REVISITING VALUATION METHODS OF TECH COMPANIES:

A CASE STUDY OF TESLA

By

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Executive Summary

The share price of Tesla, Inc., the world's all-electric vehicle manufacturer, has increased by roughly 19 times in value from its IPO on June 29, 2010 (with start price of $17 per share) to December 31, 2018 ($318). The purpose of this thesis is to estimate the value of the company's stock as of December 31, 2018, determine if the market price is fairly valued and also figure out the main drivers of such value.

In this thesis we analyse fundamental concepts of valuation and its importance. In addition, the key valuation methods and, their advantages and drawbacks are also discussed. The thesis moves on with the analysis of Tesla's business profile and historical operational and financial performance, as well as its comparison to key peer group companies. The industry outlook and the market's expectation on the future performance of Tesla are also reviewed through industry reports by international agencies and equity research papers issued by global investment banks and equity research firms.

Based on our findings from the above-mentioned analyses we forecast the future cash flow of the company and carry out its valuation using three methods, followed by the discussions regarding validity of each method's outcome. These are the major findings of this thesis:

- All three valuation methods yield share prices lower than the actual market price. We believe that Tesla's stock price is overvalued as of 31.12.2018, mainly fuelled by the market's over-optimistic expectations on the firm's future performance;
- The comparison of Tesla's performance to traditional automotive companies does not help in making right conclusions and valuation mainly due to discrepancy in their business profiles (Tesla is perceived as a tech company, rather automobile manufacturer by the market) and stage of development;
- First Chicago method is the most appropriate valuation method for Tesla.

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Introduction

The valuation of tech and early stage growth companies has been a hot topic among experts in finance industry and scholars for a while, and still remains as an interesting question. There are a lot of discussions and disagreements on the most appropriate and universal method of valuation for such companies that can estimate their true value as accurate as possible. Tesla is one of such cases that has been the object of many discussions and researches in the last several years. According to Cornell and Damodaran (2014), it is due to the difficulties in measuring how market sentiment affects the firm's stock price. The market sentiment is investors' expectations regarding the company's future cash flows and risks that cannot be justified by available data[1].

In this thesis we give another try to valuation of Tesla and attempt to define the true value of the company's stock price. This is done by the review of certain valuation methods, analysis of Tesla's business profile and historical financial performance, and its comparison to the selected group of peer companies, followed by valuations carried out using chosen methods based on the above-mentioned analysis. One of the main outcomes of of the thesis is that traditional methods of valuation are not good fit in case of Tesla and situation specific approach is required for its valuation. Additionally, we also believe that the company's stock price is overvalued as of December 31, 2018, and the main reason for that is the over-optimistic expectations of investors regarding the firm's future growth perspectives.

The thesis consists of three chapters. The first chapter discusses basic concepts and importance of valuation from theoretical perspective. The second chapter is an overview of Tesla's business profile and financial performance. The final chapter is an empirical one and it includes valuation of Tesla using three methods.

[1] M.Baker & J.Wurgler (2007), Investor sentiment in the stock market, Journal of Economic Perspectives, 21. p.129-151

Chapter 1. Basic Concepts of Valuations

1.1 Importance And Understanding of Valuation

Every asset, financial or non-financial, tangible or intangible, has a value and can be valued. The valuation has been of a great importance in finance world for centuries. With the development of financial systems, markets and its players, role of valuation has been growing over time, as investors do not want to pay for an asset than its true value.

Valuation has different applications in a wide variety of areas, including, but not limited to, the followings[2]:

- *Valuation in portfolio management:* the use of valuation in portfolio management is based on the investment philosophy of the investor(s). Different valuation methods are used by portfolio managers for different purposes depending on their type of activity. However, in general, investors try to include undervalued stocks in their portfolios with hope that in long-term those stocks perform better and reach their true value, thus create a wealth for their stock holders. However, we note that valuation methods are used rarely by active portfolio managers (e.g. information traders) as their investment horizon is normally very-short term and expectation on price/value movement is not based on an invested firm's growth perspectives, cash flow generation and etc.
- *Valuation in acquisition analysis*: valuation plays an important role in acquisition transactions as bidding party does the valuation of a target firm before making an offer, meanwhile target party carries out valuation for itself before accepting or rejecting the offer. Valuation in acquisition analysis has its own specific aspects such as synergy. The target party should also count on the additional value creation as a result of combination of firms due to the impact of synergy, which is normally quite

[2] Aswath Damodaran (2012), Investment Valuation, p.8-10

difficult to measure. Another compelling point about the valuation in acquisition analysis is over-optimism bias by target firms.

- *Valuation in corporate finance*: as known, maximizing the firm's value is the main objective of corporate finance. Hence, all financial decisions and corporate strategies should be screened from the prism of valuation. Therefore, understanding the relationship between corporate finance decisions (e.g. which source, debt or equity capital, of funding capex creates more value) and valuation is of great importance.

As mentioned earlier, valuation has been the centre of attention in finance experts and scholars and, especially, with the development/change of financial systems and markets, as well as market players, its importance has kept growing. There have been a great number of valuation methods developed to date. However, there still many disagreements on which method is the best in estimating the true value of an asset and how long its takes for asset prices to adjust to the true value, or if it does at all.

According to Damodaran (2012), there have been several myths identified over time based on empirical analysis and observations regarding valuation that market players often confuse[3]:

Myth 1. Quantitative valuation methods result in objective valuation. Despite the fact that value is sometimes driven from quantitative analysis, the inputs and assumptions taken in such quantitative methods are usually formed based on subjective judgements. Actually, in many cases the valuation is biased by the actual market price from the very beginning of the process.

Myth 2. A well-researched and well-done valuation is timeless. Any valuation is based on market-wide and company-specific information. Thus, no matter how accurate the valuation is, the value will change as soon as new information appears. Since at current

[3] Aswath Damodaran (2012), Investment Valuation, p.6-7

information-technology advanced times, new information reveals constantly and gets reflected on prices quickly, the valuation get older very soon and should be updated regularly.

Myth 3. The more quantitative a model, the more accurate the result. Complex models usually comprise of higher number of inputs. Hence, the probability of error and biases also increase accordingly. In fact, historically simpler models performed better than complex ones.

Myth 4. The outcome of valuation is what matter; The process is not important. Many analysts mainly focus on the outcome of the valuation, on if an asset is over- or under-valued, and ignore the process itself. However, understanding the process inside out can tell a lot about how the value is driven and what exactly is fuelling the price.

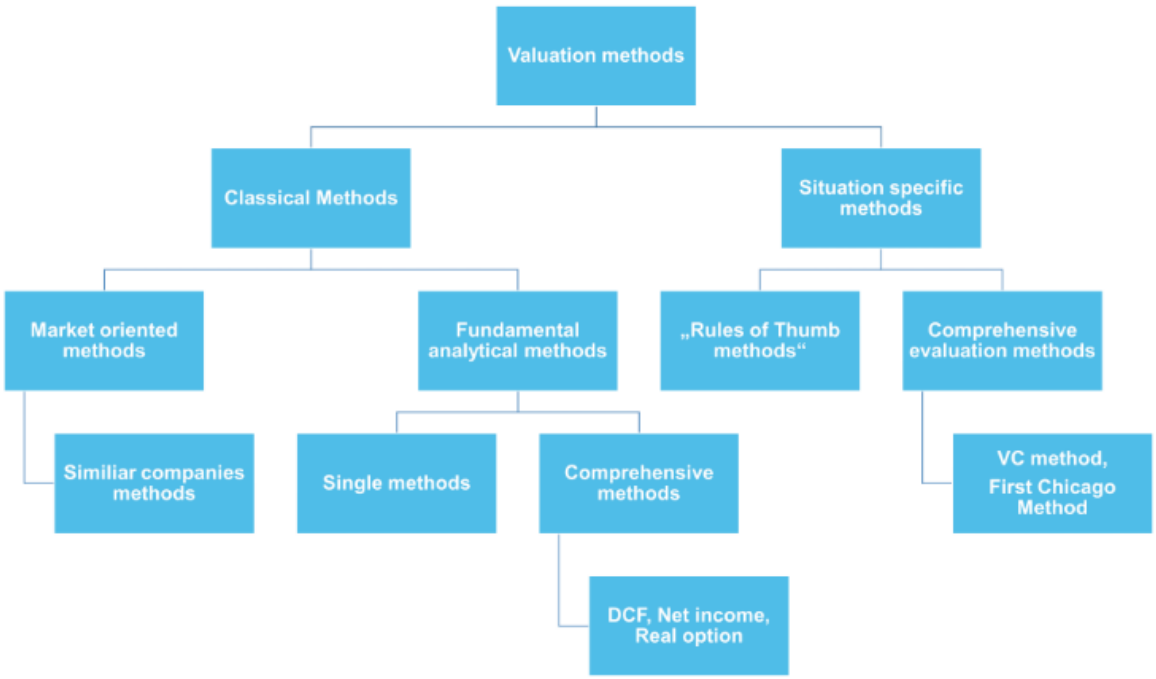
In general there are two contradictory believes regarding the valuations: one saying that no model can estimate the value of an asset with 100% accuracy, however, well-done valuation results in as accurate value as possible; the other says that the actual market price is a true value and the discrepancy in the market price and the outcome of valuation model is because of the drawbacks of the valuation methods.

1.2 Theoretical Overview Of Valuation Methods

As mentioned above there are a great number of valuation methods available for different purposes and situations. In general they can be classified into two categories: classic (or traditional) methods and situation specific methods (non-traditional)[4]:

[4] Achleitner & Nathasius (2004), Venture Valuation, p.12.

Figure 1.Simplified Charts of Valuation Methods



Source: Achleitner, Nathasius (2003)

In this chapter we discuss some of the popular valuations methods and, especially, focus on those that will be used by for Tesla's valuation in later chapters.

1.2.1 Discounted Cash Flow Method

Discounted cash flow valuation has been one of the most popular and best methods for a long time, according to Luehman (1997). Though other methods are being more frequently used currently, DCF is believed to be the foundation for most of other methods. Therefore, understanding the fundamentals of discounted cash flow model is very important for proper application of other methods, as well.

As name speaks for itself, DCF methods tries to estimate the intrinsic value of an asset by discounting its future cash flows. Here, being able to accurately predict the future cash flows and applying a correct discount rate is of great significance.

There are three ways of discounting cash flow valuations in general: valuing equity value of a company, valuing the entire firm, i.e. enterprise value, and valuing a firm in pieces, i.e. adjusted present value (valuing a company starting from its operations and adding the value created by debt and other non-equity claims). The appropriate discount rate is defined based on what is being valued.

The value of equity is estimated by discounting the residual cash flow generated after meeting a firm's all operational and investment needs, tax obligations and debt service (interest payments and net debt repayment) by the cost of equity, which is the required rate by investors in exchange for owning the equity of a company[5]:

$$\text{Value of Equity} = \sum_{t=1}^{t=n} \frac{\text{CF to Equity}_t}{(1+k_e)^t}$$

Another specialized case of equity valuation based on the above logic is dividend discount model, where the value of equity is driven by discounting expected future dividend payments to the equity.

Enterprise value is estimated by discounting the free cash flow to firm (FCFF), the residual cash flow generated after covering all operating, tax expenses and capital expenditure, but before payments to equity and debt holders of the firm, by weighted cost of capital (WACC), which will be discussed in the later section of the thesis[6]:

$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{\text{CF to Firm}_t}{(1+\text{WACC})^t}$$

In APV method the value is obtained by valuing each claim on a company. Precisely, the firm is first valued as if it is funded solely by equity capital, then additional value created by tax

[5] Aswath Damodaran (2012), Investment Valuation, p.18
[6] Aswath Damodaran (2012), Investment Valuation, p.19

benefit of raising debt capital is added. In addition, assumed bankruptcy cost should be deducted from the result.

Value of firm = Value of all-equity financed firm + PV of tax benefits + Expected Bankruptcy Costs

Despite the fact that the above three methods use different discount rates, they should result in consistent values as long as the same assumptions are used for the forecast of future cash flows.

Discounted cash flow model can be used in cases when a firm is generating positive cash flows currently and its future cash flow is predictable, as well as, appropriate risk proxy for estimating discount rate is available. However, there are certain cases, where implementation of DCF method is challenging. Below we count some of such situations:

- *Distressed firms:* such firms usually generate negative cash flows and it is very difficult to predict their future cash flows. In addition, discounted cash flow model is build based on an assumption that the valued company is going concern, while distressed firms have high probability of bankruptcy.
- *Cyclical firms:* the performance of such firms tend to move in line with the development of the economy, generating high cash flows during economic growth period and, lower or negative cash flows during down-cycles. Hence, the forecast of cyclical firms' cash flows should be correlated by development of the economy and its extent. Usually an analyst's expectations on the evolution of the economy are biased, which in turn gets reflected in the valuation.
- *Firms with un/underutilized assets:* DCF model estimates the value of assets of a firm that generate cash. If a company has unutilized or underutilized assets, which do produce relatively low or no cash flow, then the value of such assets will be

underestimated or ignored in the valuation process by the model. In such cases, the value of unutilized assets are estimated separately and added to the result of the DCF model.

- *Firms being restructured:* such firms often dispose some of their assets, alter their capital structure, change some financial strategy and policies (e.g. dividend policy, cost structure and etc.) which in turn impact the company's future cash flow generation ability and riskiness. As a result, predicting future cash flows and defining appropriate discount rate for such firms becomes challenging.
- *Acquisitive firms:* forecasting future cash flow of such firms is difficult even in case when the target firm and acquisition value are known, as it is hard to estimate compatibility of those companies, as well as their potential synergies.
- *Private firms:* the estimation of discount rate for such firms is challenging as the measurement of risk usually requires estimations based on historical price data. However, private firms are not traded, the risk parameters are measured by benchmarking to similar public companies, which brings about some biases in estimations.

1.2.2 Relative Valuation Method

Relative valuation is one of the most widely used valuation methods in the market[7]. This method purports valuation of an asset based comparison to the prices of other similar assets. The relative valuation is also called multiple valuation, since it often involves comparison of the asset being valued and its benchmark group based on some multiples. One of the implication of this method is valuation of a firm comparing its some ratios with the industry averages. Unlike DCF which relied of a firm's future cash flows, multiple valuation mostly

[7] Aswath Damodaran (2012), Investment Valuation, p.25

relies on the market under the assumption that the market on average prices stocks correctly, despite possible errors in the valuations of individual shares. If the firm's multiple is below the peers' or industry's average, it is believed to be undervalued, or vice-verse.

In relative valuation proper choice of multiples and comparable firms is a great significance. Some of the widely used multiples in relative equity valuation are price to earnings, price to sales and price to book value ratios. There are also a great number of multiples used to obtain enterprise value of a firm.

Another compelling point about relative valuation is that this method is very flexible in implementation. Some analysts use the firm's own the historical multiples for some cases, while usually average multiples of peer companies or the whole industry is taken as a benchmark. Comparison across time is applicable for mature firms with enough long track record, when the current multiples can be compared to the multiple (or its average) they used to trade historically. In addition, there are situations when relative valuation is based on fundamentals.

Multiple valuation based on fundamentals usually involve growth rates in earnings, payout ratios and etc[8]. This approach is logically the same as using discounted cash flow model, which requires the same set of information and assumptions, normally result in the same outcome. It allows analysts to illustrate the relationship between firm's characteristics and its multiples, how they are linked to each other (e.g. the relationship between in ROE and price to book ratio).

Relative valuation is easy-to-use and less time-consuming method. Moreover, it can be integrated with other valuation methods, as well. However, this method is not very useful for valuation of unique companies, like Tesla (which is discussed in more details in Chapter 3).

[8] Aswath Damodaran (2012), Investment Valuation, p.25

Also, multiple valuation can be easily biased due to its simplicity. For example, an analyst can form the peer group or choose ratios in a way to confirm its biased value perception regarding the company being valued.

1.2.3 First Chicago Method

The above-mentioned valuation methods do not work well with early stage growth companies or firms with a unique business profile due tot variety of factors, including, but not limited to difficulty of predicting future cash flows, lack of historical data and absence of enough comparable firms with similar characteristics. There are varieties of situation specific valuation methods that are used in such cases. One of them is first Chicago method (FCM) of valuation. This method is very popular among venture capital and private equity funds and widely used to value early stage growth companies.

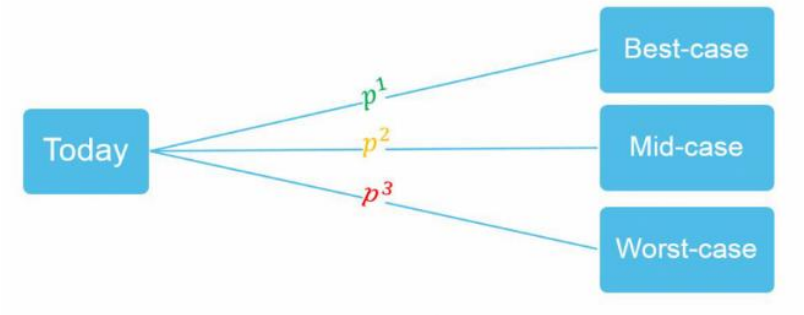
FCM combines the aspects of both fundamental analysis and market-oriented methods[9]. The method usually requires creation of valuations in three scenarios (optimistic case, base case and pessimistic case). An analyst builds separate forecasts for each scenario with different assumptions. FCM requires detailed analysis of the industries current and past performance, as well as future potentials. Based on these analyses, optimistic scenario is usually built based on "winner takes all or most" philosophy.

Usually financial forecasts are done for explicit period using DCF method and terminal value (or exit value as funds usually plan to sell the asset at higher price at some point) is estimated using multiple valuation method. Unlike DCF model, in first Chicago model venture capital/private equity fund use their own internal required rate, instead of WACC, as a discount factor in many cases.

[9] https://www.venionaire.com/first-chicago-method-valuation/

$$Valuation^i = \frac{TV^i}{(1+r)^h} + \sum_{t=1}^{h} \frac{CF_t^i}{(1+r)^t}$$

Once the values of each scenario are obtained, the analyst assigns probabilities to each of them based on his/her view on the expected occurrence of the cases. Obviously, prediction of exact probabilities for each scenario is impossible. However, analysts try to base their consensus on the extensive industry research, peer companies' performances and etc. The sum of probabilities should add up to one hundred percent.



Once the expected probabilities are defined, the weighted average value of each case's outcomes is calculated.

$$Enterprise\ Value = \sum_{i=1}^{3} p^i\ Valuation^i$$

First Chicago method is relatively complex and requires additional efforts. However, it is believed to be one of the best methods of valuation for tech companies at their early stage of growth.

Chapter 2. Introduction to Tesla

2.1 Tesla's Business Description

Tesla Inc, established in July 2003, is the world's first company solely specialized in development, design, production and sale of all-electric vehicles. In addition, the company also manufactures, installs and maintains solar and energy storage systems. Thus, Tesla operates in two segments: i) automotive, and ii) energy generation and storage.

In automotive segment Tesla currently offers three models: the Model S sedan (introduced in June 2012), the Model X sport utility vehicle (in September 2015) and the Model 3 sedan (in July 2017), a budget-friendly vehicle for mass market. In addition, the company is planning to commence the production of a new model, the Model Y, a compact crossover utility vehicle, in late 2020/early 2021.

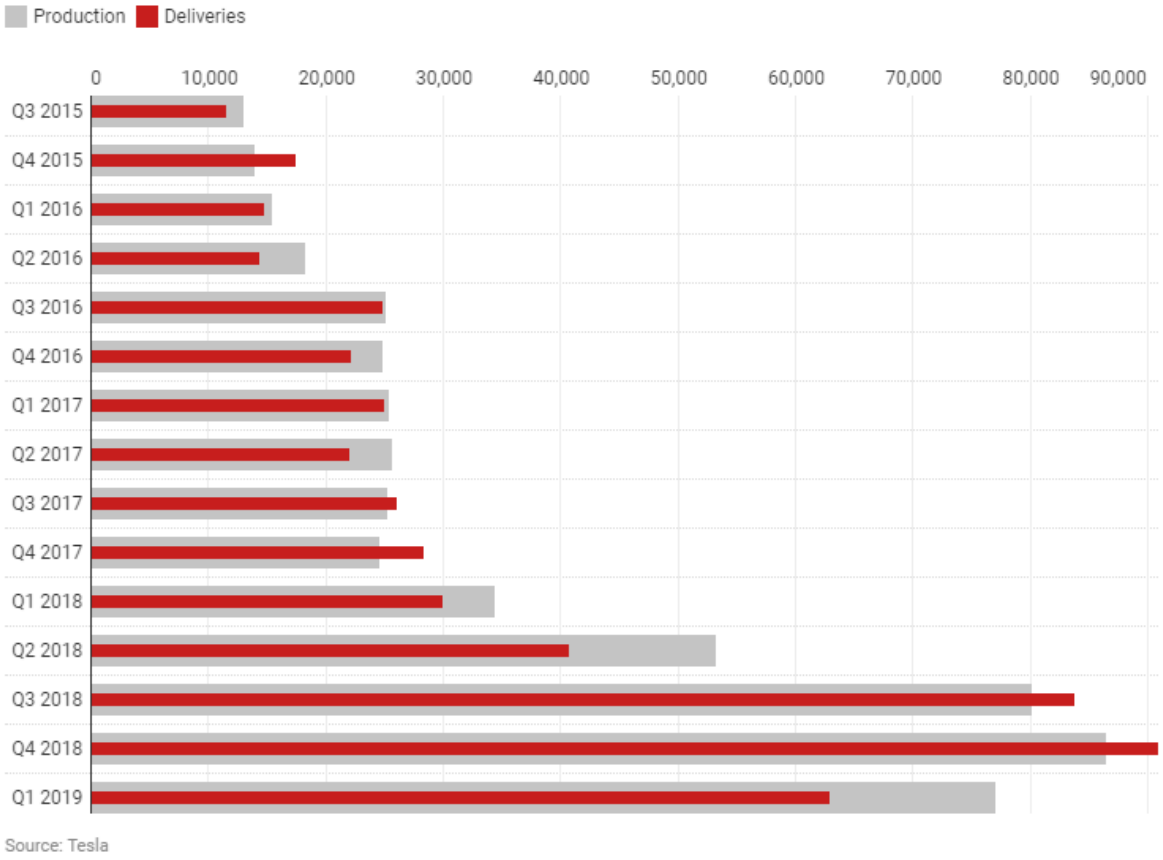
At the moment the company has only one fully operational manufacturing plant located in California, the USA. The construction of another one, Gigafactory Shanghai, has started in early 2019 in Shanghai, China. The factory will be specialized mainly in the production of Model 3, a lower-priced model, for Chinese market and it is aimed to reach 500 thousand vehicles per year production in five years once the manufacturing process fully ramped up.

Tesla has stepped in the growth phase of its business life cycle a few years ago with the introduction of its new EV models, thus ramping up its revenue generation. However, the company is still at its early stage with relatively high costs of production and cash burning nature of its business, which is typical for such capital intensive companies.

During FY2018 Tesla delivered 245 thousand EVs, which is 138% higher as compared to 103 thousand deliveries in FY2017. The growth was mainly driven by the start of Model 3 sales that accounted for 57% (or 140 thousand units) of the total sale volume. The company is

forecasting to deliver from 360 thousand to 400 thousand units of EVs in 2019, or 45% to 65% higher sales, according to First Quarter 2019 Update published by Tesla[10].

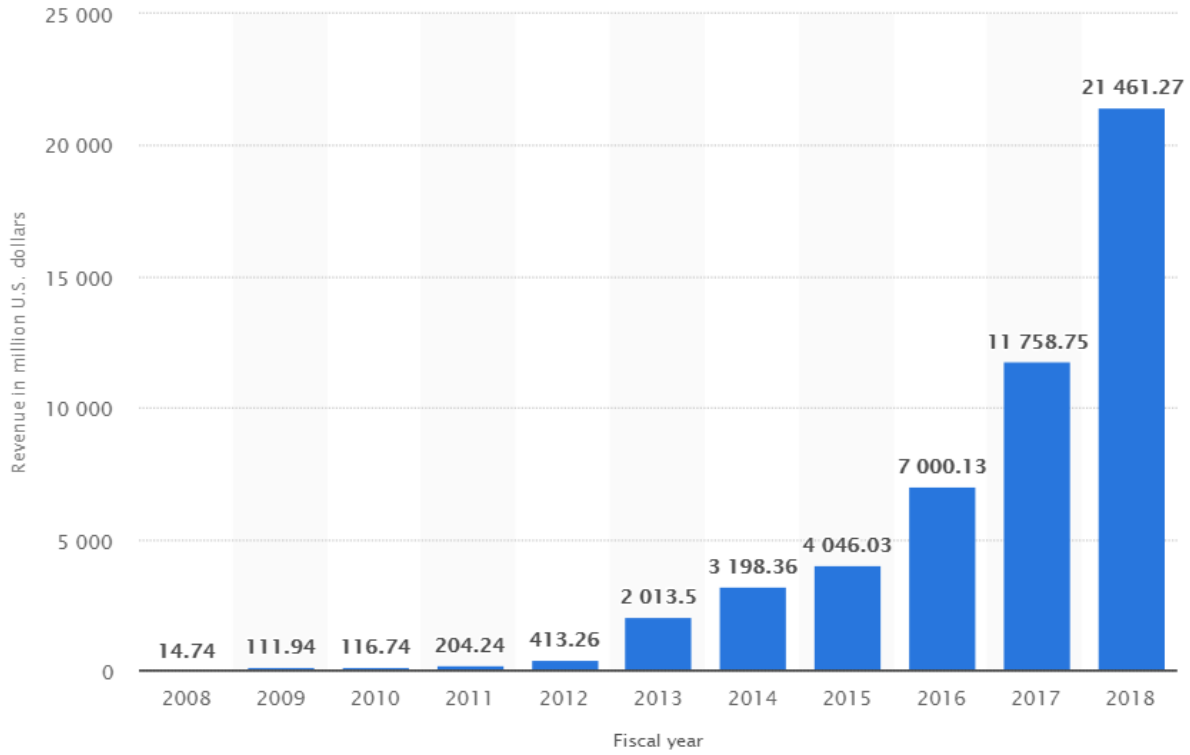
Figure 2. Tesla's quarterly vehicle production and delivery



Recent ramp-up in sales has also driven the company's revenue in the last couple of years. Tesla generated $21.5 billion of total revenue in FY2018, about 83% higher compared to FY2017 revenue.

[10] https://ir.tesla.com/static-files/b2218d34-fbee-4f1f-ac95-050eb29dd42f

Figure 3. Tesla's revenue from FY2008 to FY2018 (in million U.S. dollar



Source: www.statista.com (https://www.statista.com/statistics/272120/revenue-of-tesla/

In addition to manufacture and sale of electric vehicles, Tesla has also established global network of Supercharger stations, vehicle service centers, Mobile Service technicians and body shops to support its existing and potential customers. As of March 31, 2019, the company had approximately 1.5 million Supercharger stations installed in North America, Europe and Asia, and the management is dedicated to significantly increase the number of such stations in coming years to accelerate the adoption of its vehicles.

In ***energy generation and storage segment*** Tesla develops and sells energy storage hardware and solutions for home use and commercial properties, such as Powerwall 2, a 14-kWh rechargeable lithium-ion battery intended for storing energy at residential properties, and Powerpack 2, a 210-kWh rechargeable lithium-ion battery designed for commercial facilities. Both offer a functionality of being combined with renewable energy generation sources.

In addition, the segment's portfolio comprises of solar panels, inventers that convert the electrical output from the panels to a usable current compatible with the electric grid, and other functional hardware components. In 2016 the company introduced its Solar Roof system that combines solar energy production with durable glass roofing tiles. The project is expected to ramp up in the second half of 2019. Currently, energy generation and storage segment does not have meaningful weight in Tesla's overall operations with just 7% share in FY2018 total revenue.

We note that despite the rapidly growing sales volume and revenue of the company, Tesla's production costs are still relatively high and its net income has not turned into positive yet since the establishment of the company. One of the main reasons is the fact that Tesla purchases majority of the components for its products from third-party vendors.

2.2 Tesla's Stock Price Performance Analysis

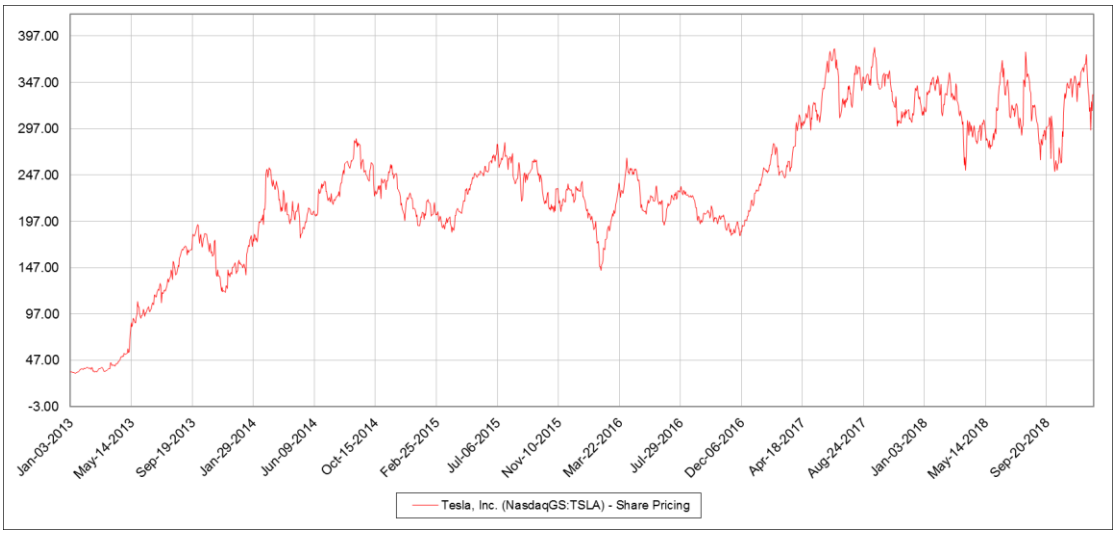
Tesla's stock price has shown a nineteen-fold increase since the IPO till December 31, 2018, despite the fact that the firm has been generating negative cash flow and has paid no dividend historically.

Analyzing the historical stock price movement and its drivers, we note that the main drivers of such share price performance have been the market's over-reaction to the new information appeared in the market, rather than fundamental analysis. The first sharp increase in Tesla's stock price was observed during 2013, when the share price soared by about 570% increased up to $193 from $34. It was driven by the company's earnings releases, when it generated very low, but positive earnings for the first time in its history beating the investors' expectations, and the CEO's tweets saying that Tesla became a profitable firm from that time[11]. However, it turned out to be wrong.

[11] https://www.mercurynews.com/2013/04/01/2013-tesla-soars-to-all-time-high-after-ceo-says-company-is-now-profitable/

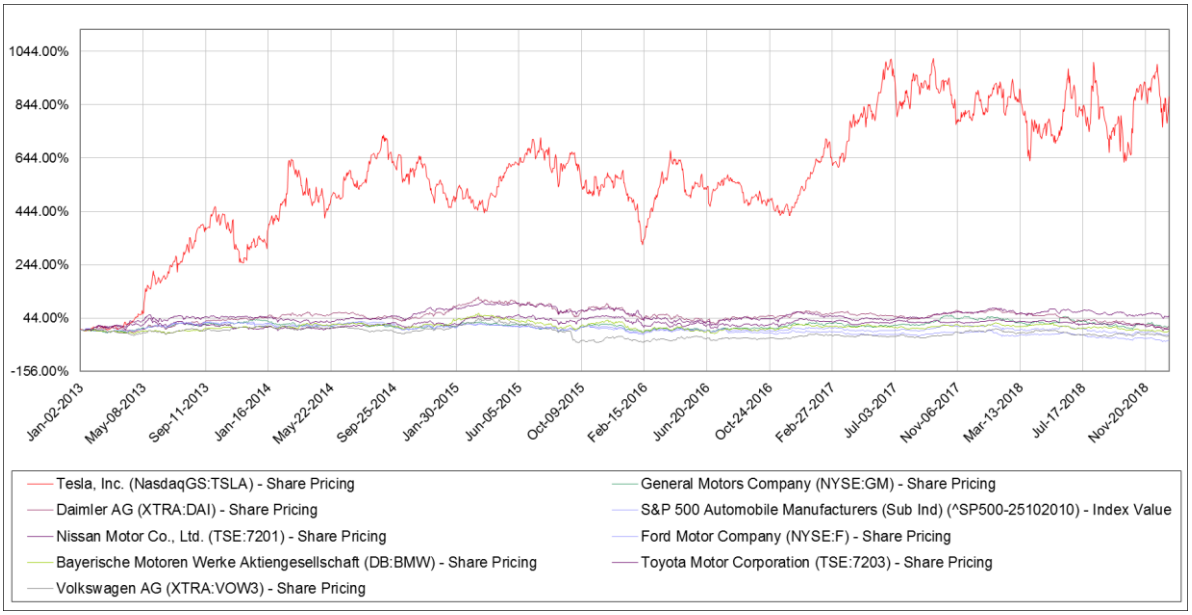
Other share price spike events were mainly followed by the announcement of new EV models and future projects in energy generation and storage segment that was supported by speculative announcements of Elon Musk.

Figure 4. Tesla Stock Price Movement from January 2013 to December 2018



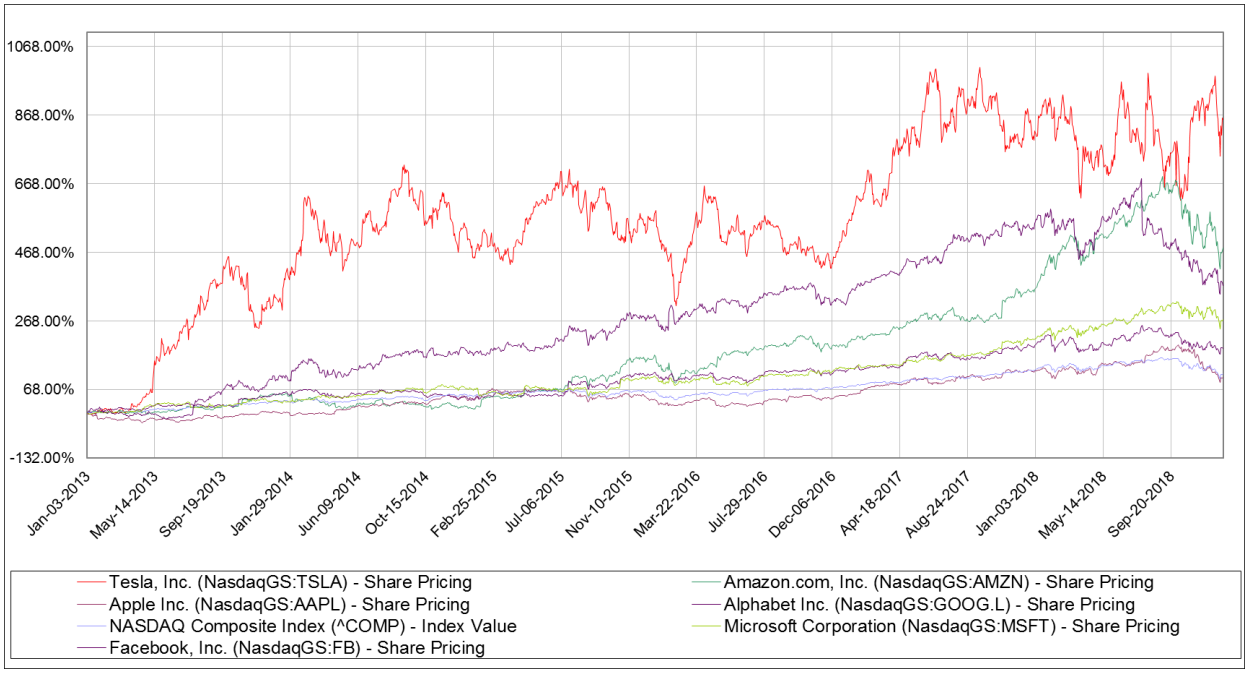
Source: Capital IQ

We compare the stock price performance of Tesla to the share price movement of its automobile manufacturer peers and the industry index. As it can be seen from the blow graph, Tesla largely outperformed its peers and the industry in general despite the fact has been generating negative cash flow and producing significantly lower number of cars compared to the peers.



This situation once again proves that Tesla is not perceived as car producing company by the market. Now we compare the firm's stock price performance with the selected group of peers from tech industry. As can been seen from the below chart, Tesla's stock price moved somewhat in line with the performance of tech companies' share prices and industry index.

Figure 5. Tesla's and Selected Tech Companies' Stock Price Performance



2.3 Analysis of Financial Performance

Prior to moving to the forecast of Tesla's cash flow for valuation purposes, we need to analyse its current financial position and historical performance. The financial performance analysis also gives us an idea about how the company created value for its shareholders and how it has performed compared to peers. The below we provide brief analysis of the company's financial statements.

Table 1. Tesla's Income Statement, 2012-2018

Income Statement, $m	2012	2013	2014	2015	2016	2017	2018
Total Revenue	**413**	**2,013**	**3,198**	**4,046**	**7,000**	**11,759**	**21,461**
Growth		*387%*	*59%*	*27%*	*73%*	*68%*	*83%*
COGS	(383)	(1,557)	(2,317)	(3,123)	(5,401)	(9,536)	(17,419)
Gross Profit	**30**	**456**	**882**	**924**	**1,599**	**2,222**	**4,042**
Selling, General & Admin Expenses	(122)	(179)	(372)	(500)	(463)	(815)	(947)
R&D Expenses	(274)	(232)	(465)	(718)	(834)	(1,378)	(1,460)
EBITDA	**(365)**	**45**	**45**	**(294)**	**301**	**30**	**1,635**
Depreciation & Amortization	(29)	(106)	(232)	(423)	(947)	(1,636)	(1,888)
EBIT	**(394)**	**(61)**	**(187)**	**(717)**	**(646)**	**(1,606)**	**(253)**
Net Interest Expense	0	(33)	(100)	(117)	(183)	(458)	(629)
Other Expenses	(2)	(43)	(198)	(276)	(284)	(1,060)	(1,381)
EBT	**(396)**	**(71)**	**(285)**	**(876)**	**(746)**	**(2,209)**	**(1,005)**
Tax Expense	(0)	(3)	(9)	(13)	(27)	(32)	(58)
Net Income	**(396)**	**(74)**	**(294)**	**(889)**	**(773)**	**(2,241)**	**(1,063)**

Common-Size Income Statement	2012	2013	2014	2015	2016	2017	2018
Total Revenue	100%	100%	100%	100%	100%	100%	100%
COGS	(93%)	(77%)	(72%)	(77%)	(77%)	(81%)	(81%)
Gross Profit	**7%**	**23%**	**28%**	**23%**	**23%**	**19%**	**19%**
Selling, General & Admin Expenses	(29%)	(9%)	(12%)	(12%)	(7%)	(7%)	(4%)
R&D Expenses	(66%)	(12%)	(15%)	(18%)	(12%)	(12%)	(7%)
EBITDA	**(88%)**	**2%**	**1%**	**(7%)**	**4%**	**0%**	**8%**
Depreciation & Amortization	(7%)	(5%)	(7%)	(10%)	(14%)	(14%)	(9%)
EBIT	**(95%)**	**(3%)**	**(6%)**	**(18%)**	**(9%)**	**(14%)**	**(1%)**
EBT	**(96%)**	**(4%)**	**(9%)**	**(22%)**	**(11%)**	**(19%)**	**(5%)**
Net Income	**(96%)**	**(4%)**	**(9%)**	**(22%)**	**(11%)**	**(19%)**	**(5%)**

Source: Capital IQ

Tesla's revenue has been growing rapidly (CAGR of 93%) since FY2012 as the company's operations started ramping up with the introduction of new model. In addition, the growth was supported by the installation of new Supercharge stations worldwide and establishment of financial services offerings such as direct leasing and financial arrangement primarily in cooperation with financial institutions. Solid revenue growth in FY2018 was due to the introduction of Model 3, a budget-friendly model of the company, which became the best-selling luxury car in the US in 2018. Tesla's revenue growth is expected to slow down to low double-digit rates from high double-digit rates in next few years due to absence of new product offers (except Model Y) and high competition from increasing number of peers in EV segment with lower priced models.

Despite the increase in the scale of sales in the last several years, the company's cost structure and profit margins have not improved much, and has remained somewhat instable. It can be explained by the fact Tesla purchases majority of component parts for it vehicles from third-party suppliers which makes the cost of production higher and more sensible to changes in market prices for such parts. On the other side, the company's fixed costs (with elements of variable costs) such as SG&A and R&D has decreased as a % of revenue over the last several years. Subsequently, Tesla has been generating negative net income since its inception.

Table 2. Tesla's Balance Sheet, 2012-2018

Balance Sheet, $m	2012	2013	2014	2015	2016	2017	2018
Cash&Cash Equivalents	202	846	1,906	1,197	3,393	3,368	3,686
Accounts Receivable	27	49	227	169	499	515	949
Inventory	269	340	954	1,278	2,067	2,264	3,113
Other Current Assets	28	31	94	138	300	424	558
Total Current Assets	**525**	**1,266**	**3,180**	**2,782**	**6,260**	**6,571**	**8,306**
PP&E	562	1,121	2,596	5,195	15,037	20,492	19,691
Other Non-Current Assets	27	30	55	91	1,367	1,593	1,742
Total Non-Current Assets	**589**	**1,151**	**2,651**	**5,286**	**16,404**	**22,085**	**21,433**
Total Assets	**1,114**	**2,417**	**5,831**	**8,068**	**22,664**	**28,655**	**29,740**
Accounts Payable	303	304	778	916	1,860	2,390	3,404
Other Current Liabilities	236	371	1,387	1,942	3,975	5,284	6,588
Total Current Liabilities	**539**	**675**	**2,165**	**2,858**	**5,836**	**7,675**	**9,992**
LT Debt (excl. ST portion)	411	599	1,850	2,222	7,377	11,152	11,116
Other Non-Current Liabilities	39	476	903	1,903	3,546	4,196	2,318
Total Non-Current Liabilities	**450**	**1,075**	**2,754**	**4,126**	**10,923**	**15,348**	**13,434**
Total Liabilities	**989**	**1,750**	**4,919**	**6,984**	**16,759**	**23,023**	**23,426**
Total Equity	**125**	**667**	**912**	**1,084**	**5,905**	**5,632**	**6,314**
Balance Sheet Key Ratios	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Current Ratio	1.0x	1.9x	1.5x	1.0x	1.1x	0.9x	0.8x
Quick Ratio	0.5x	1.4x	1.0x	0.5x	0.7x	0.6x	0.5x
Net Total Debt/EBITDA	(0.7x)	(5.3x)	14.0x	(5.8x)	17.2x	294.9x	6.2x
Debt-to-Equity Ratio	7.9x	2.6x	5.4x	6.4x	2.8x	4.1x	3.7x
DSO	16	7	16	18	17	16	12
DIO	152	71	102	130	113	83	56
DPO	109	68	67	90	82	80	58
CCC	59	10	50	59	49	19	11

Tesla's balance sheet has been increasing rapidly in line with the business development. PP&E accounts for majority of the company's assets (66% in FYE2018). Tesla's assets are mainly (79% in FYE2018) financed by liabilities leading to high debt-to-equity ratio of 3.7x.

However, we note that this level debt-to-equity ratio is typical for automotive industry (see peer comparison section for details).

The company's balance sheet is relatively illiquid, that being said Tesla's ability to meet obligations is limited. Especially, its short-term liquidity position has worsened in recent years with current and quick ratios having declined to 0.8x and 0.5x in FYE2018 from 1.5x and 1.0x in FYE2014, respectively. However, Tesla's working capital management has meaning fully improved in the last couple of years, due to ramp-up of sales, bringing about decline in cash conversation cycle from 11 days in FY2018 from 49 days in FY2016.

We note that low liquidity and high leverage profile of Tesla's balance sheet may result in difficulties with raising additional debt capital and have a negative impact on its share price in near future.

Table 3. Tesla's Cash Flow Statement

Cash Flow Statement, $m	2012	2013	2014	2015	2016	2017	2018
Funds from Operations	(309)	116	200	(31)	570	436	2,040
Change in NWC	45	149	(257)	(493)	(694)	(497)	58
Cash from Operating Activities	(264)	265	(57)	(525)	(124)	(61)	2,098
Cash from Investing Activities	(207)	(249)	(990)	(1,674)	(1,081)	(4,196)	(2,337)
Cash from Financing Activities	420	635	2,143	1,524	3,744	4,415	574
Impact of FX Rate Change	(2)	(7)	(36)	(34)	(7)	40	(23)
Net Change in Cash	**(53)**	**644**	**1,060**	**(709)**	**2,532**	**198**	**311**
Cash BoP	255	202	846	1,906	1,197	3,393	3,368
Cash EoP	202	846	1,906	1,197	3,393	3,368	3,686
FCFF	**(336)**	**(27)**	**(745)**	**(1,066)**	**599**	**(1,248)**	**(674)**

Source: Capital IQ

Tesla's cash flow generation has been negative historically as the company is at its early stage of development and performs in capital intensive industry. Even cash flow from operations has been negative until 2018, mainly due to high cost of production. In addition, Tesla has generated negative cash flow to firm (FCFF) every year, except 2016, during the period of 2012-2018, as a result of high production cost and capital expenditures. That being said the company has not been able to generate extra cash by itself for debt service and shareholder

compensation. Contrary, Tesla has been funding its expansion via equity and debt capital. The company's FCFF is expected to turn into positive starting from 2020.

2.4 Peer Comparison Analysis

We have analysed the financial performance of Tesla in the last several years. However, it is difficult to see the full picture of the company's financial position just by analysing its current and historical performance on a standalone basis. Comparison with the selected group of peers in the same industry provides more clear idea on the financial health of the firm.

In this section we compare Tesla's key financial metrics in FY2018 with its peers that consist of the largest global automakers. All of these companies have relatively mature business. Another compelling point is that all of these firms, possessing extensive industry experience and in-house know-how as well as financial resource, are engaged in the production of electric vehicles and expected to ramp-up their EV production, thus representing significantly increased competition in this segment of the market.

The below table represents the key financials of Tesla and its selected peers that enables us to conduct comparison analysis of their revenue generation, profit margins, cash generation ability, as well as leverage and liquidity positions. Summary of these analysis will later be used in relative valuation of Tesla in the following section of the thesis.

Table 3. Key Financial Metrics of Tesla and Selected Group of Peers, FY2018

Key Financial Metrics	Tesla	Ford	GM	Audi	Daimler	Nissan	Toyota	BMW
Market Capital (31.12.2018)	57,153	30,431	47,212	37,308	54,774	31,203	166,058	51,228
Enterprice Value (31.12.2018)	69,094	160,385	133,728	17,538	190,148	96,303	308,499	145,482
Total Revenue	21,461	160,338	147,049	66,073	186,642	108,307	266,251	108,710
Gross Profit	4,042	14,879	14,278	10,749	34,442	19,368	49,756	19,062
EBITDA	1,635	12,727	11,908	8,497	15,804	8,738	37,463	14,033
Net Income	(976)	3,677	8,014	3,772	8,084	6,769	22,602	7,937
Total Assets	29,740	256,540	227,339	73,155	314,062	169,894	455,918	233,055
Total Liabilities	23,426	220,474	184,562	40,036	240,399	118,339	279,833	168,275
Total Equity	6,314	36,066	42,777	33,119	73,662	51,554	176,085	64,780
Total Net Debt	10,142	154,213	104,951	476	161,595	70,129	177,091	113,663
Cash from Operating Activities	2,098	15,022	15,256	7,821	383	9,708	38,153	5,633
Cash from Investing Activities	(2,337)	(16,261)	(20,763)	(7,995)	(11,064)	(10,401)	(33,170)	(8,211)
Cash from Financing Activities	574	(122)	11,454	(2,859)	14,750	334	(4,070)	4,791
Net Change in Cash	311	(1,731)	5,648	(3,017)	4,217	(318)	518	2,163
FCFF	(674)	4,187	(5,068)	1,150	(156)	(10,476)	194	(4,566)
Revenue/EV	0.3x	1.0x	1.1x	3.8x	1.0x	1.1x	0.9x	0.7x
Gross Margin	18.8%	9.3%	9.7%	16.3%	18.5%	17.9%	18.7%	17.5%
EBITDA Margin	7.6%	7.9%	8.1%	12.9%	8.5%	8.1%	14.1%	12.9%
Net Income Margin	(4.5%)	2.3%	5.4%	5.7%	4.3%	6.2%	8.5%	7.3%
Dilluted EPS	(5.72)	0.92	5.53	87.7	7.56	1.73	7.55	12.07
Payout Ratio	0.0%	73.6%	28.0%	71.1%	53.9%	26.5%	25.1%	37.0%
Net Debt/EBITDA	6.2x	12.1x	8.8x	0.1x	10.2x	8.0x	4.7x	8.1x
EBITDA/Interest Expense	2.5x	10.4x	18.2x	112.0x	21.6x	76.1x	149.9x	40.6x
Debt-to-Equity Ratio	3.7x	6.1x	4.3x	1.2x	3.3x	2.3x	1.6x	2.6x
Current Ratio	0.8x	1.2x	0.9x	1.6x	1.2x	1.7x	1.0x	1.2x
Quick Ratio	0.5x	1.0x	0.7x	1.1x	0.9x	1.4x	0.8x	0.8x
CCC	11	(11)	(19)	42	77	12	27	41

Source: Capital IQ

Despite the fact that Tesla has the lowest revenue among the peers, its enterprise value is relatively high, yielding Revenue/EV ratio of 0.3x, or generating 0.3 dollar cents per dollar of enterprise value, while the average of peers stand at 1.4x (or medium of 1.0x).

The company's gross margin is higher than its US peers and roughly in line with European and Asian peers. GM and Ford report all production expenses (both variable and fixed costs) under COGS, while Tesla and Asian peers mainly refer to cost of materials (mainly variable costs). In the annual reports the American peers state that material costs account roughly two third of COGS. However, their adjusted (out for fixed costs) gross margins are still lower than Tesla that can be explained by Tesla's more centralized manufacturing and ability to sell its products at relatively high price due to uniqueness and currently low competition. Asian peers have lower material and labour costs that enable them to yield higher profit margins.

On the other side, Tesla's net income margin has historically been negative and meaningfully lower than peers level because of its higher SG&A and R&D expenditures that is attributable to high-tech business model and early stage of development of the firm. Subsequently, the company's EPS is also negative. Unlike its peers, Tesla has not paid dividends historically, that being said the only source of return for equity investors of the company has been share price growth (capital gain).

The company's cash flow generation has starting stabilizing with the ramp-up of sales recently. However, it is more sensible to the firm's future growth compared to the peers' ability to generate cash.

Leverage and short term liquidity profile of Tesla are within the peer average currently. However, given significantly smaller size of the firm, this level is considered to be high. Especially, the company's long term liquidity position is not as stable as the peers' liquidity, which also reflected in its credit rating. We will compare their credit ratings in the following section while calculation WACC.

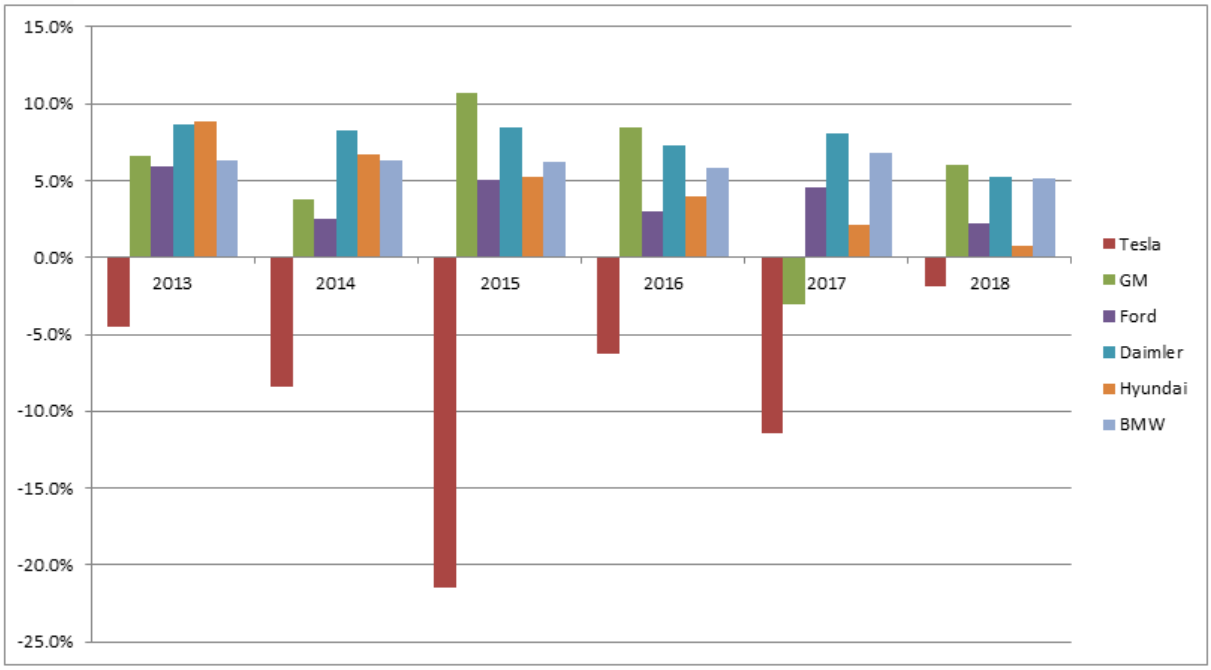
In general Tesla's ability to create value for shareholders is meaningfully worse compared to the peer group. It also reflected in the company's return in invested capital (ROIC), one of the important indicators of a firm that measures how much return investors in a company are earning from their investments, or how effectively the invested funds are being utilized by a firm. In other words, this ratio demonstrates if (how much) excess return is being generated above its debt and equity capital costs. ROIC is calculated by using the below formula:

$$ROIC = \frac{Net\ Operating\ Profit\ After\ Tax\ (NOPAT)}{Invested\ Capital}$$

Normally, companies with ROIC of above 2% are considered to be value creators, while value destroyers are defined by ROIC of less than 2%. As can be seen from the below figure,

Tesla has historically had negative and somewhat fluctuating ROIC. However, it improved (became less negative) in 2018 due to the ramp-up of sales. The company's ROIC is expected to keep improving in line with its high revenue growth and lowering cost of revenue, which is, on the other side, subject to its WACC change.

Figure 6. Historical ROIC of Tesla and its peers, 2013-2018



Source: Compiled by author based on the companies' financial reports

Despite negative ROIC, Tesla's share price has been increasing in value and is more expensive compared to its peers with positive ROIC. It can be explained by the market's quite optimistic expectations regarding the firm's future performance.

Chapter 3. Valuation Of Tesla

In this chapter we estimate fundamental value of Tesla's share price as of 31.12.2018 and compare it to the market price in order to analyse how much the market price is justified, and/or figure out what is the rationale behind the discrepancy in the prices, if any. As mentioned earlier, we use three equity valuation methods to obtain Tesla's share price. The two of these methods (discounted cash flow model and relative/multiple valuation) are traditional and most popular methods used by majority of the market participants, while the third method (first Chicago method) is non-traditional one used widely by venture capitals to value private equity and early stage high-growth companies. Theoretical background of the first two methods is discussed in the first chapter of the thesis. We decided not to use economic value added (EVA) method of equity valuation, as it would yield almost the same result due to the fact that we would have to use the same inputs and assumptions as in the DCF.

3.1 Discounted Cash Flow Model (DCF)

As stock value is a forward-looking measure and driven by the company's future earnings, most valuation methods, including DCF model, are based on a company's future cash flows. The discounted cash flow model estimates a firm's enterprise value by discounting its future free cash flow to firm (FCFF). Since FCFF is the cash generated by the company after all operating and capital expenses, but before debt service and shareholder remuneration, it is discounted by weighted average cost of capital of the firm, using the below formula[12].

$$Enterprise\ value_0 = \sum_{t=1}^{n} \frac{FCFF_t}{(1+WACC)^t} + \frac{FCFF_{n+1}}{(WACC-g)^t} \times \frac{1}{(1+WACC)^n}$$

[12] Petersen & Plenborg (2012), Financial Statement Analysis, p. 180

As a firm's future cash flow is uncertain, the DCF model requires projections of future cash flows based on assumptions reflecting wide variety of analysis starting from market's expectations, corresponding industry outlook, to pure company specific analysis.

3.1.1 WACC Calculation

The weighted average cost of capital reflects debt and equity investors' expected compensation for the time value of money and variety of risks attributable to the corresponding asset[13]. WACC is calculated using the below formula:

$$\text{WACC} = \left(\frac{E}{V} \times Re\right) + \left(\frac{D}{V} \times Rd \times (1 - Tc)\right)$$

From this point we start calculating each component of WACC.

The cost of equity (R_e), is equity investors' required return on a share as a compensation for bearing certain risks by owning this asset and giving up an alternative investment options. We calculate the cost of equity based on the CAPM-model[14], which is one of the widely used models that reflects the relationship between equity's return and market risk, as well as the equity-specific risks such as liquidity. The below table illustrates the result of our CAPM calculation:

Table 7. Cost of Equity Calculation

Cost of Equity (CAPM)	as of 31.12.2018
Risk Free Rate	2.67%
Beta	0.45
Expected Market Return	10.71%
Other Risk Premiums	2.0%
CAPM	**8.31%**

[13] Petersen & Plenborg (2012), Financial Statement Analysis, p. 245

[14] $R_e = R_f + \beta \times (R_m - R_f)$

We use US 10 Year Treasury Note yield as of 31.12.218 as a risk free rate since Tesla's operations are located mainly in the USA and cash flows are reported/forecasted in USD. The data is driven from Bloomberg terminal.

We calculate Tesla's equity beta by regressing its return on the return S&P 500 using 3-year and 5-year historical weakly data (please see separately provided excel file for the calculations). Adjusted betas[15] are similar for both 3-year and 5-year data. Moreover, our results are roughly in line with the beta calculated by Bloomberg that proves the validity of our calculations. We use 3-year data based beta in our CAPM calculation.

Table 8. Results of Equity Beta Calculations

5-Y Beta Calculation	
Covariance	0.000356617
Variance	0.002385125
Covariance/Variance	0.149517016
5-Y Raw Beta	**0.15**
5-Y Adjusted Beta	**0.43**

3-Y Beta Calculation	
Covariance	0.000393096
Variance	0.002200905
Covariance/Variance	0.178606582
3-Y Raw Beta	**0.18**
3-Y Adjusted Beta	**0.45**

Comparison	
S&P's Capital IQ (5-Y)	0.35
Yahoo Finance (3-Y)	0.39
Bloomberg (5-Y)	0.46

Alternative calculation of the beta is using the industry beta as a benchmark. According to Damodaran's calculations[16] based on 14 firms in Auto&Truck industry as of January 2019, the average unlevered beta for this industry is 0.32. After relevering it based on Tesla's capital structure, we get levered beta of 0.37. However, we do not consider this method of calculating beta since the market's perception on Tesla differs from other automobile manufacturing companies due to difference in their business models.

Expected market return (R_m) is sourced from Bloomberg terminal.

[15] Adjusted Beta = (2/3) x Raw Beta + (1/3) x 1

[16] http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html

We also apply 2.0% "other risk premium" that reflects our view on Tesla's liquidity, survival and country (i.e. opening a new manufacturing factory in China) risks.

Our CAPM model results 8.31% cost of equity.

The cost of debt (R_d), is the required rate of return by debt investors for providing funds to a firm. The rate reflects the firm's operational and financials risks and therefore requires a premium over risk free rate. Thus, cost of debt can be calculated by applied credit risk spread above risk free rate based on a firm's credit rating/health. Currently, Tesla is rated at B- and B3 by S&P and Moody's, respectively, with a negative outlook from the both agencies. The company's credit rating is significantly lower compared to the ratings of its peers in the respective industry.

Table 9. Credit Ratings of Tesla and Its Peers from Automotive Industry

Credit Ratings	S&P	Moody's
Tesla Motor	**B-/Negative**	**B3/Negative**
Ford Motor Company	BBB/Negative	Baa3/Negative
Peugeot S.A.	BBB-/Stable	Baa3/Stable
General Motors Company	BBB/Stable	Baa3/Stable
BAIC Motor Corporation Limited	NR	NR
AUDI AG	BBB+/Stable	A3/Stable
Hyundai Motor Company	BBB+/Stable	Baa1/Negative
Daimler AG	A/Stable	A2/Stable
Honda Motor Co., Ltd.	A/Stable	A2/Stable
Nissan Motor Co., Ltd.	A-/Stable	A2/Stable
Bayerische Motoren Werke (BWM)	A+/Stable	A1/Stable

Sources: www.standardandpoors.com and www.moodys.com

Damodaran suggests to apply a credit spread of 6.60% for large manufacturing firms (with market capital of above $5bn) in developed markets with B-/B3 credit rating[17]. It yields the cost of debt of 9.27% after adjusting for risk free rate, which is meaningfully higher than Tesla's historical cost of debt.

[17] http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ratings.htm

Tesla's Historical Cost of Debt	
Interest Expense/Total Debt in 2018	4.6%
Interest Expense/Total Debt in 2017	5.5%
Average	**5.1%**

Tesla's lower cost of debt can be explained by the fact that the company uses a wide variety of debts, starting from bank loans, convertible and non-convertible bonds, to asset backed debt securities (e.g. Solar Bonds). We believe that the company keeps maintaining such a complex debt portfolio going forward. Therefore, we use the average of the company's historical cost of debt for the last two years, rather than using the first-mentioned method (i.e. credit spread plus risk free rate).

Corporate tax rate (Tc) in the USA is 21.0% and no changes are expected for the short-to-medium term perspective. Effective tax rates may differ from the standalone rate due to many reasons. According to the Reuters[18], the effective tax rate in the industry where Tesla operates is 20.9%, which in line with the above-mentioned rate. We use 21.0% tax rate for Tesla in our WACC calculation and DCF model projections.

Tesla's *capital structure* has been dominated by equity capital (83% share in total capital in 2018) historically.

Table 10. Tesla's Capital Structure

Capital Structure	as of 31.12.2018	Share in TC	as of 31.12.2017	Share in TC
MV of Equity (Market Cap)	57,442	83%	59,805	85%
MV of Debt	11971	17%	10,315	15%
Total Capital	**69,414**	**100%**	**70,120**	100%

Source: Compiled by author based on the company's financial reports

Meanwhile, the capital structure of the company's peers somewhat evenly distributed with a slight higher share of debt capital. However, we do not expect the share of debt to increase meaningfully increase in Tesla's capital structure due to the company's relatively poor access

[18] https://www.reuters.com/finance/stocks/financial-highlights/TSLA.OQ

to debt market (as a result of low credit rating) and long-term liquidity position. Therefore, in our WACC calculation we use 75%:25% (debt:equity) long term capital structure.

Table 11. Capital Structure of Tesla's Peers in Automotive Industry

Peers	Value*		Share	
	Mar.Cap	Total Debt	Mar.Cap	Total Debt
Ford Motor Company	30,431	154,213	16%	84%
Peugeot S.A.	18,668	8,699	68%	32%
General Motors Company	47,212	104,951	31%	69%
BAIC Motor Corporation Limited	4,218	3,518	55%	45%
AUDI AG	37,488	479	99%	1%
Hyundai Motor Company	21,627	62,634	26%	74%
Daimler AG	55,038	162,373	25%	75%
Honda Motor Co., Ltd.	46,237	61,725	43%	57%
Nissan Motor Co., Ltd.	31,258	70,253	31%	69%
Bayerische Motoren Werke (BWM)	51,475	114,211	31%	69%
Average			**42%**	**58%**
Median			**31%**	**69%**

**as of 31.12.2018*
Source: Capital IQ data

Based on the below calculations and analysis, now we can calculate the weighted cost of capital for Tesla, which yields the rate of 7.2%, as shown in the below summary table.

Table 12. Result of WACC Calculation.

WACC Calculation	as of 31.12.2018
Long-Term MV of Equity/MV of Total Capital	75%
Cost of Equity	8.3%
Cost of Debt	5.1%
Corporate Tax Rate	21.0%
WACC	**7.2%**

3.1.2 DCF Model Projections Assumptions

DCF model requires projection of a company's future cash flows, which, in turn, the result of operating and investing activities of the firm, being valued. Our projections are based on analysis of Tesla's future plans, industry outlook, expectations of some market players and etc. Our assumptions are also reflect the view of rating agencies', global international banks,

as well as equity research firms that has an extensive expertise both in valuation and respective industry. Our projections are divided into three periods: explicit projection period – 2019-2024, fade period – 2025-2029, terminal period – from 2030 to eternity. Below we provide a brief description of our assumptions for key financial metrics of Tesla:

- *Revenue:* Tesla's revenue growth is expected to slow down in coming years, despite the higher growth in the sales volume, however, remain at double digit rate. The anticipated deceleration is justified by i)increase share of budget-friendly vehicles that cost twice as low as the premium class cars of the company, and ii) increased competition in the market, both in low end and high end segments.
- *Profit margins:* The gross margin is expected to improve moderately over the next several years (from 23% in 2019 to 28% in 2024) as a result of decreased COGS as % of revenue driven by positive impact of economies of scale, as well as localization of some spare parts production that are currently purchased from third-party vendors. The company's EBITDA margin is projected to show even faster improvement due to expected decline in SG&A and R&D expenses as % of revenue.
- *Tax expenses:* Tax expenses are projected under the assumption that effective tax rate will be consistent with US corporate income tax rate (21%).
- *Net income:* As a result of the above, Tesla's net income is expected to turn into positive starting from 2020.
- *Operating assets:* The company's accounts receivable, accounts payable and inventories are projected under the assumption that days of sales, inventories and payables outstanding will remain at 2018 level on average throughout the projection period.

- *Depreciation and amortization:* D&A is projected under the assumption that D&A/Fixed asset ratio will remain roughly flat at the level of the average of the last three years.
- *Capital expenditures:* we expect Tesla to spend higher capex in coming years driven by i) the new manufacturing plant projects in China and Europe, ii) expansion of Supercharger stations network globally and iii) other several projects in energy generation and storage segment. Despite the higher capex projections in absolute terms, the Capex/Revenue ratio is anticipated to remain roughly in line with 2018 level during 2019-2020 and start declining very smoothly thereafter (from 14% in 2019 to 12% in 2024).
- *Equity issuance:* We project $1.0bn equity issuance each year for 2019-2024 period which is consistent with the issuance in the last two years.
- *Dividend payments:* We project zero dividend payments for 2019-2024 period as the company's net income and free cash flow to equity will still likely be very low.
- *Debt repayment/issuance:* Tesla's debt repayment projections are based on maturity schedule of the currently outstanding debt. We project additional debt capital issuance based on the company's liquidity needs to cover its working capital needs, capital expenditures and service of maturing debt, after cash generated from operations and net equity capital issuance.
- *Interest expenses:* Interest expenses are projected under the assumption that the current cost of debt will remain unchanged on average during the projection period.

We build all three financial statements of Tesla for the explicit projection period (2019-2024) based on the above discussed assumptions. Then, FCFF is calculated based on the

financials for explicit projection period. For face and terminal periods we project only FCFF.

We expect the company's FCFF to grow at 5% rate during the fade period (2025-2029) which, in our view, is stable rate of growth, but lower than growth rates in the earlier periods. It reflects our view (based on market research) that EV market will be highly competitive with the start of mass EV productions by big players and "aggressive" Chinese low-cost automobile manufacturers.

For terminal (long-term) period we assume growth rate of 3.0%. According to HIS Markit[19], global light vehicle production will grow at 1.5%-2.0% (0% in North America) rate annually in 2019-2026 period. Asia-Pacific region is anticipated to be the main driver of the growth. Global light vehicle industry is projected to see zero growth in the period after 2026. However, electric vehicle segment of the industry will most likely keep growing as its share in total automobile production is expected to increase. Hence, considering the EV sub-segment outlook and Tesla's being a pioneer in the sector, we consider 3% of growth rate to be an appropriate long-term (terminal) growth rate for our DCF model.

[19] "Automotive Industry Outlook: Managing Volatility and Leveraging Opportunities in a Dynamic Market Environment", a report by IHS Markit dated February 2019.

3.1.2 DCF Model Result

Table 13. Summary of DCF Model Result

Model Summary										
$m	**2018A**	**2019F**	**2020F**	**2021F**	**2022F**	**2023F**	**2024F**	**LT1 V in 2024**	**TV in 2024**	**TV in 2030**
Revenue	21,461	25,128	30,451	33,696	37,065	40,772	44,849			
EBITDA	**1,648**	**1,633**	**2,885**	**3,912**	**5,139**	**6,322**	**7,652**			
D&A	(1,901)	(1,823)	(2,088)	(2,404)	(2,712)	(3,012)	(3,305)			
EBIT	**(253)**	**(190)**	**797**	**1,509**	**2,427**	**3,311**	**4,346**			
Tax	(58)	142	(45)	(185)	(388)	(577)	(797)			
NOPAT	**(311)**	**(49)**	**752**	**1,324**	**2,039**	**2,733**	**3,549**			
D&A	1,901	1,823	2,088	2,404	2,712	3,012	3,305			
CAPEX	(3,133)	(3,518)	(4,111)	(4,380)	(4,633)	(4,893)	(5,158)			
Change in NWC	(269)	44	(135)	(83)	(88)	(97)	(108)			
Other Adjustments	994	877	982	1,042	1,098	1,154	1,210			
FCFF	**(818)**	**(822)**	**(424)**	**306**	**1,127**	**1,909**	**2,799**	**13,148**	**59,599**	**84,487**
Discount Factor		0.93	0.87	0.81	0.76	0.71	0.66	0.66	0.66	
Discounted FCFF		**(767)**	**(369)**	**248**	**853**	**1,346**	**1,842**	**8,649**	**39,208**	

Equity Valuation, in $m	**FYE2018**
FCFF NPV	3,154
LT1 Value NPV	8,649
Terminal Value NPV	39,208
Total EV	**51,011**
Less: Net Debt	8,286
Less: Minority Interest	1,390
Equity Value, in $m	**41,335**
Number of outstanding shares, in m	172.6
Implied Share Price	**239.5**
Market Share Price	**317.7**
Difference, $	***78.2***
Difference, %	***33%***

LT1 (2025-2029) Growth Rate	5.0%
TV (since 2030) Growth rate	3.0%
WACC	7.2%

Our DCF model results $51.0bn of enterprise value (i.e. sum of discounted value of all future FCFFs) for Tesla, as of 31.12.2018. After deducting net debt and minority interest we get the equity value of the company, $41.3bn. Then we calculate the price of a stock by dividing the number of outstanding common shares as of 31.12.2018. Implied price of a Tesla share is $240, per our DCF model, which is 33% lower than the market price at that point in time.

We compare our result with the consensus of different sources (i.e. investment banks and equity research firms) that have been found by the author. As can be seen from the below table, the consensuses of all sources in the below list are below market price and close to the result of our model. In our opinion the discrepancy between our result and the below given consensuses is can be explained by slight difference in WACCs used (e.g. due to different long-tem capital structure and/or risk premiums) and possible different views on long-term growth rate.

Table 14. Comparison of Consensuses Issued by Different Sources

Source	Consensus	Report Issuance Date
Our DCF Model	$240	31.03.2019
JP Morgan	$200	23.04.2019
Wolfe Research LLC	$265	05.04.2019
Rose Capital Partners LLC	$238	25.04.2019
Norddeutsche Landesbank Girozentrale	$250	01.02.2019
Wedbush Securities Inc.	$275	25.04.2019
Morningstar Inc.	$240	26.02.2019

Source: Bloomberg, CapitalIQ

We note that terminal value makes up a large part (78%) of Tesla's implied enterprise value, as per the results of our DCF model, that being said Tesla's value is highly sensitive to the market's perception of the company's long-term growth rates. It may explain the difference between our implied price and the market price. However, large share of TV in a company's EV also means the firm's stock price may be very sensitive and fluctuating, as any small

change in market's expectation can have significant impact on the share price. The below table illustrates the sensitivity analysis of Tesla's stock price to long-term growth rate, based on our DCF model. As can be seen, implied stock price under the assumption of 4.0% long-term (terminal) growth rate is roughly in line with the market price.

LT Growth Rate	2.0%	2.5%	**3.0%**	3.5%	4.0%
Implied Stock Price	$196	$216	**$240**	$270	$310

3.2 Relative Valuation

Despite the fact multiples valuation does not have a strong theoretical background, this method is widely used by the market participants, such as investment banks, venture capitals (especially, in M&A deals). The choice of multiples and peers is very important in relative valuation. We can estimate either enterprise value, or equity value of the firm directly subject to what multiple is chosen. However, given in many cases a company being valued and its peers have different capital structure, as in our case, EV estimation is more appropriate decision.

There is a great deal of multiples available. In our valuation we stop in two of them: EV/EBITDA and EV/Sale. According to Koller et.al. (2010), EV/EBIT is one of the most appropriate multiples, as it reflects the company's ROIC, tax, cost of debt, as well as growth rates[20]. However, we use EV/EBITDA, very similar multiple, to avoid the impact of discrepancy in depreciation schemes of Tesla and its peers. Also, the company's EBIT is negative, unlike EBITDA. EV/Sales is also good fit for the valuation of Tesla, as the company has negative and volatile earnings due to its being at early growth stage. In addition, at this point the firm's earnings do not fully represent its long-term potential.

[20] Koller, T. Goedhart, M. And Wessels, D. (2010), Valuation. p. 305

As mentioned above, picking up right peers is vital in relative valuation. We carry out two multiple valuation cases with different peer groups. In the first case we use Tesla's peers in automotive and, solar energy generation and storage industries. Since a firm's value represents its future cash generation/wealth creation prospects, we use forward-looking multiples for 2019 in our relative valuation. This approach is believed to result more accurate estimates, as empirical evidence suggests.

As illustrated in the below table, the first case of multiple valuation resulted in roughly three times as low EV as the actual market EV as of 31.12.2018. We consider it unrealistic (most likely due to the fact that market's perceptions on Tesla and other automanufacturers vary from each other) and therefore ignore this result.

Table 15. Tesla's Multiple Valuation Summary

Company Name	Symbol	Country	Enterprise Value at 31/12/2018	Revenue 2018A	Revenue 2019E	EBITDA 2018A	EBITDA 2019E	EV/Revenue 2018A	EV/Revenue 2019E	EV/EBITDA 2018A	EV/EBITDA 2019E
Car Manufacturers											
Ford Motor Company	(NYSE:F)	USA	160,385	160,338	145,460	13,376	14,639	1.0x	1.1x	12.0x	11.0x
Peugeot S.A.	(ENXTPA:UG)	France	12,711	83,223	85,556	10,018	9,927	0.2x	0.1x	1.3x	1.3x
General Motors Company	(NYSE:GM)	USA	133,728	147,049	146,514	21,892	21,754	0.9x	0.9x	6.1x	6.1x
BAIC Motor Corporation Limited	(SEHK:1958)	China	4,777	22,269	24,566	4,438	4,865	0.2x	0.2x	1.1x	1.0x
Hyundai Motor Company	(KOSE:A005380)	S.Korea	64,736	81,972	86,445	6,550	7,039	0.8x	0.7x	9.9x	9.2x
Daimler AG	(XTRA:DAI)	Germany	191,687	188,153	192,821	20,383	20,784	1.0x	1.0x	9.4x	9.2x
Honda Motor Co., Ltd.	(TSE:7267)	Japan	93,053	140,125	144,584	11,712	12,205	0.7x	0.6x	7.9x	7.6x
Nissan Motor Co., Ltd.	(TSE:7201)	Japan	96,935	109,019	106,239	7,717	8,119	0.9x	0.9x	12.6x	11.9x
Bayerische Motoren Werke	(DB:BMW)	Germany	146,660	109,590	110,962	13,992	15,852	1.3x	1.3x	10.5x	9.3x
Volkswagen AG	(XTRA:VOW3)	Germany	241,780	265,148	274,857	38,015	41,035	0.9x	0.9x	6.4x	5.9x
Average								**0.8x**	**0.8x**	**7.7x**	**7.2x**
Median								**0.9x**	**0.9x**	**8.7x**	**8.4x**
Energy Storage&Solar Panel Manufacturers											
Pattern Energy Group Inc.	(Nasdaq:PEGI)	USA	5,140	473	536	305	394	10.9x	9.6x	16.9x	13.0x
TerraForm Power, Inc.	(Nasdaq:TERP)	USA	8,675	767	1,012	485	764	11.3x	8.6x	17.9x	11.4x
SunPower Corporation	(Nasdaq:SPWR)	USA	2,577	1,726	1,977	-115	97	1.5x	1.3x	-22.5x	26.6x
Canadian Solar Inc.	(Nasdaq:CSIQ)	Canada	2,487	3,745	3,561	491	389	0.7x	0.7x	5.1x	6.4x
Enphase Energy, Inc.	(Nasdaq:ENPH)	USA	499	316	483	15	69	1.6x	1.0x	32.6x	7.3x
Azure Power Global Limited	(NYSE:AZRE)	India	1,176	110	144	84	110	10.7x	8.2x	14.0x	10.6x
Average								**6.1x**	**4.9x**	**10.7x**	**12.5x**
Median								**6.2x**	**4.7x**	**15.4x**	**11.0x**
Tesla Inc	**(Nasdaq:TSLA)**	**USA**	**69,094**	**21,461**	**25,128**	**1,648**	**1,633**	**3.2x**	**2.7x**	**41.9x**	**42.3x**

Source: Compiled by author based on financial reports of the companies

Peer Group	EV/Revenue 2018A	EV/EBITDA 2018A	EV/Revenue 2019E	EV/EBITDA 2019E	Weights*
Car Manufacturers Median	0.9x	8.7x	0.9x	8.4x	92%
Solar Panel Manufacturers Median	6.2x	15.4x	4.7x	11.0x	8%
Weighted Average	**1.3x**	**9.2x**	**1.2x**	**8.6x**	
Tesla Implied EV, $m	**28,247**	**15,176**	**30,169**	**14,068**	

Based on pro-forma share of segments in Tesla's total revenue in 2018

Multiple	Enterprise Value
EV/EBITDA 2019E	14,068
EV/Revenue 2019E	30,169
Average EV in 2019E	**22,118**
Implied EV in 2018 (discounted by WACC)	**20,633**

In the second case we carry out relative valuation based on the same multiples, but compare Tesla to the selected group of high tech companies. As we have seen in previous chapter, Tesla's share price performance has been somewhat close to the movement of high-tech companies in the last several years. In addition, the company is classified as a high-tech company by the market. Hence, we consider tech companies to be more appropriate benchmark for valuing Tesla.

Our relative valuation in the case resulted in $55bn EV, or share price of $263. We assume it is more accurate value compared to the consensus in the first case. Of note, the result of multiple valuation is relatively high than the value estimated by the DCF model, however, still lower than the actual market price.

Table 16. Tesla's Multiple Valuation Summary

Company Name	Symbol	EV/Revenue 2018A	EV/Revenue 2019E	EV/EBITDA 2018A	EV/EBITDA 2019E
Tech Companies					
Apple Inc.	(Nasdaq:AAPL)	3.7x	3.5x	12.1x	11.6x
Amazon.com Inc.	(Nasdaq:AMZN)	3.8x	3.2x	35.5x	21.0x
Alphabet	(Nasdaq:GOOG.L)	5.1x	4.2x	16.6x	11.4x
Alibaba Group	(NYSE:BABA)	8.7x	6.1x	40.0x	19.5x
Microsoft Corporation	(Nasdaq:MSFT)	6.8x	6.1x	16.6x	14.5x
Intel Corporation	(Nasdaq:INTC)	3.4x	3.2x	7.5x	6.7x
Average		**4.6x**	**4.4x**	**21.4x**	**14.1x**
Median		**3.8x**	**3.9x**	**16.6x**	**13.1x**
Tesla Inc	**(Nasdaq:TSLA)**	**21,461**	**25,128**	**1,648**	**1,633**

Source: Compiled by author based on financial reports of the companies

Peer Group	EV/EBITDA 2018A	EV/Revenue 2018A	EV/EBITDA 2019E	EV/Revenue 2019E
Tech Companies Median	16.6x	3.8x	13.1x	3.9x
Tesla Implied EV	**27,357**	**81,552**	**21,308**	**96,744**

Multiple	Enterprise Value
EV/EBITDA 2019E	21,308
EV/Revenue 2019E	96,744
Average EV in 2019E	**59,026**
Implied EV in 2018 (discounted by WACC)	**55,047**
Less: Net Debt	8,286
Less: Minority Interest	1,390
Equity Value, in $m	**45,371**
Number of outstanding shares, in m	172.6
Implied Share Price	**262.9**
Market Share Price	**317.7**
Difference, $	***54.8***
Difference, %	***21%***

3.3 First Chicago Method of Valuation

First Chicago method (FCM) is widely used by venture capital funds for valuation of private equity and early stage growth firms. As discussed in the first chapter of the thesis, the method is by nature a hybrid method that uses elements of both DCF, for projection of cash flow for explicit period (usually 5 to 7 years), and relative valuation to derive terminal value. FCM requires projection of cash flows in three scenarios: base case, optimistic case and pessimistic case. Then results of each case are multiplied by anticipated probabilities by investor(s) that should add-up to one hundred percent. This method is believed to somewhat smooth out the biases of each scenario's results.

We build our First Chicago method valuation based on discounted cash flow model that we used earlier. As it has been observed in the previous section, there is no particular multiple or peer group that perfectly fits Tesla for relative valuation. Therefore, in our FCM we predict terminal value in the same way as in the DCF model, rather than based on some multiples. The result of our DCF valuation from the previous section is taken as a base case scenario. For optimistic and pessimistic scenarios we use different assumptions with higher/lower growth rates, profit margins, different fade and long-term (terminal) period growth rates, and etc., accordingly (for more details please refer to excel file provided together with the thesis).

We assume that the probability of optimistic case is 50%, as market seems bullish regarding Tesla's future perspectives. For base and pessimistic cases we assign 30% and 20% probabilities, respectively. Below the results of each case are given. Based on the above-mentioned probabilities we obtain the weighted-average value of the results.

Table 17. Summary of FCM Valuation

Optimistic Case

Equity Valuation, in $m	FYE2018
FCFF NPV	3,177
LT1 Value NPV	10,603
Terminal Value NPV	55,569
Total EV	**69,349**
Less: Net Debt	8,286
Less: Minority Interest	1,390
Equity Value, in $m	**59,673**
Number of outstanding shares, in m	172.6
Implied Share Price	**345.7**
Market Share Price	**317.7**
Difference, $	***(28.0)***
Difference, %	***(8.1%)***

Base Case

Equity Valuation, in $m	FYE2018
FCFF NPV	3,154
LT1 Value NPV	8,649
Terminal Value NPV	39,208
Total EV	**51,011**
Less: Net Debt	8,286
Less: Minority Interest	1,390
Equity Value, in $m	**41,335**
Number of outstanding shares, in m	172.6
Implied Share Price	**239.5**
Market Share Price	**317.7**
Difference, $	***78.2***
Difference, %	***33%***

Pessimistic Case

Equity Valuation, in $m	FYE2018
FCFF NPV	2,391
LT1 Value NPV	6,918
Terminal Value NPV	31,361
Total EV	**40,670**
Less: Net Debt	8,286
Less: Minority Interest	1,390
Equity Value, in $m	**30,995**
Number of outstanding shares, in m	172.6
Implied Share Price	**179.6**
Market Share Price	**317.7**
Difference, $	***138.1***
Difference, %	***77%***

Scenarios	Weight	Result
Optimistic	50%	345.7
Base	30%	239.5
Pessimistic	20%	179.6
Consensus		**280.6**
Market Share Price		**317.7**
Difference, $		***37.1***
Difference, %		***13%***

First Chicago method results in a stock price of $281 for per Tesla's share, which is closer to the actual market price than the results of previously used valuation methods.

Conclusion

The object of this thesis was to estimate the fair value of Tesla's stock price using the most appropriate method and identify the reasons behind the discrepancy between the outcomes of our valuation and the actual market price.

Following our analyses and valuations carried out in the thesis, we come up with the following outcomes:

- Tesla is a tech-like company, as perceived by the market, rather than traditional automobile manufacturing firm, due to the results of the peer comparison analysis and relative valuation.
- First Chicago method is the most appropriate method of valuation for Tesla, followed by discounted cash flow method. Valuing the company using relative valuation method is challenging due to absence/lack of similar companies.
- Tesla's stock price as of December 31, 2018 is overvalued as the results of all three valuation models yielded a lower value.
- The discrepancy in the fair value and actual market price can be explained by the market's over-optimistic expectation on Tesla's future growth.
- The company's value is mainly fuelled with its long-term growth perspectives and very sensitive to growth rates, i.e. market's expectation on future success of the firm. Therefore, we believe that the company's stock price become more volatile going forward subject to changes in investors' mood that is easily impacted by Tesla's current operations as it is entering the positive earnings & cash generation stage with the recent ramp-up of its sales.

Bibliography

Books

Achleitner, A. Nathasius E (2004), Venture Valuation – Valuation of growth companies, Schaffer Poeschel.

Damodaran, A. (2012), Investment valuation – Tools and techniques for determining the value of any asset., 3rd edition. John Wiley & Sons Ltd.

Damodaran, A. (2012), Damodaran on valuation: Security analysis for investment and corporate finance., 2nd edition. John Wiley & Sons Ltd.

Koller, T. Goedhart, M. And Wessels, D. (2010), Valuation: Measuring and Managing the Value of Companies. 5th edition. New Jersey. Wiley & Sons Ltd.

Plenborg, T. & Petersen, C. V. (2012), Financial Statement Analysis, Harlow.

Research Papers

Cornell, B. Damodaran, A (2014), Tesla: Anatomy of a Run-up. Value creation or investor sentiment?, The Journal of Portfolio Management, 41. P.139-151.

Damodaran, A (2014), Returning to the firing line: Revisiting Tesla. (http://aswathdamodaran.blogspot.com/2014/03/return-to-firing-line-revisiting-tesla.html)

Baker, M. Wurgler, J (2007), Investor sentiment in the stock market, Journal of Economic Perspectives, 21. p.129-151.

Annual Reports

Tesla, Inc. – Annual Reports 2013, 2014, 2015, 2016, 2017, 2018

General Motors Company – Annual Reports 2013, 2014, 2015, 2016, 2017, 2018

Ford Motor Company – Annual Reports 2013, 2014, 2015, 2016, 2017, 2018

AUDI AG – Annual Reports 2013, 2014, 2015, 2016, 2017, 2018

Hyundai Motor Company – Annual Reports 2013, 2014, 2015, 2016, 2017, 2018

Daimler AG – Annual Reports 2013, 2014, 2015, 2016, 2017, 2018

Bayerische Motoren Werke (BWM) – Annual Reports 2013, 2014, 2015, 2016, 2017, 2018

Toyota Motor Corporation – Annual Reports 2013, 2014, 2015, 2016, 2017, 2018

Agency Reports

S&P Global Ratings – Credit rating report on Tesla dated May 2019

Moody's – Credit Opinion Update report on Tesla dated March 2019

IHS Markit - Automotive Industry Outlook: Managing Volatility and Leveraging Opportunities in a Dynamic Market Environment, a report by dated February 2019

Equity Research Reports

JP Morgan – Tesla Inc, issued in April 2019

Wolfe Research LLC – Tesla Inc, issued in April 2019

Rose Capital Partners LLC – Tesla Inc, issued in April 2019

Norddeutsche Landesbank Girozentrale – Tesla Inc, issued in February 2019

Morningstar Inc. – Tesla Inc, issued in February 2019

Zacks Investment Research – Tesla Inc, issued in November 2018

Online Databases

https://ir.tesla.com/investor-relations

S&P's Capital IQ

Bloomberg

Reuters

Appendix

Appendix 1. Summary of Tesla's Key Metrics

(In thousands, except metrics and per share data)

	Three Months Ended			Change	
	March 31, 2019	December 31, 2018	March 31, 2018	QoQ	YoY
Model S/X production	14,163	25,161	24,728	-44%	-43%
Model 3 production	62,975	61,394	9,766	3%	545%
Model S/X deliveries	12,091	27,607	21,815	-56%	-45%
Model 3 deliveries	50,928	63,359	8,182	-20%	522%
Vehicles sold under lease accounting (%)	2%	4%	8%	-2%	-6%
Solar deployed	47	73	76	-36%	-38%
Storage deployed	229	225	373	2%	-39%
Residential solar cash & loan (%)	73%	75%	63%	-2%	10%
Store and service locations	377	378	339	0%	11%
Mobile service fleet	550	411	248	34%	122%
Supercharger stations	1,490	1,421	1,205	5%	24%
Supercharger connectors	12,767	12,002	9,372	6%	36%
Destination charging connectors	22,399	21,541	16,941	4%	32%
Total revenues	$ 4,541,464	$ 7,225,873	$ 3,408,751	-37%	33%
Automotive gross margin excluding SBC and ZEV credit – non-GAAP	20.3%	24.7%	18.8%	-4.4%	1.5%
Total GAAP gross margin	12.5%	20.0%	13.4%	-7.5%	-0.9%
Operating expenses	$ 1,087,574	$ 1,029,364	$ 1,053,500	6%	3%
(Loss) income from operations	(521,831)	413,536	(596,974)	-226%	-13%
Operating margin	-11.5%	5.7%	-17.5%	-17.2%	6.0%
Net (loss) income per share attributable to common stockholders, diluted - GAAP	(4.10)	0.78	(4.19)	-626%	-2%
Net (loss) income per share attributable to common stockholders, diluted - non-GAAP	(2.90)	1.93	(3.35)	-250%	-13%
Net cash (used in) provided by operating activities	$ (639,606)	$ 1,234,561	$ (398,376)	-152%	61%
Capital expenditures	(279,932)	(324,978)	(655,662)	-14%	-57%
Operating cash flow less capital expenditures	$ (919,538)	$ 909,583	$ (1,054,038)	-201%	-13%
Cash and cash equivalents	$ 2,198,169	$ 3,685,618	$ 2,665,673	-40%	-18%

Source : Tesla First Quarter 2019 Update (https://ir.tesla.com/static-files/b2218d34-fbee-4f1f-ac95-050eb29dd42f)

Appendix 2. Tesla Income Statement Projections

Income statement, $m	2017A	2018A	2019F	2020F	2021F	2022F	2023F	2024F
Total Revenue	11,759	21,461	25,128	30,451	33,696	37,065	40,772	44,849
Revenue Growth	*68%*	*83%*	17%	21%	11%	10%	10%	10%
Automotive Sales	*9,641*	*18,515*	*21,662*	*26,212*	*28,833*	*31,716*	*34,888*	*38,376*
Energy Generation and Storage	*1,116*	*1,555*	1,866	2,239	2,463	2,710	2,981	3,279
Services and Other	*1,001*	*1,391*	*1,600*	*2,000*	*2,399*	*2,639*	*2,903*	*3,194*
COGS	(9,536)	(17,419)	(20,290)	(24,169)	(26,454)	(28,703)	(31,136)	(33,770)
Automotive Sales	*(7,433)*	*(14,174)*	*(16,680)*	*(19,921)*	*(21,625)*	*(23,470)*	*(25,468)*	*(27,631)*
Energy Generation and Storage	*(875)*	*(1,365)*	*(1,642)*	*(1,948)*	*(2,119)*	*(2,303)*	*(2,504)*	*(2,721)*
Services and Other	*(1,229)*	*(1,880)*	*(1,968)*	*(2,299)*	*(2,711)*	*(2,930)*	*(3,165)*	*(3,417)*
Of which: Depreciation&Amortization	*(1,636)*	*(1,901)*	*(1,823)*	*(2,088)*	*(2,404)*	*(2,712)*	*(3,012)*	*(3,305)*
Gross Profit	**2,223**	**4,042**	**4,838**	**6,282**	**7,241**	**8,362**	**9,635**	**11,079**
Automotive Sales	*2,209*	*4,341*	*4,982*	*6,291*	*7,208*	*8,246*	*9,420*	*10,745*
Energy Generation and Storage	*242*	*190*	*224*	*291*	*345*	*406*	*477*	*557*
Services and Other	*(228)*	*(489)*	*(368)*	*(300)*	*(312)*	*(290)*	*(261)*	*(224)*
Gross Profit Margin	*18.9%*	*18.8%*	*19.3%*	*20.6%*	*21.5%*	*22.6%*	*23.6%*	*24.7%*
Automotive Sales	*22.9%*	*23.4%*	*23.0%*	*24.0%*	*25.0%*	*26.0%*	*27.0%*	*28.0%*
Energy Generation and Storage	*21.7%*	*12.2%*	*12.0%*	*13.0%*	*14.0%*	*15.0%*	*16.0%*	*17.0%*
Services and Other	*(22.8%)*	*(35.2%)*	*(23.0%)*	*(15.0%)*	*(13.0%)*	*(11.0%)*	*(9.0%)*	*(7.0%)*
R&D Expenses	(1,378)	(1,460)	*(1,710)*	*(1,768)*	*(1,788)*	*(1,781)*	*(1,959)*	*(2,155)*
SG&A	(2,477)	(2,835)	*(3,319)*	*(3,717)*	*(3,945)*	*(4,154)*	*(4,366)*	*(4,578)*
Other Operating Expenses	0	(135)	0	0	0	0	0	0
EBIT	**(1,632)**	**(388)**	**(190)**	**797**	**1,509**	**2,427**	**3,311**	**4,346**
EBITDA	**4**	**1,513**	**1,633**	**2,885**	**3,912**	**5,139**	**6,322**	**7,652**
Adjustments for unusual items								
Add:Other Operating Expenses (Restructuring Costs)	*0*	*135*	0	0	0	0	0	0
Add: Incentive Compensation Arrangement re Grohman Acquisition	*26*	*0*	0	0	0	0	0	0
Add: Transaction Costs re SolarCity Acquisition	*0*	*0*	0	0	0	0	0	0
Adjusted EBITDA	**30**	**1,648**	**1,633**	**2,885**	**3,912**	**5,139**	**6,322**	**7,652**
EBITDA Margin	*0.3%*	*7.7%*	*6.5%*	*9.5%*	*11.6%*	*13.9%*	*15.5%*	*17.1%*
Interest Income	20	25	34	41	45	50	55	60
Interest Expense	(471)	(663)	(522)	(627)	(676)	(630)	(618)	(614)
Other Income/(Expense)	(125)	22	3	3	3	3	3	3
EBT	**(2,209)**	**(1,005)**	**(676)**	**214**	**880**	**1,850**	**2,750**	**3,795**
Tax benefit/(expense)	(32)	(58)	142	(45)	(185)	(388)	(577)	(797)
Net Income/(Loss)	**(2,241)**	**(1,063)**	**(534)**	**169**	**695**	**1,461**	**2,172**	**2,998**

Appendix 3. Tesla Balance Sheet Projections

Balance Sheet, $m	2017A	2018A	2019F	2020F	2021F	2022F	2023F	2024F
Cash&Cash Equivalents	3,368	3,686	2,000	2,000	2,000	2,000	3,111	5,065
Restricted Cash (Current Portion)	155	193	193	193	193	193	193	193
Accounts Receivable	515	949	857	1,039	1,150	1,265	1,391	1,530
Inventory	2,264	3,113	3,131	3,730	4,083	4,430	4,806	5,212
Prepaid Expenses and Other Current Assets	268	366	366	366	366	366	366	366
Total Current Assets	**6,571**	**8,306**	**6,547**	**7,327**	**7,791**	**8,253**	**9,866**	**12,366**
Operating Lease Vehicles	4,117	2,090	2,090	2,090	2,090	2,090	2,090	2,090
Solar Energy Systems, leases and to be leased	6,348	6,271	6,271	6,271	6,271	6,271	6,271	6,271
PP&E	10,028	11,330						
Intangible Assets (excl.Goodwill)	362	283	13,376	15,399	17,376	19,297	21,177	23,029
Goodwill	60	68						
MyPower Customer Notes Receivable	457	422	422	422	422	422	422	422
Restricted Cash (Non-Current Portion)	442	398	398	398	398	398	398	398
Other Non-Current Assets	273	572	572	572	572	572	572	572
Total Non-Current Assets	**22,085**	**21,433**	**23,128**	**25,151**	**27,128**	**29,049**	**30,930**	**32,782**
Total Assets	**28,655**	**29,740**	**29,675**	**32,479**	**34,919**	**37,302**	**40,796**	**45,148**
Accounts Payable	2,390	3,405	3,375	4,020	4,400	4,774	5,179	5,617
Accrued Liabilities and Other	1,731	2,094	2,094	2,094	2,094	2,094	2,094	2,094
Current Portion of Long-Term Debt and Capital Leases	797	2,568	2,601	2,817	2,189	987	83	84
Current Portion of Solar Bonds Issued to Related Parties	100	0						
Other Current Liabilities	2,657	1,926	1,926	1,926	1,926	1,926	1,926	1,926
Total Current Liabilities	**7,675**	**9,992**	**9,996**	**10,857**	**10,610**	**9,782**	**9,282**	**9,721**
Long-Term Debt and Capital Leases	9,418	9,404	8,870	9,643	10,635	11,385	12,206	12,120
Other Long-Term Liabilities	5,930	4,030	4,030	4,030	4,030	4,030	4,030	4,030
Total Non-Current Liabilities	**15,348**	**13,434**	**12,900**	**13,673**	**14,665**	**15,415**	**16,236**	**16,150**
Total Liabilities	**23,023**	**23,426**	**22,895**	**24,530**	**25,275**	**25,197**	**25,518**	**25,872**
Preferred Stocks	0	0	0	0	0	0	0	0
Common Stocks	0	0	0	0	0	0	0	0
Additional Paid-in Capital	9,178	10,249	11,249	12,249	13,249	14,249	15,249	16,249
Accumulated Other Comprehensive Income/(Loss)	33	(8)	(8)	(8)	(8)	(8)	(8)	(8)
Accumulated Deficit	(4,974)	(5,318)	(5,852)	(5,683)	(4,987)	(3,526)	(1,354)	1,645
Noncontrolling Interests	1,395	1,390	1,390	1,390	1,390	1,390	1,390	1,390
Convertible Senior Notes	0	0	0	0	0	0	0	0
Total Equity	**5,632**	**6,314**	**6,780**	**7,949**	**9,644**	**12,105**	**15,278**	**19,276**
Check	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*

Appendix 4 Tesla Cash Flow Statement Projections

Cash Flow Statement, $m	2017A	2018A	2019F	2020F	2021F	2022F	2023F	2024F
Net income	(2,241)	(1,063)	(534)	169	695	1,461	2,172	2,998
Add: D&A	1,636	1,901	1,823	2,088	2,404	2,712	3,012	3,305
Add: Interest expense	471	663	522	627	676	630	618	614
Change in other assets	(1,714)	1,748	0	0	0	0	0	0
Change in other liabilities	2,548	(2,268)	0	0	0	0	0	0
Change in accounts receivable	(16)	(434)	92	(182)	(111)	(115)	(126)	(139)
Change in accounts payable	530	1,014	(30)	645	380	374	405	438
Change in inventory	(196)	(850)	(18)	(599)	(353)	(347)	(376)	(406)
Change in net working capital	318	(269)	44	(135)	(83)	(88)	(97)	(108)
Operating cash flow	**1,018**	**713**	**1,855**	**2,748**	**3,692**	**4,715**	**5,705**	**6,810**
Adjustments (for non-cash items in Income Statement)								
Add: Stock-based compensation (included in SG&A)	*467*	*749*	877	982	1,042	1,098	1,154	1,210
Add: Inventory write-downs (Included in COGS)	*132*	*85*	0	0	0	0	0	0
Add: Loss on disposals of fixed assets (Inc.in other expenses)	*106*	*161*	0	0	0	0	0	0
Foreign currency transaction (gains) losses (Other expenses)	*52*	*(2)*	0	0	0	0	0	0
Loss (gain) related to SolarCity acquisition (Other expenses)	*58*	*0*	0	0	0	0	0	0
Normalized OCF	**1,832**	**1,707**	**2,732**	**3,731**	**4,734**	**5,813**	**6,859**	**8,020**
Net Capex	(5,726)	(3,133)	(3,518)	(4,111)	(4,380)	(4,633)	(4,893)	(5,158)
Cash Flow from Investing Activities	**(5,726)**	**(3,133)**	**(3,518)**	**(4,111)**	**(4,380)**	**(4,633)**	**(4,893)**	**(5,158)**
Debt drawdown/ (repayment)	3,195	1,657	(501)	989	365	(452)	(83)	(84)
Interest	(471)	(663)	(522)	(627)	(676)	(630)	(618)	(614)
Proceeds from Share Issuance/(Expenses for Share Repurchase)	1,404	1,071	1,000	1,000	1,000	1,000	1,000	1,000
Cash Dividend Distributions	0	0	0	0	0	0	0	0
Other Change in Equity	554	673	0	0	(0)	0	0	(0)
Cash Flow from Financing Activities	**4,683**	**2,738**	**(23)**	**1,363**	**688**	**(82)**	**298**	**302**
Net Change in Cash	**(25)**	**318**	**(1,686)**	**0**	**0**	**0**	**1,111**	**1,954**
Cash&Cash Equivalents BoP	**3,393**	**3,368**	**3,686**	**2,000**	**2,000**	**2,000**	**2,000**	**3,111**
Net Change in Cash	(25)	318	(1,686)	0	0	0	1,111	1,954
Cash&Cash Equivalents EoP	**3,368**	**3,686**	**2,000**	**2,000**	**2,000**	**2,000**	**3,111**	**5,065**
Check	*(0)*	*(0)*	*0*	*0*	*0*	*0*	*0*	*0*