013-2017)

	2017	2016	2015	2014	2013
¥¥¥	\$11,758,751	\$7,000,132	\$4,046,025	\$3,198,356	\$2,013,496
<i>Revenue growth</i>	68%	73%	27%	59%	
Gross profit	\$2,222,487	\$1,599,257	\$923,503	\$881,671	\$456,262
Gross profit margin	18.9%	22.8%	22.8%	27.6%	22.7%
R&D	\$1,378,073	\$834,408	\$717,900	\$464,700	\$231,976
SG&A	\$2,476,500	\$1,432,189	\$922,232	\$603,660	\$285,569
EBIT	(\$1,632,086)	(\$667,340)	(\$716,629)	(\$186,689)	(\$61,283)
Taxes	\$31,546	\$26,698	\$13,039	\$9,404	\$2,588
EBIT - Taxes	(\$1,663,632)	(\$694,038)	(\$729,668)	(\$196,093)	(\$63,871)
Net investment	\$4,044,565	\$2,579,623	\$1,574,067	\$1,090,773	\$186,265
NWC	\$388,668	\$706,255	\$530,655	\$402,333	\$85,495
Increase in NWC	(\$317,587)	\$175,600	\$128,322	\$316,838	\$93,531
FCF	(\$5,390,610)	(\$3,449,261)	(\$2,432,057)	(\$1,603,704)	(\$343,667)
<i>FCF, Y/Y</i>	-56%	-42%	-52%	-367%	

4. DCF model assumptions

DCF is a model based on fundamental financial economic theory, explicitly recognizing and valuing, based on opportunity cost, the three seminal considerations in investment: cash flow, time, and risk. Before applying the Discounted Cash Flow Model to figure out the stock price of Tesla, it is necessary to mention about few assumptions.

4.1 Assumptions of sales growth rates

It can be known from the actual sales of 2017 and 2018 that the sales growth rate of the last year was 82.52%. The high growth rate in 2018 was due to the launch of Model 3, which is famous for its combination of sedan's practicability and exceptional design of sports car [8]. Unlike the huge growth in sales during 2018, it can be assumed that 2019's sales growth rate will be declined significantly based on the business schedule of Tesla. Tesla is expecting to produce Model Y in November of 2019 and open reservations for customers in the year 2020[8]. Most fans of Tesla are looking forward to buying a new product, which is Model Y instead of the old one Model 3, so the number of people purchasing the existing product will decrease, they will hold on and wait for the new product. Therefore, it can be estimated that the sales growth rate will be dropped to 34.48% in the grounds of the quarterly sales estimation of 2019[8].

For the following years, Tesla's sales growth rate may have a slight rise and follow with a decrease. The reason is that the Gigafactory in Shanghai, which aims at hiring new employees in late 2019. The local factory in Shanghai will allow Tesla to produce much more vehicles, and the market share in China will be increased significantly. However, at the same time, competitors of Tesla, BMW, for example, may produce electric cars with similar techniques and sell them through its well-established customer base. Competitors will soon battle for market share with Tesla. Therefore, it is reasonable to forecast that the sales growth rate of Tesla will decrease to around 25% in the year 2029. The sales growth rate is still higher than other companies because as the first-mover of this newly established electric automobile industry, Tesla has developed its unique advantages.

Table 2. Actual Sale in 2018 & Estimated Sale for 2019. (Estimize Tesla, 2018&2019)

Year 2018	Q1 2018	Q2 2018	Q3 2018	Q4 2018	FY 2018
Actual sales	3,409	4,002	6,824	7,226	21,461
Year 2019	Q1 2019	Q2 2019	Q3 2019	Q4 2019	FY 2019
Estimated sales	6,482	7,023	7,440	7,916	28,861

4.2 Assumption of operating expenses

Operating expenses is another important assumption that should be made in order to adopt the DCF Model. As a newly developed company, Tesla needs a large amount of money to be invested in research and development in order to develop and launch new products. Also, the Gigafactory in Shanghai is expected to start producing products in late 2019, with plans to manufacture approximately 3,000 vehicles per week and to ramp up to 150,000 Model 3 per year. According to this plan, the costs of raw material, the wages of employees, R&D and other SG&A expenses will increase substantially in the year 2020 and rise stably year by year [9].

4.3 Assumption of EBIT margin

EBIT (earnings before income taxes) is the difference between sales and operating income. Although it assumes both sales and operating expenses will go up year by year, the former one increases in a more considerable phase than the latter one because, Tesla as a new company, will try its best to earn more money to compensate the expenses, in order to reinvest in profitable projects. To achieve this goal, Tesla may have to develop more advanced vehicles with a sleek appearance and affordable price to attract the general public. Therefore, it is reasonable to say the EBIT margin is growing continuously as sales always increase more than expenses. It can be estimated that the EBIT margin of Tesla will go up steadily after surging from -19% to -2% between 2017 and 2018.

The huge variation was attributed to the substantial increase in sales during these two years. It is reasonable to assume that Tesla's EBIT margin may end up with around 8.2% in the year 2029. Even though Tesla is an automobile manufacturer with state-of-the-art technology, it still cannot surpass mature companies such as BMW and Ford. The financial reports show BMW's EBIT margin reached 7.6% in 2018; thus, Tesla could have a slightly higher figure than BMW, since Tesla sells cars that do not use fossil fuels [10][11].

4.4 Assumption of Increase in NWC ratio

By exploring Tesla's financial report, it is easy to find that the tax rate of auto manufacture industry is around 21% and will remain steady. The next item that should be estimated is the Increase in Net Working Capital [10].

Net Working Capital (NWC) illustrates the difference between current assets (accounts receivable, inventory, etc.) and current liabilities (accounts payable). An increase in NWC indicates a company either has a rise in current assets or has a decrease in current liabilities; it also reflects a cash outflow of the company. As a percentage of any increase in sales, Increase in NWC should be estimated based on Tesla's balance sheet. Using accounts receivable, inventory accounts payable, and increases in sales during the period from 2017 to 2018, it can be known that the ratio of Increase in NWC to increases in sales is around 3%. Compared to 3.39% of the well-established company BMW, Tesla's ratio is rational. By keeping the ratio constant around 3%, Tesla's annual increase in NWC can be calculated easily.

4.5 Assumption of Net Capex

Furthermore, Net Capex is another significant item that ought to be estimated. Net Capex is also known as Net investment, which means the number of capital expenditures in excess of depreciation. Before making an assumption of Net Capex, it is necessary to calculate the ratio of the Net Capex and the increase in sales in the previous year, based on Tesla's balance sheet. Using the data of 2018, it can be known that the ratio in 2018 is 2%, and then this ratio will stay constant in the following years.

By multiplying 2% with the increase in sales during 2019, Net Capex in 2019 can be figured out easily.

Based on all the previous assumptions, the free cash flow of Tesla can be computed. By assuming the discount rate is 12%, and long-term growth rate is 2%, which lower than the 5% growth rate of the mature company BMW, the free cash flow is increasing year by year. The more the free cash flow, the more funds available for Tesla to make reinvestment.

Table 3. Projection on FCF (in millions) (Tesla, Inc. 2018)

Tax	21.00%
(1-Tax)	79.00%
Increase in NWC Ratio	3.00%
Net CapEx Ratio	2.00%
Discount Rate	12.00%
Long-term Growth Rate	2.0%

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Sales	11,759	21,461	28,861	40,434	57,052	81,328	117,600	164,876	230,496
Sales Growth Rate(%)		82.51	34.48	40.10	41.10	42.55	44.60	40.20	39.80
Operating Expenses	3,854	4,430	4,602	5,248	6,520	6,680	6,934	7,002	7,023
EBIT Margin (%)	-19.00	-2.00	2.00	2.20	1.40	3.00	3.10	4.20	5.00
EBIT			577.22	889.55	798.73	2,439.84	3,645.61	6,924.77	11,524.80
EBIT*(1-Tax)			456.00	702.74	631.00	1,927.47	2,880.03	5,470.57	9,104.59
Increase in NWC			221.99	347.19	498.55	728.27	1,088.17	1,418.26	1,968.61
Net CapEx ratio		2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Net CapEx		194.01	148.00	231.46	332.37	485.51	725.45	945.51	1,312.41
		0	1	2	3	4	5	6	7
FCF			86.01	124.08	(199.92)	713.69	1,066.42	3,106.81	5,823.57
Discount Factor			0.89	0.80	0.71	0.64	0.57	0.51	0.45
Discounted FCF			76.80	98.92	(142.30)	453.56	605.11	1,574.00	2,634.29

5. Application of DCF model

After calculating free cash flow in terms of all the previous assumptions, it should use the free cash flow in the year 2029, times the terminal multiple to compute the terminal value of the company, and discounted it by $r=12\%$. Then, summing up the discounted cash flow from the year 2019 to the year 2029, and adding discounted terminal value to compute the enterprise value. On the other hand, the business enterprise value is the sum of the equity and debt, and then deducts the free cash. There is an equation to work out the value of equity. The number of shares outstanding can be found by exploring the financial statement of Tesla, which is around 172 million shares. Finally, using the equity value of Tesla divided by the shares outstanding, it can be computed that the share price of Tesla is \$780.98. Compared to the current price of Tesla \$376.7, it can be concluded that the share price is undervalued.

Table 4. Estimation on Equity Value and Stock Price (in millions)

Discount rate(r)	12%
Long-term growth rate	2%
Sum of Discounted FCF from 2018 to 2029	\$33,399.03
Terminal value	\$371,263.6582
Enterprise Value	\$140,128.46
Cash balances	\$3,600.00
debt	\$9,400.00
Equity Value	\$134,328.46
Number of shares outstanding	172
Stock price	\$780.98

There is a sensitivity analysis of how the discount rate and long-term growth rate could affect the share price of Tesla. It can be seen that the higher the long-term growth rate, the higher the share price. In the meantime, the discount rate and the share price have an inverse relationship. When the discount rate increases by 1%, the share price drops significantly. For instance, when the discount rate rises from 10% to 11%, long-term growth keeps steady at 2%, the share price decreases by \$203.38.

Table 5. Sensitivity Analysis on Stock Price

Stock Price(\$)	Long-term Growth rate(%)					
	1	2	3	4	5	6
Discount Rate(%)						
10	1,028.41	1,141.73	1,287.42	1,481.68	1,753.64	2,161.58
11	855.54	938.35	1,041.87	1,174.95	1,352.40	1,600.83
12	719.14	780.98	856.69	951.32	1,072.99	1,235.22
13	609.39	656.62	713.29	782.56	869.14	980.46
14	520.06	556.65	599.89	651.79	715.21	794.49
15	446.40	475.14	508.68	548.30	595.86	653.98

6. Conclusion

In terms of the estimated share price, Tesla is a valuable company to invest. According to the estimation made previously, Tesla has a strong cash position; most of its free cash flows are increasing year by year and might reach 1 billion dollars in the year 2023. It is reasonable to say that the general public has a strong demand for Tesla’s product. In this situation, Tesla may use the free cash to reinvest, for earning a higher return in the future. Additionally, the Tesla Gigafactory is going to operate in Shanghai. The local factory in Shanghai will maximize the efficiency of selling Tesla’s products to Asian customers, and decreasing transportation costs substantially. Therefore, Tesla’s profitability will be dramatically increased. The above discussion demonstrates that Tesla has a prospecting future in the automotive industry. Regarding all the competitive advantages Tesla possessed, it can be confirmed that scholars need to pay more attention to Tesla in future research. For instance, how Tesla uses leverage to finance its asset to find out its key success factors and discover its potential is a valuable topic worthy of study in future investigation.

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