Tesla and the CEO Reputation Premium

A Valuation-Based Approach

– Master’s Thesis –

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Abstract

The modern economy has in recent decades witnessed a profound shift from being one where the primary driver of value for companies were their tangible assets to one where value is increasingly derived from intangible assets. Within the various types of intangible assets, one of the hardest to value is reputation. As such, this thesis will examine the degree to which Tesla was selling at a premium as of January 1, 2019, and the degree to which this can reasonably be attributed to a hypothesized CEO reputation premium. Existing literature and empirical findings on the subject show that there is a theoretical case to be made for the existence of such a premium, but also show a dearth of valuation-based studies quantifying said premium. The thesis thus sets out to quantify Tesla's CEO reputation premium by conducting a thorough valuation of Tesla based on the enterprise discounted cash flow method, grounded in strategic and financial analyses, and corroborated with supporting analyses, such as multiples, a regression and a (limited) survey.

The estimated enterprise value of Tesla is 60,242 million USD, which results in a share price of 248.59 USD. Comparing this valuation to Tesla's current share price shows that Tesla is currently selling at a 33.9 percent premium. A combination of regression and survey analyses found that the CEO reputation premium for Tesla likely exists and that it is more likely than not to lie within a range of 33 to 37 percent of Tesla's current market value.

The results have important implications for both investors and managers by highlighting the need to further develop valuation approaches when it comes to intangible assets and the importance of corporate governance and risk management to take CEO reputation into account from a shareholder value perspective.

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Introduction, Problem Statement & Delimitation

The modern economy has in recent decades witnessed a profound shift from being one where the primary driver of value for companies were their tangible assets to one where value is increasingly derived from intangible assets. Indeed, investments in intangible assets, such as research and development, software, databases, artistic creations, designs, branding and business processes, have soared in the US and the UK, so much so that, measured as a share of sector value added, intangibles have overtaken tangible assets (Haskel & Westlake, 2017).

Within the various types of intangible assets, one of the hardest to value is reputation (Black et al., 2000). From a valuation standpoint, this is unfortunate, particularly given that reputation has been shown to have a significant effect on the market value of companies (Gámez et al., 2016; Wang et al., 2016). Interestingly, Weng and Chen (2016) have found that when it comes to financial performance and reputation, the effect of the CEO's reputation is likely to dominate the effect of the company's own reputation. This is probably even more so the case for younger companies, where the founder is still the CEO. One of the most famous CEO's today is Elon Musk, whose company, Tesla, thus presents an interesting valuation case. Given that most literature on CEO reputation does not take a valuation-based approach thereto, then this thesis can hopefully add value to the topic from a novelty perspective through its grounding in the valuation discipline and use of Google Trends data.

Among many seasoned Wall Street analysts and commentators it has become somewhat of a group pastime to weigh in on the degree to which Tesla is overvalued, earning the stock the label of being a 'story stock,' implying that the stock's valuation has lost its connection to its fundamentals and is driven by the appeal of "a utopian future of safe, reliable, powerful, self-driving electric vehicles powered by solar-fed batteries that are easy on the environment" (Stewart, 2017, April 6). The foremost salesman of this vision is Elon Musk, who has achieved quite the celebrity status and even served as an inspiration for the character of Tony Stark in the Iron Man movies (Hern, 2018, February 9). In 2017, the market cap of Tesla soared past that of GM and Ford despite the fact that both sold vastly more cars and earned several billions of dollars in profits whilst Tesla earned a loss. As such, a case could be made that either Tesla is overvalued or that the classical valuation approaches are not capturing intangibles such as reputation. In either case, Tesla appears to be selling at a premium – but what is the value of this premium and what drives it? To investigate this, this thesis will seek to answer the question of whether Tesla is selling at a premium by conducting a thorough valuation of the company and then proceeding to analyze and discuss how much of this premium can reasonably be attributed to the reputation of Elon Musk, i.e.:

- *What is the value of Tesla and is the company selling at a premium? If so, is it possible to identify a 'CEO Reputation Premium' and to say anything about its magnitude and what could be motivating it?*

This thesis will thus seek to investigate the degree to which any premium Tesla might be selling at can be attributed to Elon Musk. To fully understand what drives the final valuation estimate, it will therefore have to be supported by strategic and financial analyses. The thesis will consequently include the following sections in order to accomplish this from both a qualitative and a quantitative dimension:

- Company and industry overviews to establish a solid knowledge foundation to support the strategic analyses;
- Strategic analyses, the aim of which will be to isolate what drives competitive advantage and profitability/performance in Tesla's industry now and going forward;
- Analysis and reorganization of the financial statements of Tesla in order to understand the company's past performance and potential growth trajectories; and
- The valuation itself and an evaluation of the hypothesized CEO reputation premium.

The thesis will devote a substantial amount of pages to the strategic analyses because this thesis will argue that a substantial strategic analysis is a prerequisite for conducting a valuation of substance, which, in turn, is a prerequisite for making any sort of meaningful conclusions regarding the presence of a CEO reputation premium.

In order to feasibly investigate the above within the scope constraints of a masters thesis, certain delimitations had to be made. First of all, the thesis will rely on publicly available information and on widely available and utilized data providers such as Thompson Reuters and, to a lesser extent, Bloomberg. Second, a valuation date of January 1, 2019 was utilized for the valuation, with the added implication that any new and publicly available information from a later date is subject to an information "black-out" for the sake of feasibility. Moreover, though this thesis is not limited to the area of the US, it does have a significant focus on the area, due that 53 percent of Tesla's revenue is derived from there and due to scope/feasibility constraints. Hence, the results of this thesis may theoretically not be equally applicable to other geographical areas and cultural contexts. Lastly, the thesis is also aware of that a valuation case such as this thesis only provides a "statistic of one," which could limit the degree to which some conclusions would be broadly applicable and extrapolable.

Literature Review

The following review will fall into two main parts – a valuation focused one and a more theory oriented one that will give an overview of the academic treatments that the subjects of corporate and CEO reputation and, though to a lesser extent, Corporate Social Responsibility ("CSR") have hitherto received. Lastly, methodological approach and data will also be touched upon.

Valuation

Given the large number of valuation methods available to value a company, the following review will not include a full review of each as their applicability vary and will instead focus on the main methods within the established literature of the field (such as Bodie et al., 2013; Koller et al., 2015; Petersen et al., 2017; Penman, 2009; and the works of Aswath Damodaran). Thus, the table below has been adopted and synthesized based on said literature:

Table 1: Valuation Methods Overview

Method	Pros	Cons
Enterprise Discounted Cash Flow	Based on asset fundamentals Makes tax benefits explicit Relies on free cash flows	High sensitivity to few inputs and terms (i.e. WACC and continuing value) Penalizes long term investments
Economic Value Added	Pushes management to focus on positive NPV projects No reliance on % spreads	High sensitivity to few inputs and terms Ignores value created by R&D Several accounting adjustments required
Residual Income	Does not require dividends or positive cash flows Less sensitive to continuing value Looks at economic profitability	Very sensitive to quality of projections Relies on Cost of Equity Clean surplus assumption
Dividend Discount	Easy to use	Overly simplistic Requires dividend paying companies Limited link to fundamental value drivers
Multiples	Easy to use Reflects the view of the market and can show over/under valuation Relevant for investors	Boils a company down to a single ratio Backward looking Sensitive to accounting choices More pricing than valuation
Liquidation	Based on real value from real assets Shows the value floor of a company	Ignores intangibles Not relevant for going concerns
Real Options	Can value assets with no current revenues and profits Good for uncertain projects	Technically demanding Not often used in practice

Ideally, the balance sheet should reflect the value of a company as it presents all its assets. Yet, the book value of a company seldom reflects its market value, which then is why we have alternative valuation methods to choose from (Penman, 2009). A company can be valued either through technical analysis or fundamentals valuation. Technical analysis is the search for recurrent and predictable patterns in the stock price of a company's shares to predict its future share price (Bodie et al., 2013). The key to successful technical analysis is a lag in the response of stock prices to fundamental supply and demand factors. This assumption is thus diametrically opposed to the notion of an efficient market. (Bodie et al., 2013). On the other hand, a fundamentals valuation is conducted by performing strategic and financial analyses to identify the fundamental value drivers of a company and then using these to estimate/project future performance (Petersen et al., 2017). Fundamentals valuation relies on the weak market hypothesis, since it assumes the market does not capture all publicly available information. It thus goes against the assumption of the semi-strong market hypothesis, which states that all publicly available information regarding the prospects of a company must be reflected already in its stock price (Bodie et al., 2013). Though both technical analysis and fundamentals valuation have in various instances been applied successfully, and could be applied as Tesla is a publicly traded company, this thesis will elect to conduct a fundamentals valuation since, if done right, this method can better capture the core value of a company's operations, as it does not react to short-term share price fluctuations and should thus be less exposed to market moods and perceptions. Therefore, it is deemed the most appropriate valuation method for the purposes of this thesis.

As per Table 1, this thesis will not be using the dividend discount method, the liquidation method and the real options valuation method. The dividend discount method is not applicable as this thesis' investigation of Tesla will require an examination of the company's fundamental value drivers, which the method is ill suited for, plus the fact that Tesla has never paid any dividends (Petersen et al., 2017). Liquidation value is mostly applicable to companies on the verge of going bankrupt. Though some analysts continuously argue that Tesla will face issues in terms of having to raise additional financing, the method will not be employed, as this thesis does not share their view, and since the method ignores intangibles, which is a focus of this thesis (Petersen et al., 2017). The real options valuation method is good at valuing new projects because of its adaptability. The method makes it possible to account for the value of the option to walk away from an investment (Koller et al., 2015). Yet, the real options method is rarely used in practice. This is largely due to the high technical demands of the method, and that the Enterprise Discounted Cash Flow ("EDCF") method is the most widely used method by practitioners and thus proven in practice (Bodie et al. (2013). Hence, the real options valuation is deemed to not be applicable for the purposes of this thesis.

EDCF

The EDCF method, the Economic-Value Added method ("EVA") and the Residual Income method ("RI") are all accounting-based valuation methods that estimate value drivers, project cash flow(s), and discount them back at an applicable rate (Petersen et al., 2017). The three valuation methods should theoretically yield the same results when the same inputs are used. The choice of valuation method should thus not change the estimated enterprise value (Koller et al., 2015; Petersen et al., 2017). With this in mind, this thesis will elect to only employ the EDCF method due to scope and feasibility constraints. One of the EDCF method's main strengths is its focus on cash flows as opposed to earnings (Bodie et al., 2013; Koller et al., 2015; Petersen et al., 2017). The EDCF discounts back free cash flows available to all investors ("FCF") with the weighted average cost of capital ("WACC") to calculate the operating value of the enterprise as per the following formula (Koller et al., 2015):

$$Operating\ Value = \sum_{t=1}^{\infty} \frac{FCF}{(1 + WACC)^t}$$

The EDCF method takes a two-staged approach, consisting of forecasting period(s) and a continuing value ("CV") (Koller et al., 2015). The forecasting period(s) is the length of time the value drivers are estimated before the company reaches its 'steady state.' As recommended by Koller et al. (2015), a detailed forecasting period of five years, a key value driver forecast of the subsequent 10 years, plus a CV is used for this thesis.

The CV represents the performance of a company when it has reached its 'steady state.' The implicit assumption is that as a company matures, it will reach a level of constant growth at some point subsequent to the forecasting period(s) of the EDCF. Though this assumption is theoretically questionable, it is widely considered a 'pragmatic solution' to the Sisyphean task of projecting cash flows and dividends to infinity (Petersen et al., 2017). The CV will be calculated based on principles first developed by Myron Gordon, and here as applied by Koller et al. (2015):

$$Continuing\ Value_t = \frac{NOPLAT_{t+1} * (1 - \frac{G}{RONIC^1})}{WACC - g}$$

Two key advantages of the EDCF method is its focus on future as opposed to historic performance, and that the effect of the tax shield is incorporated in the WACC as per the following calculation:

$$WACC = \frac{D}{V} k_d (1 - T) + \frac{E}{V} k_e$$

The separation of tax shield and operations thus facilitates the comparison between and benchmarking of the operations of comparable companies (Koller et al., 2015). On the other hand, the EDCF method is also subject to several shortcomings, particularly that the enterprise value is highly sensitive to a few key inputs, such as the WACC and the growth rate employed. In addition, the CV usually ends up constituting a large part of the total valuation in the EDCF method, which implies that a thorough analysis must be undertaken when calculating the CV (Petersen et al., 2017). The imperative of conducting comprehensive strategic and financial analyses to validate inputs and assumptions thus become apparent and will consequently inform how this thesis will proceed.

Multiples Valuation

Multiples valuation is one of the quickest and easiest valuation approaches to take (Petersen et al., 2017). The method relies on the principle that similar assets and companies should sell at similar prices (Koller et al., 2015). The method assumes that a ratio comparing value to some company-specific variable (operating margins, cash flow, etc.) is the same across similar companies. Enterprise value multiples and equity multiples are the two categories of valuation multiples (Bodie et al., 2013). As equity multiples are sensitive to different capital structures and accounting differences between companies, this thesis will elect to apply enterprise value multiples (Koller et al., 2015). However, given the limitations of the method, particular its oversimplifying nature and that it conflates valuation with pricing, the method will applied as a supplement (Damodaran in Harris, 2018, July 13). Hence, multiples valuation will be used as a 'sanity check' to evaluate the enterprise value calculated via the EDCF with how the market is pricing Tesla's competitors. This should give an indication of

[1] RONIC = expected rate of return on new invested capital.

whether Tesla can be considered overpriced, though the method does not take into account whether overpricing is an industry wide issue, such as in the tech space (Koller et al., 2015).

Corporate Reputation

As a basis for what drives and determines the value of a company, the relative importance has in recent decades shifted significantly from tangible towards intangible assets (Haskel & Westlake, 2017). Indeed, in the US and UK, investment in intangible assets – as in research and development, software, databases, artistic creations, designs, branding and business processes – now exceeds that in tangible assets. However, one of the most discussed (Tischer & Hildebrandt, 2014) and hardest to value (Black et al., 2000) intangible assets of companies today is constituted by their reputation. As such, even clearly defining reputation can be challenging. Broadly viewed, the literature defines it as a collective construct that reflects an aggregation of individual perceptions (Tischer & Hildebrandt, 2014; Barnett et al., 2006; Walker, 2010). More specifically in a corporate context, reputation can be regarded as ‘a collective representation of past actions and results of a company that describes its ability to distribute the value created between different stakeholders. It also measures the relative status of a company, both internally with employees and externally with stakeholders within a competitive and institutional environment’ (Fombrun & Van Riel, 1996; Gamez et al, 2016). Weng and Chen (2017) and Tischer and Hildebrandt (2014) both provide a summaries of benefits that the have been associated with having a good reputation as a company, of which the most important ones can be synthesized to:

- Companies that have a good reputation can command a higher stock price and level of prestige and loyalty, whilst lowering transaction costs in the market place;
- They can attract better employees and also better motivate the employees they currently have; and
- Corporate reputation correlates with a lower cost of equity (see also Cao et al., 2014).

In order for a resource of a firm to qualify as a driver of sustainable competitive advantage, it must be valuable, imperfectly imitable, rare and non-substitutable, thereby reflecting the degree to which said resources can be characterized as immobile and heterogeneous (Barney, 1991; Grant, 1991). Positively related to the value of these traits as strategic resources are their level of distinctiveness in the marketplace (Amit & Schoemaker, 1993). Thus, building on the principles of the resource-based view, Roberts and Dowling (2002) argue that reputation is a source of sustainable, valuable and scarce competitive advantage that can enhance a company's market value. Moreover, it is an inimitable, irreplaceable asset, unevenly distributed and a source of barriers within and between sectors through differentiation (Gamez et al., 2016). However, several scholars, such as Brammer et al. (2004) and Filbeck (2001), argue that companies with good corporate reputations do not generate excess returns and can even have a tendency to generate negative income. Yet, as also argued by Brammer et al. (2004) and Gamez et al. (2016) this is almost to be partially expected in so far as investors are susceptible to the same effects on most other stakeholders that a good corporate reputation provides – i.e. there will be a herd effect / tendency to invest in companies that are well-known and have a good reputation, which can then lead to ‘buying euphoria’ that leads investors to overpay. In such scenarios, companies with good reputations can be expected to find it hard to live up to the expectations of exuberant investors and hence lead to (temporary) losses of value for investors.

CEO Reputation

As more attention has been given to the effects of corporate reputation on the performance of firms, so too has the level of granularity increased in the investigations of what component parts drive the value generated by / associated with a good corporate reputation. As a result thereof, it has been found that management quality is the main driver of reputation (Wang et al., 2016). Concordantly, Fuller and Jensen (2002) propose that one of the key determinants of a company’s future success is the reputation of its CEO and Anderson and Smith (2006) construct a portfolio based on CEO reputation and show that buying stocks with a good CEO reputation and selling stocks with a poor CEO reputation is a strategy that can outperform the S&P 500. In addition, Jian and Lee (2011) find that the stock market's responses to announcements of capital investments are more favorable for firms with more reputable CEOs and that firms with more reputable CEOs exhibit significantly better post-investment operating performance improvements than those with less reputable CEOs. Francis et al. (2008) find that earnings quality is positively associated with CEO reputation, and that in most cases of a negative association between the two, it is due to that the board or directors of more or less distressed firms have hired a reputable CEO to help manage their turnaround efforts. On the other hand, Malmendier and Tate (2007) find significant underperformance in stock returns, higher executive compensation and higher earnings management after CEOs attain “superstar” status in the media. Furthermore, Finkelstein and Hambrick (1996) argue that managerial ego, biases, and experiences affect firm behavior because of the ambiguity and complexity that characterize the tasks of top managers. Conceptually then, identifying what constitutes CEO reputation and assessing its impact becomes a complex, multidimensional task that can be influenced by factors as diverse as credibility, charisma, integrity, honesty, and vision, among other attributes that are typically difficult to quantify (Francis et al., 2008). On this note, Milbourn (2003) suggests that the CEOs who are frequently mentioned in public media or newspapers tend to have a better personal reputation than those who are mentioned less frequently. Arguably then, the degree to which a CEO is "trending" can be regarded as a potential proxy for his or her reputation (subject to the level of positivity/negativity of the coverage). Interestingly, Weng and Chen (2017) conclude that: "*CEO reputation is consistently beneficial to firm performance even if corporate reputation is poor. Corporate reputation has only a partial positive effect on firm performance when the CEO is performing well or enjoys a high level of media coverage. We believe that these results show that CEO reputation is more important than corporate reputation.*" Maintaining and restoring a CEO's reputation can therefore also become a concern for firms. Here, Cianci and Kaplan (2010) find that management reputations that are currently favorable appear more enduring and unaffected by revelations of questionable behavior relative to when management's reputation is currently unfavorable and that efforts to rebuild trust by engaging in trust enhancing behaviors are likely to be helpful in rebuilding one's reputation.

CSR

One strategy that companies and CEOs have been known to employ to bolster their reputations are to engage in CSR. Regarding this, Borghesi et al. (2014) find that firms with a higher level of media coverage are significantly more inclined to invest in CSR, which they attribute to that either media scrutiny induces managers to emphasize the interests of stakeholders, or that CEOs with greater press coverage view CSR investments as a way of promoting their own reputations and careers. Moreover, they also conclude that many CSR investments are not aligned with shareholder interests and that they are instead made for the private benefit of firm managers – either because they believe they have a moral obligation or they believe these investments enhance their personal reputation. Similarly, Bhandari and Javakhadze (2017) find that CSR reduces both accounting as well as stock-based future corporate performance and, more broadly, that focusing on aggregate CSR strategies may impose costs to a firm in the form of forgone investment opportunities that in the long run are manifested in the loss of shareholder wealth. With Tesla in mind, it is also interesting to note that they find that "*CSR positively affects investment sensitivity to cash flow for the US firms implying that CSR aggravates financial constraints to some extent*." In addition, it has also been shown that CSR in the form of business sustainability can affect the cost of equity of firms to varying degrees, depending on which dimension of sustainability performance characterizes the CSR carried out (Ng & Rezaee, 2015). However, it must also be noted that several studies have found that CSR can be consistent with shareholder wealth maximization as well as with generating positive societal results (e.g., Edmans, 2011; Flammer, 2013). In sum, the consensus view on the whole is that CSR has small positive effects on firm performance, but that untangling the various causal relationships is complicated (Thomsen & Conyon, 2012).

Supplemental Regression Analysis

In the event that Tesla is in the end found to currently be "overvalued" vis-à-vis its selected peer group, a basic multiple regression analysis using Ordinary Least Squares estimation will be conducted in Excel to estimate how much of such an overvaluation can reasonably be attributed to the CEO reputation premium associated with Elon Musk based on publicly available data from Google Trends. This method allows one to quantify the relationships between the proposed premium and its driver(s) with reasonable precision, and evaluate whether these associations are statistically significant. The method relies on a number of restrictive assumptions that should be considered in relation to the results. It is simplifying by nature and does not allow one to accurately capture all details though it is very useful in pointing towards overall relationships. There are a range of other general limitations concerning the data and measurement errors, such as that Excel standard errors and t-statistics and p-values are based on the assumption that the error is independent with constant variance (homoskedastic). These will be commented on when testing and evaluating model robustness.

Methodological Approach & Data

The main methodological dichotomy within business research is that of the inductive and the deductive approach. The inductive approach takes its starting point in a set of observations and attempts to identify and explain patterns through theory (Bryman & Bell, 2015). This approach is often used when little knowledge exist in terms of established research and is thus often more qualitative in nature. On the other hand, the deductive approach is based on established theory, where hypotheses are tested against data. It is the most frequently used approach given the inherent difficulty of applying a pure inductive approach (Bryman & Bell, 2015). This thesis will largely follow a deductive approach, having hypothesized the existence of a CEO reputation premium based on available theory. However, some inductive elements will be present as the thesis attempts to quantify the premium, which there is only a limited and somewhat subjective precedence for. Moreover, given that the topic of the thesis requires both qualitative and quantitative analyses, a combination of approaches are warranted in light of the challenge of, e.g., conducting a valuation, covering the strategic landscape of a company and estimating a very intangible asset such as reputation, all within the same investigation/thesis.

For the quantititative analysis, i.e. the valuation and financial statement analyses, this thesis has for the sake of consistency and coherence of method, terminology and technique decided adopt the valuation framework and approach of Koller et al. (2015) for the majority of the valuation and financial statement analyses. Attempting to organically combine all the main works with the valuation field herein referenced for the sake of doing so was deemed an exercise in reinventing the wheel. As Koller et al. (2015) was deemed the work most in tune with valuing US equities from a practitioner standpoint, it was selected.

Data will be collected from largely secondary sources, such as data providers, articles, research papers and academic publications. However, Tesla's financial data will be obtained through its Form 10-Ks and 10-Qs, and will therefore be of a more primary nature. Thus, the thesis will rely on external data and not conduct any interviews. As company representatives would only to a very limited degree be able to discuss valuation relevant information due to insider trading concerns, relying on external data was therefore deemed the most feasible and effective approach to data collection.

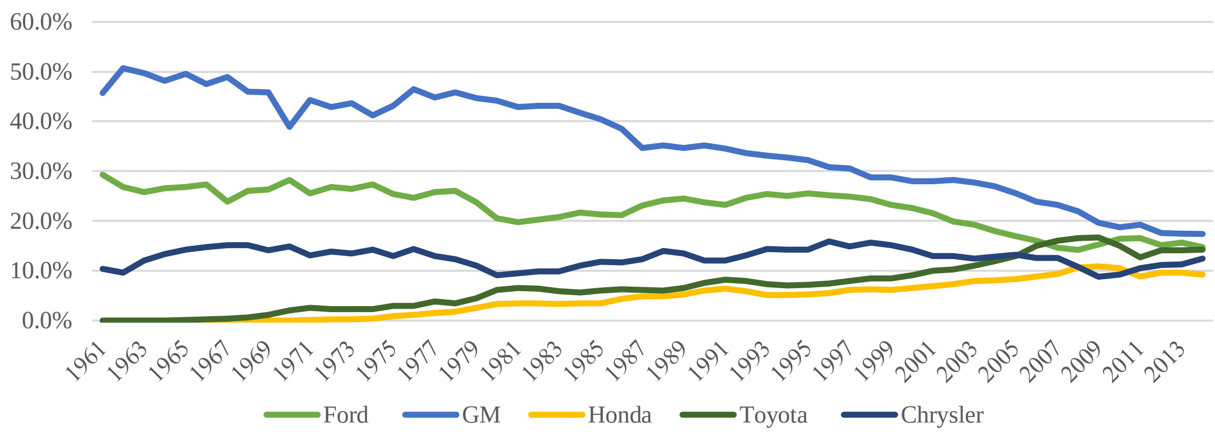
Industry & Company Overview

This section will give a brief overview of the history of the US automotive industry, and a detailed description of the different products and major trends in the industry facing companies in order to provide a better understanding of the background of Tesla's strategic and financial drivers. In addition, the operations, ownership and competitive situation for Tesla will be introduced to create a foundation for the strategic analysis.

History of the US Automotive Industry

The US automotive industry has played a pivotal role in the growth of the American economy into a full-fledged industrial powerhouse throughout the 20th century. Yet, as that century came to a close, the industry had also come to exemplify the relative decline of the US' industrial might vis-à-vis increasingly successful competitors from abroad. An industry with several companies had largely been reduced to the Detroit Three, i.e. the three largest automobile manufacturers in North America: General Motors ("GM"), Fiat Chrysler Automobiles and the Ford Motor Company (Klier, 2009). The industrial organization literature suggests that market shares can be a useful initial step in analyzing the competitiveness of an industry (see, for example, Carlton and Perloff, 1990). By that metric, the US automotive industry of the 1960s and 1970s was highly concentrated among a small number of companies and therefore not very competitive as illustrated by the figure below:

Figure 1: % of total US auto industry market share, by automaker 1961 - 2014



Source: WardsAuto, as made availible by Cutcher-Gershenfeld et al. (2015)

Klier (2009) identifies three key drivers for this great change in the structure of the US automotive industry. First, as the rebuilt industries in, amongst other places, Japan and

Germany, matured, the entrance of new players meant that by 1970, imports had established a solid foothold in the US market, capturing approximately 15 percent of the market. Secondly, the 1979 oil shock prompted a severe downturn in the economy and saw a fast increase in the share of imports from approximately 18 percent in 1978 to approximately 27 percent just two years later. As American cars at the time were large and fuel inefficient, consumers increasingly started to opt for smaller and more fuel efficient European and Asian alternatives. Finally, as foreign manufacturers started to compete in the light truck segment, the last remaining stronghold of US carmakers, while continuing to make inroads in the passenger car segment, while at the same time oil prices in 1998 started a decade long rise, all resulted in that by late 2008 the Detroit carmakers were on the brink of extinction – so much so that both GM and Chrysler, both of which declared bankruptcy, received a total of $24.9 billion in loans from the Troubled Asset Relief Program, a US government appropriation of funds to help various major businesses which suffered losses due to the Great Recession. Following the subsequent restructuring, a large number of assembly plants closed in order to reduce excess assembly capacity and new labor contracts between the Detroit Three and the United Auto Workers Union, agreed upon in 2011, provided for renewed wage competitiveness for the industry (Klier & Rubinstein, 2012).

US Automotive Industry Today

Today, the US is the world's second largest market for motor vehicles, a category that comprises passenger cars and trucks, with 17.6 million units sold in 2017. The US market has mostly seen a consistent increase in new vehicle sales in the last five years with unit sales increasing from 15.9 million in 2013 to 17.6 million in 2017. Also in 2017, the US exported almost 2 million new light vehicles and almost 130,000 medium and heavy trucks (at a total value of $63.2 billion) to more than 200 markets around the world, with additional exports of automotive parts valued at $85.6 billion.[2]

Table 2: US Motor Vehicle Sales and Production, 2008-2017[3]

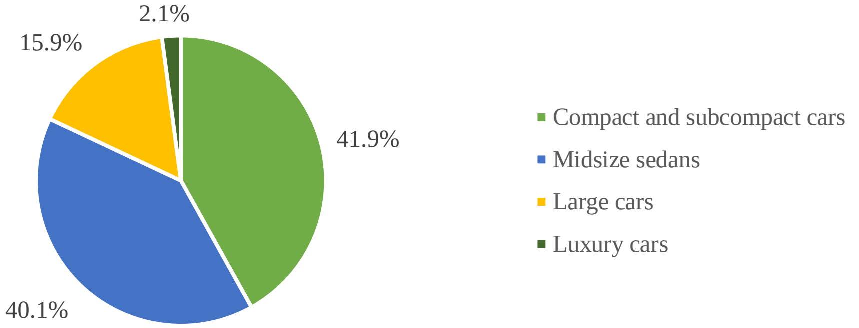
YEAR	SALES		PRODUCTION	
	Total Vehicles	% Change over PY	Total Vehicles	% Change over PY
2017	17,583	-1.6%	11,189	-8.1%
2016	17,866	0.1%	12,198	0.8%
2015	17,776	5.6%	12,100	3.9%
2014	16,842	6.0%	11,650	5.3%

[2] Select USA, The Automotive Industry in the United States, accessed via <https://www.selectusa.gov/automotive-industry-united-states>, as on 15 August, 2018.
[3] OICA, Sales and Production Statistics, accessed via <http://www.oica.net/category/production-statistics/>, as on August 11, 2018.

2013	15,883	7.4%	11,066	7.1%
2012	14,788	13.4%	10,336	19.3%
2011	13,041	10.8%	8,662	11.9%
2010	11,772	11.1%	7,744	35.6%
2009	10,601	-21.4%	5,710	-33.8%
2008	13,493		8,627	

The meagre US motor vehicle sales in 2016 and a subsequent decline in 2017 sales volumes can be traced to a shift in customer preferences from the traditional passenger-car models, i.e., sedans, coupes and convertibles, to a growing affinity for sport utility vehicles (“SUVs”). Even though the shift towards buying more SUVs decreases overall vehicle sales volumes, the average selling price of the vehicles has continued to rise, making any short term sales decreases less of a concern for the industry (Butters, 2017). As the US economy has improved, consumer confidence has trended upward and financing options have become more widely available, pent-up consumer demand for new vehicle has been released. In addition, interest rates have remained at historical lows, which has reduced the cost to finance a vehicle purchase, and sales across the US automotive sector have for the most part recovered. Still, overall industry revenue is expected to have declined at an annualized rate of 4.2 percent over the five years to 2017 to reach $94.8 billion, not including medium and heavy trucks (Peters, 2017).

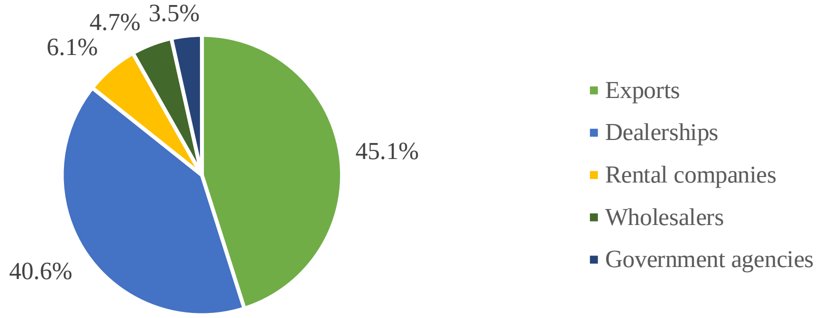
Figure 2: US auto industry product segmentation (2017)



Source: Ibisworld.com

As can be seen from the chart above, midsize sedans remains a mainstay of the industry. Over the past 20 years, midsize and compact car sales have gained market share over full-size cars as consumer preferences have changed. Demand for mid-size and compact cars has for most of the past decade been supported by high gas prices, which prompted consumers to prefer compact and midsize cars with better fuel efficiency, rather than large cars (Peters, 2017). Midsize car offer better fuel efficiency than full-size vehicles without sacrificing too much cargo or passenger room. In addition, hybrid-electric drivetrains are now commonly available as an upgrade option for midsize cars. As for compacts, they offer exceptional fuel economy, but also come with limited legroom and smaller engine options (Peters, 2017). Lastly, luxury cars represents a small but growing high-margin segment, which has increased as a percentage of revenue over the past five years, as US income levels has increased (Peters, 2017).

Figure 3: US auto industry market segmentation (2017)



Source: Ibisworld.com

As illustrated by the chart above, most cars produced in the US are exported to markets abroad. Though major automakers tend to produce distinct vehicle lines or vehicle types in different factories around the world, the concentration of manufacturing capacity in the US by the Detroit Three means exports are an important market for the US industry (Klier & Rubinstein, 2012). However, as the USD over the past five years has appreciated against most major currencies (and is expected to continue to do so as the Federal Reserve continues to normalize interest rates) this could create headwinds for the industry and make US produced cars less attractive on international markets.[4] Car dealerships remain the largest domestic market segment of the industry, who sell the vast majority of their vehicles directly to consumers.

Electric Vehicles

As Tesla from a carmaker perspective is solely producing electric vehicles ("EVs"), this particular but growing niche of the automotive industry, which overall is dominated by the internal combustion engine ("ICE"), will here be introduced to provide a foundation for the strategic and financial analyses to come.

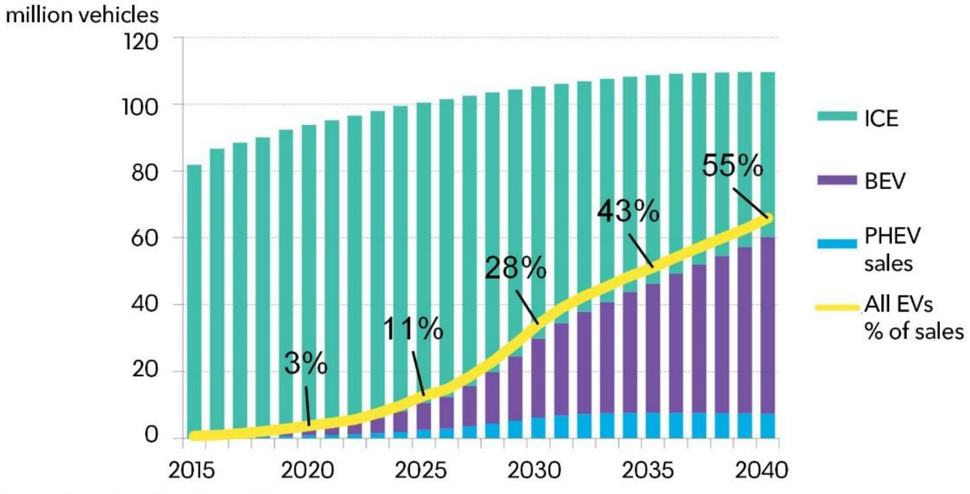
[4] Federal Reserve Bank of St. Louis, Trade Weighted U.S. Dollar Index: Major Currencies, accessed via <https://fred.stlouisfed.org/series/DTWEXM>, as on August 15, 2018.

EVs are vehicles that are powered at least partially by an electric motor. Vehicles produced by this industry may be either entirely electric-powered, also known as battery EVs ("BEV") or gas-electric/diesel-electric hybrids, also known as plug-in hybrid EVs ("PHEV"). While some are designed for use by individual consumers, others are developed for commercial or recreational purposes. The EV industry develops electric fueling solutions for all manner of vehicles, from forklifts to spacecrafts, but cars and public transit vehicles have received a majority of resources because of their mass market potential ('Electric Vehicles', 2017).

Though highly attractive from both a CO2 emissions and an engineering/maintenance perspective (the induction motor in an EV has vastly fewer parts than a comparable ICE engine and is thus expected to require significantly less maintenance (Clark, 2017)), EV have been plagued by a number of barriers to adoption, chief among which is 'range anxiety.' Range anxiety refers to the concerns many consumers have about the relatively shorter distance capabilities of a full electric charge versus a full tank of gasoline and about the reliability of batteries over time ('Electric Vehicles', 2017). Additional concerns have been the historically high cost of batteries and the lack of a widespread charging station network to support a wider adoption and deployment of EVs.

However, initially spurred on by government subsidies in several countries and expected to be sustained (as the subsidies are inevitably phased out) by economies of scale and declining battery costs, sales of EVs are expected to increase from a record 1.1 million worldwide in 2017 to 11 million in 2025, and then surging to 30 million in 2030 as they establish a cost advantage over ICE vehicles (BNEF, 2018, May 21). China is expected to lead this transition, with sales there accounting for almost 50 percent of the global EV market in 2025 and 39 percent in 2030. As seen in the graph below, the number of ICE vehicles sold per year is expected to start declining in the mid-2020s, and in 2040, some 60 million EVs are projected to be sold, equivalent to 55 percent of the global light-duty vehicle market (BNEF, 2018, May 21).

Figure 4: Annual global light duty vehicle sales projection as of May 21, 2018



Source: Bloomberg New Energy Finance

<u>Autonomous Driving</u>

The automotive industry is facing several disruptive trends, some of which will be touched upon in subsequent sections. However, due to the degree to which Tesla has embraced autonomous driving ("AD"), this thesis has determined the subject deserves this separate introduction (Tesla, Form 10-K 2017). AD refers to the capacity of an automotive to navigate traffic on its own and deliver its passengers safely from A to B. To achieve this, vehicles will rely on a mix of advanced software, powerful computers, radar (such as LIDAR) and cameras/sensors.

All Tesla vehicles, including the Model 3, have the hardware needed for full self-driving capability, though not all drivers will have the feature available as it, like the current semi-autonomous autopilot, is a software update Tesla owners must choose to purchase to activate (Tesla, Form 10-K 2017). However, because Tesla has designed its vehicles to receive over-the-air updates, software enhancements can improve the car's self-driving capabilities over time. As such, one might say AD is part of the DNA of every Tesla vehicle.

Though there have been several accidents involving AD, incl. for Tesla and Uber, the medium to long term benefits, such as greater safety (less human error), convenience, lower insurance premiums and lower cost of travelling per mile are all expected to make the wide adoption of AD inevitable (BCG, 2017, December 18). Indeed, "a typical Chicagoan who owns a car and drives 10,000 miles a year could cut the cost of travel from around $1.20 per mile to around 50 cents per mile" and by 2030, 25 percent of miles driven in US could be in shared self-driving electric cars (BCG, 2017, December 18).

For carmakers, the implications are profound, as in an AD future, where ownership is optional, they will need to increasingly sell rides, not cars. This will lead to new opportunities as well as threats, as the global transportation market dwarfs that of the car market (in the area of $2 vs. $10 trillion USD a year) but will also expose carmakers to competition from technology and ride-sharing services (Economist, 2018, March 1). Of particular concern will also be the degree to which shared self-driving electric cars will drive down vehicle sales as less vehicles are needed to transport the same amount of people (the average vehicle usage rate is only 5 percent, meaning that for 95 percent of the time any given vehicle is not in use) vs. the degree to which the increased usage per vehicle will lead to increased fleet turnover (Economist, 2018, March 1).

Energy Storage and Solar Power

Lastly, as Tesla also leases and sells solar energy systems, renewable energy and energy storage products, this is a segment that must be touched upon, though in limited form, as the business segmented only accounted for 9.5 percent of Tesla's total revenues in 2017 (Tesla, Form 10-K 2017).

The main problems with renewable energy have historically been high fixed costs and their intermittency – i.e. when the sun does not shine or the wind does not blow there is no energy produced, and when they do the energy must be deployed to the grid (Shively & Ferrare, 2012). Thus, energy storage have long been considered the key missing link to making renewable energy systemically viable, but also an expensive and inefficient one (Silverstein, 2018, March 15) Yet, by 2020 the levelized cost of electricity ("LCOE") of solar is expected to have declined 83 percent vis-à-vis 2010 levels, and to by 2030 be 'effectively free' from a marginal cost perspective (Arie, 2018, August 13). Furthermore, the global energy storage market is expected double six times between 2016 and 2030, representing $103 billion USD invested in energy storage over this period (BNEF, 2017, November 20). Eight countries will lead the market, with 70 percent of capacity to be installed in the US (~25 percent), China, Japan, India, Germany, UK, Australia and South Korea (BNEF, 2017, November 20). Affordable energy storage, both utility-scale and behind-the-meter, will provide a key source of flexibility through this period and will help in integrating increasing levels of renewable energy. Economies of scale will be a significant factor in this, as Tesla's Gigafactory 1 when completed is expected to produce more lithium ion batteries in a year than were produced in all of 2013 (Tesla, 2014, September 24). Moreover, solar farms are getting much bigger than in the past (+1 million individual panels) and market participants are consolidating to compete at scale (Arie, 2018, August 13).

Company Overview

History

The idea behind Tesla Motors was originally conceived by Martin Eberhard, an engineer and entrepreneur who in 2003 had begun to investigate the feasibility of a zero-emissions luxury sports car that was going to confront the image of EVs as being boring and unattractive in both style and high-level performance (Elley, 2011). Thus, Tesla Motors was founded in 2003 by Eberhard and Marc Tarpenning and was named after Serbian American inventor Nikola Tesla. Eberhard became Tesla's first CEO and Tarpenning its CFO. Funding for the company was obtained from a variety of sources, most notably Elon Musk, who contributed more than $30 million to the new venture and served as chairman of the company, beginning in 2004.

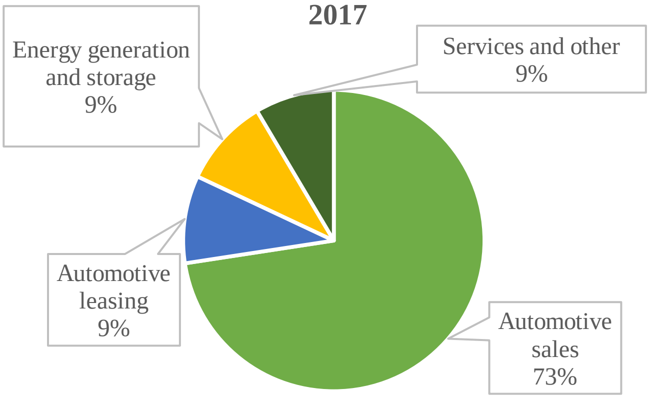
In 2008, the company released its first car, the electric Roadster. In company tests, it achieved 394 km on a single charge, a range unprecedented for a production EV (Gregersen & Schreiber, 2018). Additional tests showed that its performance was comparable to that of many ICE sports cars: the Roadster could accelerate from 0 to 100 km per hour in 4 seconds and could reach a top speed of 200 km per hour. Despite a federal tax credit of $7,500 for purchasing an EV, the Roadster's cost of $109,000 made it a luxury item for the few.

Musk became CEO in 2008 to help Tesla Motors transition from a focus on development to operations, particularly scaling up production of the Roadster and eventually take aim at a broader market (Elley, 2011). Thus, Tesla Motors was listed on the NASDAQ and went public on June 29, 2010, and in 2012, Tesla stopped production of the Roadster to concentrate on its new Model S sedan, which became acclaimed by automotive critics for its performance and design, and began to build out a network of charging stations (Gregersen & Schreiber, 2018). Since then, the company has introduced the Model X in 2015, a "crossover" vehicle (i.e., a vehicle with features of a SUV but built on a car chassis), and in 2017, the Model 3, a four-door sedan with a range of 354 km and a starting price of $35,000. The company also branched out into solar energy products: a line of batteries to store electric power from solar energy for use in homes and businesses was unveiled in 2015, and in 2016 solar panel company SolarCity was acquired. In 2017, the company changed its name to Tesla, Inc., to reflect that it no longer sold just cars.

Operations

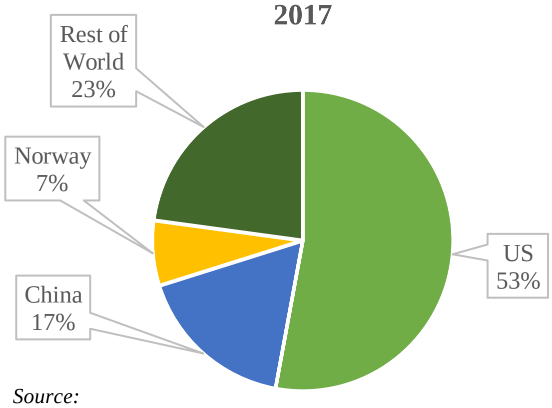
Tesla is a US-based manufacturer of electric vehicles and complementary technologies such as energy generation and its ‘Supercharger’ network for its EVs. It is also the world’s only vertically integrated sustainable energy company and offers a full range of products from generation to storage and consumption (Tesla, Form 10-K 2017). The revenue and cost breakdowns of Tesla can be found below:

Figure 5: Tesla revenues split 2017



Source: Tesla, Inc. Form 10-K for 2017

Figure 6: Tesla sales geographies 2017

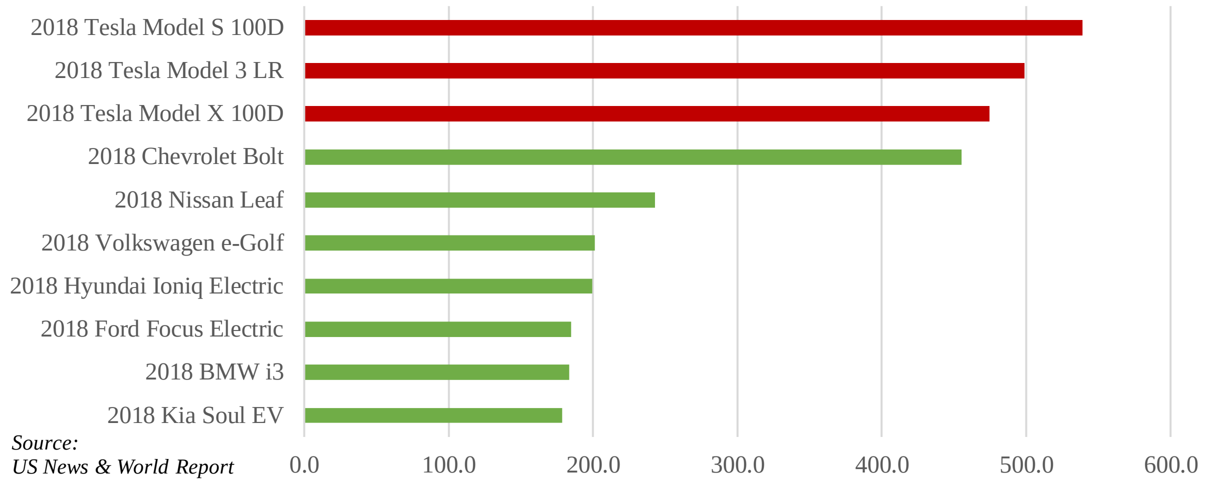


Source: Tesla, Form 10-K 2017

As evident from the figures above, Tesla’s largest/primary segment is by far its automotive segment, which combined accounts for 82 percent of revenues, and the US market is by far the largest geographical market, accounting for 53 percent of sales, followed by China at 17 percent, and Norway at 7 percent. The latter is an interesting case, as sales of Tesla has seen great sales growth there due to government subsidies, free parking and toll-free road for EVs, which has resulted in that more than half of new cars in Norway are BEVs and PHEVs (Reid, 2018, January 30). The Norwegian market is thus an example of how quickly EVs can penetrate a market, albeit an example with very favorable conditions for EVs.

The Model S and Model X were some of the first fully electric vehicles in their segments and Tesla was therefore able to gain a head start in overcoming the technical challenges associated with EVs, which manifests itself through that Tesla today dominate the rankings of EVs by range per single charge as here shown:

Figure 7: Top 10 km per charge of EVs as of July 26, 2018



Source:
US News & World Report

Tesla sells its vehicles through its own sales and service network as opposed to the widely used dealership model of the US market, arguing that the benefits that result from distribution ownership enable the company to improve the overall customer experience, the speed of product development and the capital efficiency of its business (Tesla, Form 10-K 2017). The company continues to build its network of Superchargers and 'Destination Chargers' in North America, Europe and Asia to provide both fast charging that enables convenient long-distance travel as well as other charging options (Tesla, Form 10-K 2017). Tesla's vehicles are all capable of "Supercharging" on their Supercharger network – they can reach full charge in a little over an hour, whereas normally it would take multiple hours. These Superchargers charge customers a fee for use depending on when the vehicle was manufactured.

Corporate Governance

Tesla is a publicly traded company under the ticker symbol TSLA. The stocks of Tesla are all traded under the same share class as common stock and all with the same voting rights, i.e. one stock, one vote. Data from Thompson Reuters shows that Elon Musk is by far the company's largest shareholder with a holding of 19.7 percent and that the top 10 shareholders, most of which are asset/investment management firms, together own 60.1 percent of the company's shares. However, Tesla's bylaws contain supermajority voting requirements that require the approval of two-thirds of shares to approve major changes at the company, including mergers, acquisitions or changes to the board's compensation. As such, though Elon Musk does not have outright equity or voting power control of the company, he retains indirect control through his significant stake and the above supermajority voting provisions, as outside shareholders would need to reach unity among 83 percent of them to be able to muster a supermajority (Orol, 2018, April 23). As of December 31, 2018 Tesla had 171.73 million shares outstanding (Thompson Reuters).

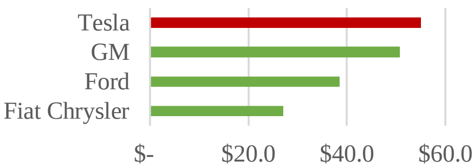
On August 7, 2018, Elon Musk on Twitter suggested that Tesla was exploring options to go private. On the same day, he later elaborated on Tesla's blog that this would allow the company to focus on executing on the company's long term mission without the distractions of quarterly reporting, stock price fluctuations and defending against short sellers (Musk, 2018, August 7). However, on August 24, 2018, after seeking outside and inside advice, Musk ultimately announced that for the foreseeable future, Tesla would remain a public company to allow several institutional investors to remain and to not distract from the imperative of successfully ramping up Model 3 production (Musk, 2018, August 24).

<u>Competitive Landscape</u>

As the table below shows, on its main market, the US auto market, Tesla remains a minor player. Additionally, most of Tesla's competitors plan to invest heavily in and/or enter the EV space.

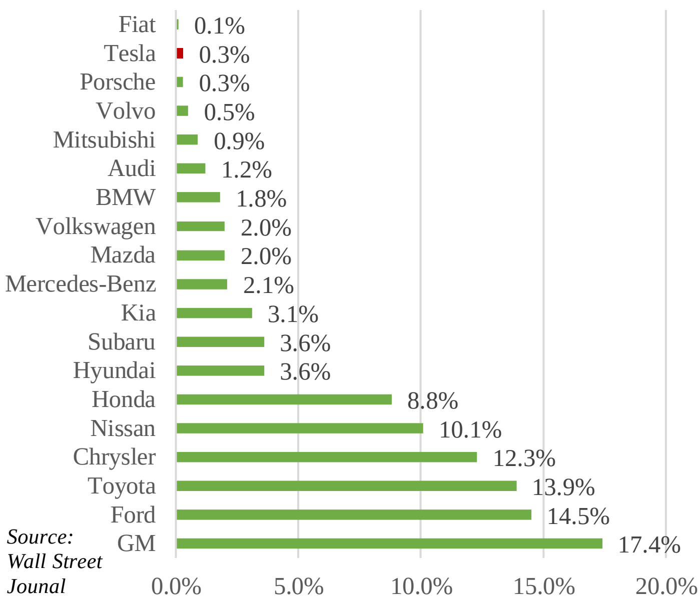
Yet, when looking at the consolidated market capitalization of the Detroit Three and Tesla, Tesla comes out on top:

Figure 8: US automakers by market cap. Dec. 2018 ($bn.)



As such, Tesla's market capitalization can reasonably be expected to largely reflect expectations of future performance due to factors to be discussed later in this thesis (Bodie et al., 2013).

Figure 9: Market shares of automakers in the US (YTD March 2018)



Strategic Analyses

In order to adequately understand the valuation inputs and, more importantly, the drivers and trends behind the valuation inputs, one must conduct a thorough strategic analysis to ensure that the valuation result and hypothesized premium rest on realistic fundamentals accurately reflecting the market dynamics facing Tesla. The analysis must therefore seek to capture both internal and external dynamics. However, this thesis recognizes that currently no single, unifying framework exists that on its own is able to capture a wide enough spectrum of such dynamics, and the thesis will therefore take a multi-framework approach, which will move from the macro to the mezzo to the micro level of analysis of the factors influencing Tesla's performance.

The first step will be to examine the macro-environment that Tesla faces through a so-called PEST Analysis. This framework, which seeks to capture and categorize the critical determinants of the threats and opportunities a company will face in its future, has multiple extensions, yet for the sake of succinctness this thesis will rely on the original iteration of the framework (Grant, 2013). Though the framework has faced criticism for statically describing external dynamics that are bound to change over time and need constant attention and reviewing, this thesis will seek to mitigate this by focusing on the trends most likely to have a material impact on Tesla and its industry.

Secondly, the mezzo/industry level of analysis will be conducted utilizing the now classic, yet still widely used framework of Porter's Five Forces (Porter, 1979). Like the PEST framework, it has faced criticism for being a static model that provides a snapshot of the wider industry at some point in the past, but does not necessarily say much about the medium and long term due to rapidly evolving external factors such as globalization and technology that can change hitherto ironclad principles of an industry (Grant, 2013). In addition, the model can also struggle with being applied to companies that straddle multiple industries. Regarding the latter point, for Tesla the main segment remains the automotive segment, as compared for instance to Waymo (parent company Alphabet; formerly Google) and Apple, where this is much harder to evaluate. The automotive segment will thus be the subject of the bulk of the strategic analysis, whilst energy generation and storage will receive a more limited treatment throughout the strategic analysis when deemed appropriate due to thesis constraints. On the former point, the thesis will seek to mitigate this critique by to the extent possible being forward looking and trendspotting in its analysis.

Finally, for the micro-level analysis, this thesis will utilize Barney's VRIN framework (resource-based view), which focuses on the (sustainable) competitive advantage(s) generated by a company's internal resources (Barney, 1991). A common critique of the framework is that it is too inwardly oriented, yet when combined with externally oriented frameworks, like this thesis does, it can still add analytical value and insights (Grant, 2013).

PEST Analysis

Political Environment

The automotive industry in general and Tesla specifically are subject to several political factors that can have adverse or beneficial implications for a carmaker's bottom line. Given Tesla's product profile and EV focus, several of the following factors impacts both Tesla's auto and its energy segment. Four main areas of political factors have been identified in the current political climate: environmental regulations, safety regulations, government incentives and trade policy. A significant driver of some of the factors outlined in the following are the policies of President Trump, which have been a source of uncertainty for several industries. Yet, is it short-termism to include his policies, given most political commentators do not foresee him winning reelection? While it is beyond this thesis to engage in electoral forecasting, it will find it prudent to remark that assuming President Trump runs in 2020, history suggests he will benefit from incumbency, and that "*while Trump's approval rating is only in the low 40s, some election models suggest that he would still have 50-50 or better odds to win reelection if that's his approval level in 2020*" (Kondik, 2018, April 19).[5]

- Environmental regulations

Carmakers are subject numerous environmental regulations. 15 percent of global CO2 emissions come from the transport sector,[6] of which 95 percent comes from the burning of petroleum-based fuels, largely gasoline and diesel, which still constitutes the fuel for the vast majority of the world's automotive fleet (>99 percent).[7] At COP 21 in Paris, on 12 December 2015, Parties to the United Nations Framework Convention on Climate Change reached a landmark agreement to combat climate change, to accelerate investments needed for a sustainable low carbon future and to aim at keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels.[8] On June 1, 2017, US President

[5] For the latest approval rating estimates, please consult: https://projects.fivethirtyeight.com/trump-approval-ratings/?ex_cid=rrpromo
[6] https://www.c2es.org/content/international-emissions/
[7] https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data
[8] https://unfccc.int/process-and-meetings/the-paris-agreement/what-is-the-paris-agreement

Donald Trump announced that the US would withdraw from the accord (to go into effect at the earliest possible date, November 4, 2020). So far, the US remains the sole country in the world to withdraw. On the domestic front, several US states (16), led by California, historically responsible for over 45 percent of Tesla's US sales, formed the US Climate Alliance, a subnational coalition with the objective of continuing adherence to the accord (Griffin, 2015). Together, these states represent over 40 percent of the US population.[9] Thus, though much of the world remains committed to promoting a low carbon future, which benefits and acts as a positive factor on EV and energy storage sales, the Trump administration has taken further regulatory action that from a national level will weaken this factor, such as its commitment to reversing vehicle mileage standards put in place by the previous US administration (Plumer & Popovich, 2018, April 3). Figure 10[10] below illustrates the path US mileage standards otherwise would have been on vis-à-vis other major economies had the Trump administration not decided to cap fuel economy requirements at a fleet average of 37 miles per gallon starting in 2020 (Beene et al., 2018).

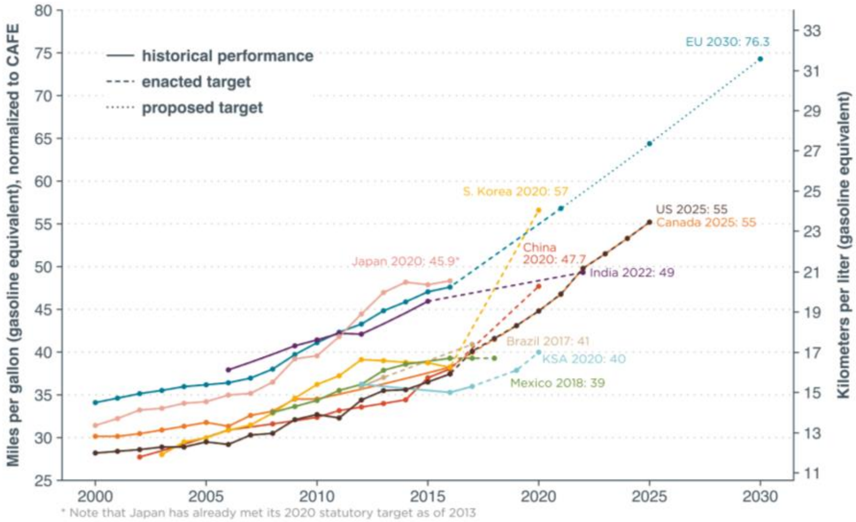


Figure 10: Passenger car miles per gallon, normalized to CAFE

However, as several other countries have modeled their vehicle standards after those in the US, a rollback by the US Environmental Protection Agency could potentially affect standards across the globe (Plumer & Popovich, 2018, April 3). As such, the negative effects of the Trump administration might have further repercussions on what would otherwise have been a generally positive environmental regulatory outlook for EVs. Additionally, though several US states have vowed to resist the reversal in standards, the administration is seeking to curtail their authority under the Clean Air Act to set rules more stringent than the federal ones limiting tailpipe greenhouse gas emissions as well as their ability to impose an EV sales mandate (Beene et al., 2018).

[9] https://www.usclimatealliance.org/
[10] https://www.theicct.org/chart-library-passenger-vehicle-fuel-economy [*source data not available, hence original figure has been retained*].

➢ Safety regulations

Ever since the first seatbelt was patented in 1885, safety has remained a key issue for the automotive industry.[11] In the US, the National Highway Traffic Safety Administration ("NHTSA") has a legislative mandate to issue Federal Motor Vehicle Safety Standards ("FMVSS") and Regulations to which manufacturers of motor vehicles and items of motor vehicle equipment must conform and certify compliance. Additionally, there are EV-specific standards for limiting chemical spillage from batteries, securing batteries during a crash, and isolating the chassis from the high-voltage system to prevent electric shock. Vehicle safety in the EU is regulated mainly by international standards and regulation devised by the EU and the UN. In general, vehicle safety standardization at the regional and national levels, taking into account as it does local conditions, can often produce faster action than a similar process at the international level (WHO, 2004). Hence why individual US states also has some discretion in this area. Of particular concern to Tesla is safety regulations concerning AD, as Tesla's autopilot has been involved in several accidents, one even fatal, which the NHTSA is currently investigating (Guardian staff, 2018). Figure 11 (Karsten & West, 2018, May 1) shows the status of AD state legislation across the US, because while the NHTSA is periodically updating their guidelines for AD vehicles, individual states are already passing relevant laws. As such, California on April 2, 2018, expanded its testing rules to allow for remote monitoring instead of requiring a safety driver inside the vehicle to be able to take over from the AD vehicle should a critical situation arise. Monitoring the regulatory environment on this developing legal front and lobbying for regulations that promote innovation and safety at the same time will therefore be key for companies like Tesla that seeks to have their AD capabilities be a part of their competitive advantage.

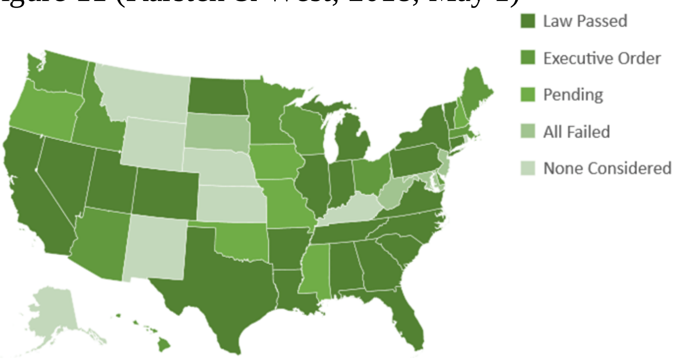


Figure 11: AD regulation implementation in the US

➢ Government incentives

Government incentives for EVs have been established by several national governments and local authorities around the world as a way to help bring about a low carbon future in accordance with the Paris Accord. In the US, 10 states in total have adopted California's Zero

[11] https://one.nhtsa.gov/nhtsa/timeline/index.html

Emission Vehicle mandate, which, as mentioned, the Trump administration is seeking to curtail. Meanwhile, on April 1, 2018, a new energy vehicle credit mandate took effect in China, which is modelled after California's mandate and aims at increasing the production of EVs, by requiring manufacturers and importers of passenger cars to earn a certain number of credits each year for EV sales (Gibson, 2018, June 4). The European Commission released an emissions targets proposal in November 2017, which called for a 15 percent reduction in CO_2 emissions per kilometer for new vehicles by 2025 and 30 percent reduction by 2030, which also noted that in order to hit these targets, EU countries would have to significantly increase the number of EVs.[12] In addition, individual EU countries also implemented policies favorable to EV production. In terms of which incentives provides the largest effect, an IEA report in 2018 found that financial and tax incentives for EV purchases remain the most effective, citing Norway as an example (IEA, 2018). However, a $7,500 federal tax credit available in the US for the purchase of qualified EVs with at least 17 kWh of battery capacity, such as Tesla's, will begin to phase out on December 31, 2018 and be fully phased out by December 31, 2019 (Tesla, Form 10-K 2017).

In addition, certain governmental rebates, tax credits and other financial incentives are currently benefiting Tesla's solar and energy storage businesses. For example, the US federal government currently offers a 30 percent investment tax credit ("ITC") for the installation of solar power facilities and energy storage systems that are charged from a co-sited solar power facility. The ITC is currently scheduled to decline to 10 percent, and expire altogether for residential systems, by January 2022. Likewise, in states where net energy metering is currently available, customers receive bill credits from utilities for energy that their solar energy systems generate and export to the grid in excess of the electric load they use. Several states have reduced or eliminated the benefit available under net energy metering, or have proposed to do so (Tesla, Form 10-K 2017). Additionally, the enactment of the Tax Cuts and Jobs Act could potentially increase the cost, and decrease the availability, of renewable energy financing, by reducing the value of depreciation benefits associated with, and the overall investor tax capacity needed to monetize, renewable energy projects (Tesla, Form 10-K 2017). Such changes could lower the overall investment willingness and capacity for such projects available in the market – a market which also face pressures from the Trump administration's decision to replace the Obama administration's Clean Power Plan with the Affordable Clean Energy Rule, which will have much less stringent CO_2 reduction

[12] https://ec.europa.eu/clima/policies/transport/vehicles/proposal_en

requirements and will only regulate power plant emissions on a plant-specific basis (Potts, 2018, August 22).

- Trade policy

During the 2016 presidential election, then candidate Trump ran on amongst other things a promise to revamp the US' trade relationship with the world to bring an end to what he perceived to be decades of unfair trade practices that had resulted in the US' substantial trade deficit (in goods) and loss of manufacturing jobs. Once President, his trade war with the world has now grown to involve multiple battles with US allies and others alike. Each battle uses a particular US legal rationale, such as calling foreign imports a "national security threat," followed by Trump imposing tariffs and/or quotas on imports. Subsequent retaliation by trading partners and the prospect of further escalation risk significantly hampering trade and investment, and possibly global growth (Strauss, 2018, August 16). Of tariffs implemented, the most salient ones for the automotive industry are the steel (25 percent) and aluminum (10 percent) tariffs of March 23, 2018, which is expected to raise input prices for the US industry and also lead to a restriction of export opportunities, as some countries have chosen to target US automotive exports as part of their retaliatory efforts. However, much more concerning for the automotive industry are the overtures the Trump administration has made towards raising US duties to 25 percent on all imports of automobiles and auto parts, again citing national security concerns (Robinson et al., 2018, May 31). As Table 3 below shows, the industry effects would be severe should such tariffs be implemented.

Table 3: Effects of President Trump's proposed auto tariffs

Source: Robinson et al., 2018, May 31	US autos and parts percent change				Change in total US employment
	Imports	Exports	Production	Employment	
Scenario 1: 25 percent US tariffs on all countries for autos and parts	–5.29	–2.53	–1.50	–1.92	–195,000
Scenario 2: Scenario 1 and retaliation in-kind by all countries	–6.70	–8.80	–3.98	–5.07	–624,000

Economic Conditions

Being a significant household purchase, the fortunes of the automotive industry are in many ways bound to the state of the economy and the consumer.

Figure 12: Sales of new passenger cars (000s)

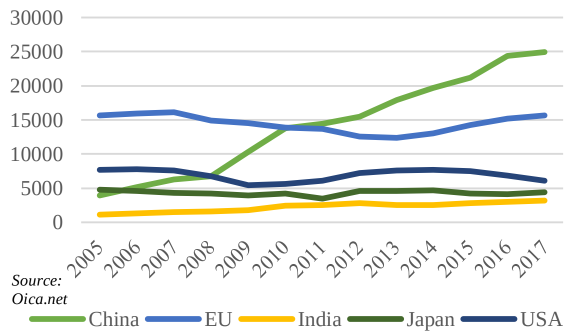
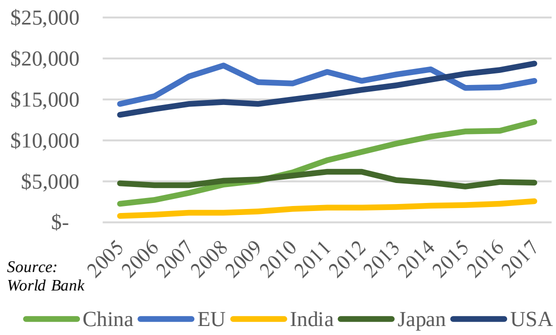


Figure 13: GDP in billions (current USD)



Amongst the world's major economies, the story of the past decade has, like in so many other cases, been the rise of China as the world's largest car market, particularly compared to the more status quo image that one sees in the more developed and mature major markets. Thus, though the slow nature of the recovery after the Great Recession undoubtedly did not foster a quick rebound in automotive demand, one would have expected more, particularly in the US, as low interest rates usually correlates with rising demand for cars because it then costs consumers less to finance vehicle purchases (Peters, 2017). Though the world's major central banks have all to varying degrees started the process of normalization (the US Fed leading the way with raising interest rates and unwinding its post-crisis balance sheet), one should not expect a return to an economic environment with interest rates at historically normal levels due to structural factors (Duprat, 2018). These include population aging, slower productivity growth and elevated levels of debt. In addition, it is not only interest rates that have been stuck at historic lows - inflation has been on a downward trend since the early 1980s. This is due, in large part, to global structural trends such as globalization, technological innovation and labor market deregulation, which have exerted downward pressure on inflation from the supply side (Duprat, 2018). Thus, though the consumer will still have access to, several of the same structural factors putting downward pressure on interest rates will also put downward pressure on overall demand – though arguably for EVs this is less of a concern since they still hold a very low market share and thus have plenty of room to grow by replacing ICE vehicles. For Tesla, given the company's history of burning cash and thus being in need of financing, the prospects of continued low interest rates for the foreseeable future should be welcome in terms of Tesla being able to continue to fund its growth initiatives, such as the recently announced Gigafactory 3 in Shanghai at an estimated cost of 5 billion USD (Ohnsman, 2018, July 10). In addition, the ability of Tesla to refinance at low interest rates should help keep the company's interest expense in check.

➢ Commodity prices

One area of concern that particularly impacts EVs is the costs of lithium and cobalt, two key inputs for the batteries at the heart of them. The prices of both have been known to fluctuate significantly both historically and in recent years, but unlike lithium, the price of cobalt is expected to remain high due to limited supply and growing demand (Bogmans & Kiyasseh, 2018, August 13). In 2016, more than 50 percent of the global supply of cobalt came from the Democratic Republic of the Congo, known for its high levels of corruption, political instability and child labor use in its mining industry. Yet, cobalt remains essential for stopping batteries from overheating and the stability it brings to the battery materials also allows users to charge and discharge their car over many years. However, cobalt is also the most expensive of the metals used, thus hindering the ability of carmakers to lower the cost of EVs to compete against their ICE counterparts (Sanderson, 2018, August 20). Fortunately, the battery industry, recognizing a demand for batteries not reliant on cobalt, is racing to develop and commercialize viable alternatives, most of which fall into the category of solid state batteries, which in theory should be safer, lighter and reduce the amount of cobalt needed (Sanderson, 2018, August 20). Solid state batteries are expected to make up the majority of EV batteries by 2030, but will not enter the market until 2025. Tesla recognizes this and accordingly is aiming to achieve close to zero usage of cobalt in the near future. Specifically, Yoshio Ito, the head of Panasonic's automotive business, which supplies Tesla, told reporters in June, 2018 that it aims to further halve the use of cobalt in Tesla's EVs in two to three years (Sanderson, 2018, August 20).

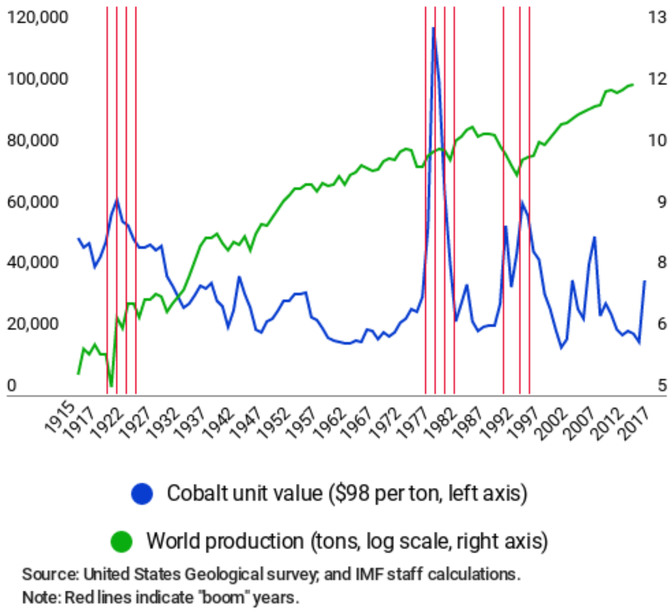


Figure 14: Global cobalt market

<u>Socioeconomic and Technology Factors</u>

Being an item that not only carries with it significant economic costs, but also one that carries with it many cultural connotations and identifiers for the image of self that consumers seek to project, society's changing tastes and preferences must therefore also be taken into account to understand the consumer landscape of the automotive industry. Moreover, technology has become such an intertwined part of the consumer's life that trying to isolate whether something is a consumer or tech driven trend can become a 'chicken and egg' exercise. Hence, why these two PEST sections are here combined.

As outlined in previous sections, climate change has for most governments been identified as a generational challenge, something which has not escaped the consumer, particularly millennials, which will soon represent the largest consumer segment.[13] As previously discussed, this represents a raison d'être for Tesla.

Today, 55 percent of the world's population lives in urban areas, a proportion that is expected to increase to 68 percent by 2050.[14] This trend is expected to promote the adoption of AD, as urban environments are well-suited to the various modes of operation (such as ride-sharing and ride-hailing) that AD can take. Reasons include the ease of building a close-knit charging station network, the potential to minimize congestion, the high concentration of riders, the availability of detailed data, the potential to convert parking space into housing and green areas and the overall health benefits from cleaner air (PWC, 2018). For city dwellers, private car ownership is thus expected to largely become a status symbol for those customers who still attach importance to owning their own vehicles and will tend to consist of larger cars, especially those from the premium segment. Shared vehicles will be found in both the premium and the volume segments, but due to the primarily urban area of application these are most likely to be smaller vehicles with fewer seats (PWC, 2018). Regardless, Tesla is positioned to cater to both the volume segment of smaller AD vehicles (Model 3) and the premium AD segment (Models S and X).

Intertwined with AD is also that of increasing connectivity demands and a 'gadgetfication' of cars. Thus, delivering services in a seamless, integrated and intuitive fashion through the car, such as internet radio, smartphone capabilities, information/entertainment services, driver-assistance apps, tourism information and the like, constitute a promising area for future profits and differentiation (McKinsey, 2013). Additionally, and pioneered by Tesla, is the trend of cars becoming able to download updates and the expectation from consumers that a car, like a smart phone, will continuously receive software updates and improvements, which represents a marked change from the historical norm of largely buying as car "as is." These are trends that Tesla is actively pushing through it focus on software updates (Elon Musk

[13] https://www.nielsen.com/us/en/insights/news/2015/green-generation-millennials-say-sustainability-is-a-shopping-priority.html
[14] https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html

even taking suggestions for new features via Twitter) and the design choice of devoting such importance to large touchscreens in all of Tesla's models, but particularly the 3, as it has no conventional dashboard.

Another area where the purchase of a car is growing similar to that of other technology items/gadgets is the increasing influence of the internet, as evident from Figure 15.[15] The importance of dealerships are thus in relative decline, highlighting the need for carmakers to provide customers not only with a great web experience, but an engaging interaction and compelling experience across all touch points on the customer decision making journey and in the post-purchase experience (McKinsey, 2013). An example hereof could be through an adoption of innovative retail concepts, such as brand experience centers, or by even going further and experiment with concepts such as that of Carvana.com, which through its e-commerce platform allows customers to shop, finance, and trade in used cars through their website. Tesla itself has adopted a direct-to-customer sales model, whereby the customer can visit showrooms, but then have to order their car online.

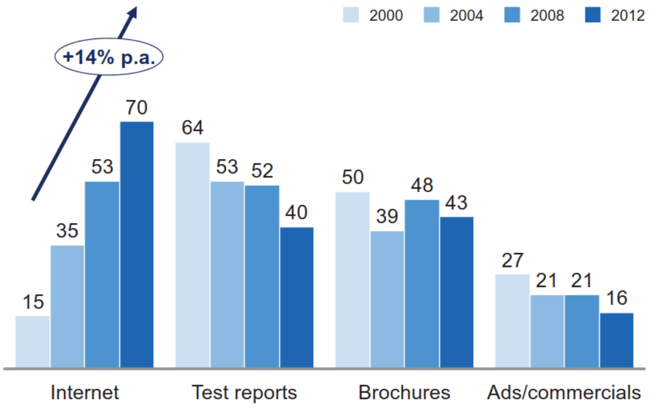


Figure 15: Top influencing sources for new buyers' purchasing decision in Germany (%)

Conclusion

Tesla operates in an industry subject to significant regulatory oversight and political influence. The automotive sector is a cyclical industry which will see much of its future growth from emerging market, and wherein the imperative of user-centered tech innovation will only grow.

Porter's Five Forces

Threat of New Entrants

Traditionally, the auto industry, particularly the US one, was regarded as one with high barriers to entry and the Detroit Three were thought to be in a position with an industrywide 'moat' (Brilliant & Collins, 2014). Yet, as the Industry Analysis herein has shown, that

[15] McKinsey, 2013.

turned out to be wrong, as Asian automakers like Toyota and Honda were able to enter the market bringing with them cheaper and more fuel efficient products, capital to invest in stateside plants, technological knowhow and great management expertise, especially in the case of Toyota with the 'Toyota Production System.' Still, as that wave of new entrants subsided and the US market had been 'cracked' by foreign competition, on a global industry scale few new major automakers emerged in the past few decades (e.g. Tesla, which still has a low market share). The reasons therefore are not new, but represent long run industry characteristics: high capital expenditure requirements upfront to be able to enter at sufficient scale or risk selling at a cost disadvantage, steep learning/experience curves and the need to develop vertically integrated supply-chains and strong distributor relationships, thereby giving incumbents a significant advantage over any new entrants. Additionally, as a car is a large household purchase where safety is a concern, consumers tend to be risk-averse and go with established brands that have a long track-record (though recent scandals such as 'Dieselgate' and Toyota's mass recalls show that this cannot be taken as a given).

However, for 'pure' EV manufacturers, Tesla has remained the dominant presence in the US and European market as other new entrants have come and gone, been acquired for their IP or relaunched (or, as in the case of Fisker Automotive, all three) (Barnard, 2017, November 23). Yet, when taking a global view of the 'pure EV' space, it becomes clear that several Chinese companies, led by BYD, are ready to take on and in their native market are far outselling Tesla (Barnard, 2017, November 23). Indeed, "*China's EV firms have an edge on Tesla for four key reasons: several of the top EV car makers in China are state-owned with government backing; they have access to the largest domestic market in the world; the Chinese government's strategic policies are very pro all-electric vehicles, and they have better battery capability*" (Shead, 2018, August 1) However, so far most Chinese EV manufacturers have targeted the low- to middle-income segment with smaller cars made primarily for China's congested megacities, though that is somewhat set to change as Nanjing's Byton starts exporting premium and SUV EVs towards the middle of 2020 (Shead, 2018, August 1). Segmentationally, the threat of new entrants has been a mixed bag for Tesla. The premium and SUV segments of EVs have been a space that Tesla has been able to dominate through its strong brand and element of novelty for first adopters with the disposable income to let such factors guide their purchasing choice (Rauwald, 2018, September 4). In contrast, in the compact car segment, Nissan Leaf has long been the world's bestselling EV, though for 2018 Tesla's Model 3 looks set to outsell it by far in the US market (internationally, the Nissan likely remains ahead,[16] though BYD is just as likely not far behind (Shead, 2018, August 1)), which is the only market the Model 3 has so far been made available in.[17] More worryingly for Tesla though is the forthcoming entry of established automakers into the 'pure' EV space with EVs targeting the high-margin premium and SUV segment (Rauwald, 2018, September 4). As highlighted by Figure 16,[18] while sales of the Model 3, a mass-market EV, are expected to surge, whilst Sales of the Model S are expected to decline (but still remain competitive).

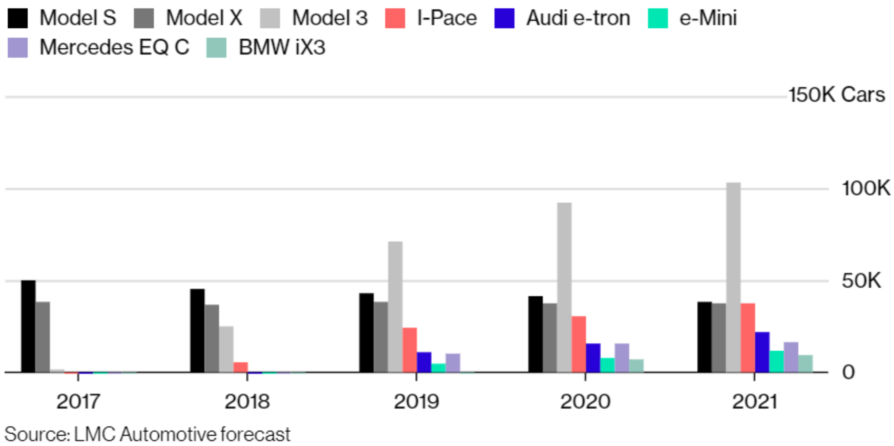


Figure 16: Growing competition in premium/SUV EV segment(s)

➢ New tech, partnerships and energy storage

Whilst not a formal new entrant into the carmaker space, the increasing importance of tech companies when it comes to connectivity software, access to platforms and the growing importance of strategic alliances cannot be understated (PWC, 2017). For while a carmaker may be able to address its engineering shortcomings largely on its own, then it cannot hope to succeed in terms of connectivity if it does not have access and compatibility with the right ecosystems, such as those maintained by Apple and Google. Moreover, as most competitive theory prescribes that a company should focus on what its competitive advantages(s) are, then accordingly a carmaker should not focus too much of its attention on become a software development powerhouse, but should instead seek out strategic alliances with tech companies (Grant, 2013). A great example hereof is the race for carmakers to strike partnerships with

[16] https://www.forbes.com/sites/sebastianblanco/2018/01/09/nissan-leaf-300000-sales-global/#1737dac91cf6
[17] https://insideevs.com/monthly-plug-in-sales-scorecard/
[18] Rauwald, 2018, September 4. Source data not available, hence original figure retained.

ride-sharing services (e.g. Uber and Lyft) and other AD platform/software developers (Campbell et al., 2018, April 2). For while carmakers can contribute to much of the hardware aspects of AD, developing the actual 'driver,' which at the end of the day is a complex web of big data, software, algorithms and deep learning systems, will likely remain the forte of more tech focused companies, though some carmakers are pursuing developing their own AD platforms (Campbell et al., 2018, April 2). Still, as illustrated by Figure 17 (from Campbell et al., 2018, April 2), most carmakers are actively pursuing several alliances and partnerships so as to not get left behind in the race to be a part of the AD future.

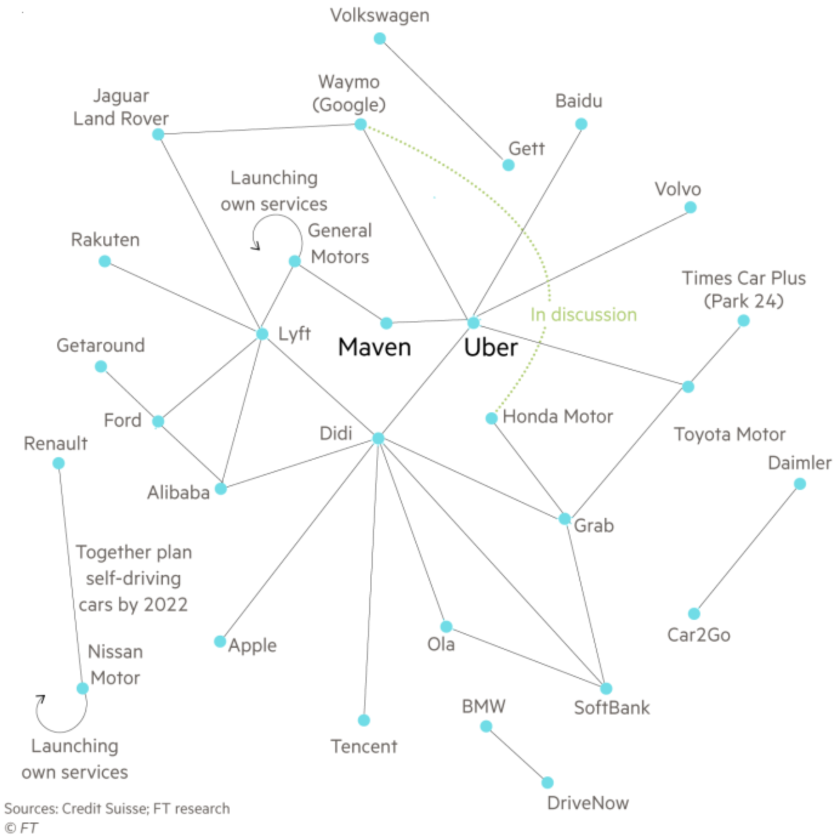


Figure 17: Carsharing-related alliances

Additionally, and of particularly importance for EVs, will be access to charging networks, some of which, and depending on the jurisdiction, will have to be built and operated in partnership with local companies such as utilities and other infrastructure providers. Tesla currently operates its own international network of supercharger stations, which it is continuously expanding.[19]

Additionally, using the energy management technologies and manufacturing processes developed for its EV powertrain systems, Tesla has developed energy storage products for use in homes, commercial facilities and on the utility grid. Advances in battery architecture, thermal management and power electronics that were originally commercialized in Tesla EVs are now being used in its energy storage products. Tesla's energy storage systems are used for backup power, grid independence, peak demand reduction, demand response, reducing

[19] https://www.tesla.com/supercharger

intermittency of renewable generation and wholesale electric market services, all of which expands the scope of Tesla business and makes them a new entrant in a new field. Last year Tesla installed a 129 megawatt hours battery in South Australia, to store wind energy from the Hornsdale wind farm, and in 2016 the company won a contract with Southern California Edison to deliver it energy storage solutions to them based on its Powerpack 2 system (Sanderson, 2018, September 4). As the energy storage market is thus still in its infancy and about to enter a period of probable high growth, as detailed in the industry analysis, it is a market that can be characterized as a competitively up-for-grabs 'blue ocean' (Kim & Maubogne, 2005). But even for other EV manufacturers, energy storage is a relevant competitive dimension, as EVs' individual batteries could be linked up to provide a source of energy storage for electric grids, with potential for storing energy during a time of day when power from renewables are abundant and sell back to the grid when energy is more scarce and prices are higher, which could help lower the costs of owning an EV compared to an ICE vehicle (Sanderson, 2018, September 4). Indeed, a recent study found that EVs could effectively support California's ambitious renewable energy targets through this synergistic relationship, while avoiding much of the capital investment required of stationary storage, which the state could then instead apply towards further deployment of EVs (Coignard et al., 2018). Thus, securing relationships and compatibility with utilities and grid operators will thus also become important for EV manufacturers. As Tesla is already active in this space, it thus has an opportunity to keep capitalizing on its energy storage know-how and sustain its first-mover advantage vis-à-vis other EV manufacturers in this space.

In sum, while the threat of new automaker entrants can overall be categorized as low, Tesla is about to face entries into some of its most profitable segments from more established carmakers, so the threat of new entrants for Tesla is medium to high, as is the threat of new alliances.

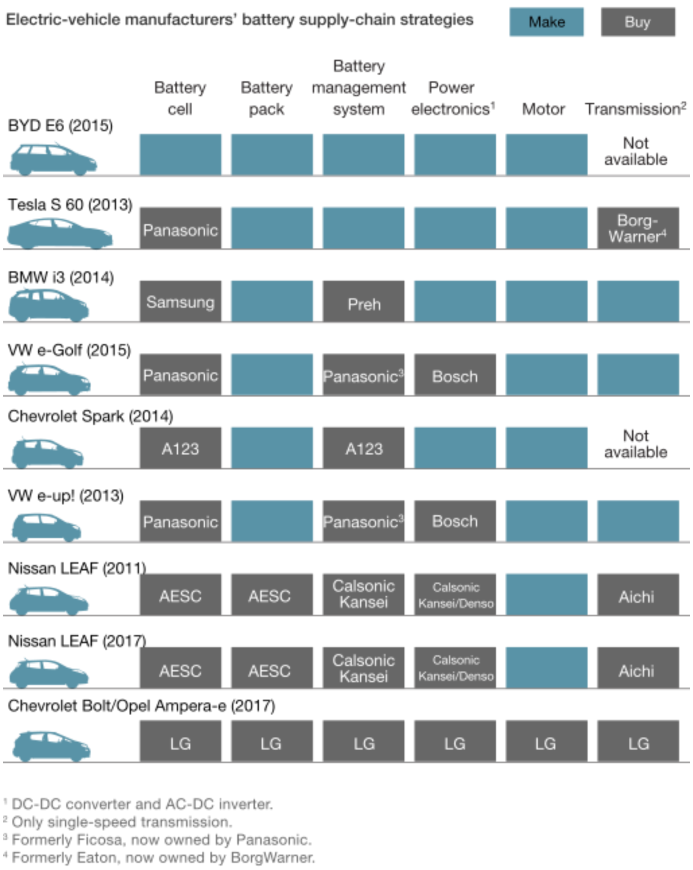
<u>Supplier Power</u>

The bargaining power of suppliers have traditionally for ICE vehicles been considered low, even though the great majority of automakers run tight supply chains oftentimes on a just-in-time basis to ensure the smooth flow of production, whilst minimizing inventory (Peters, 2017). The reason for the low power then is attributed to that there are many suppliers competing for a limited number of customers (given that historically threat of new entrants was/is low), and that a supplier tend to be subject to being reliant on most of their revenue being generated from supplying one or two major automakers. Thus, if an automaker suddenly decided to renegotiate its supply contracts to lower prices with the threat of shifting to a different supplier, the threat would be substantial to the supplier. However, as many established automakers have long-running and close business relationships with their suppliers that are characterized by a high degree of trust, even relying on some for contributions to product development and innovation efforts, the daily interactions are often more cooperative than the above description would lead one to believe (Hartzen & Hoppe, 2014). Indeed, when looking at Asian carmakers, one can find that they are often part of tightly interwoven vertical and horizontal networks of companies, including suppliers. Examples hereof include the Japanese Keiretsu and the Korean Chaebol. In a Keiretsu, member companies own small portions of the shares in each other, but the group tends to be centered around a core bank, whereas a Chaebol is traditionally thought of as a 'massive, mostly family-run business conglomerate' (Albert, 2018, May 4). An example of the former include Toyota, with its dense network of suppliers and manufacturers for parts, employees for production, real estate for dealerships, steel, plastics and electronics suppliers for cars as well as wholesalers, and an example of the latter is Hyundai, which has dozens of subsidiaries across the automotive, shipbuilding, financial and electronics industries (Twomey, 2018, March 8).

For raw inputs for automakers, most are traded as commodities, which tends to decrease supplier power. On the other hand, the importance of high quality raw materials can increase supplier power, as can shortages such as the ones seen for Cobalt in the PEST Analysis (though these also prompts automakers to look for substitutes, which then eventually decreases supplier power).

As in many other aspects, the move from ICEs towards EVs will lead to significant challenges in the current supply chain, and multiple responses thereto until an industry consensus emerges. A key question upfront with huge supply chain implications for an automaker is whether to take a 'conversion or purpose design' approach to building an ICE (Ward, 2017, April 28). In a conversion approach, the starting point is to take a conventional ICE vehicle and swap out the powertrain. This approach retains most of the conventional supply chain, now just with some additional suppliers, and is mainly relevant for established automakers looking to keep development costs down and retain economies of scale. Alternatively, there is the purpose design approach, where the automaker designs a new vehicle to specifically accommodate the new EV powertrain, which allows more room for new functionalities and innovations, but also at a higher development cost (Ward, 2017, April 28). Tesla, as a new automaker, has taken this approach, but so has some established automakers like BMW. For these purpose design vehicles, their supply chains can be substantially different, particularly when it comes to the consequences of eliminating the traditional ICE and its components, the need for new batteries, electric motors and transmissions, and the need to adapt existing components (Ward, 2017, April 28). Looking forward however, it is likely that as EV production scales up and matures most automakers will eventually take a purpose design approach for all EVs, as native EV platforms tend to outperform and be more efficient compared to ones based on the conversion approach (Erriquez et al, 2017, October 17). The largest change in what is in- vs out-sourced in the supply chain is expected to be with regards rising importance of battery expertise to drive competitive advantage in the EV market versus the decreasing importance of engine expertise, as EV engines are simpler than ICE ones (Ward, 2017, April 28). Indeed, automakers are expected to outsource a large share of EV engine components in the future as soon as industry designs converge towards commoditization (Erriquez et al, 2017, October 17). As battery capabilities will thus be a significant driver of competitive advantage, automakers can be expected to expand their capabilities in this area – which is what Tesla is doing with its Gigafactory 1 plant and plans to build on synergies with SolarCity. Many established suppliers, given that EV engines are simpler and will require less maintenance and spare components, will thus likely face some difficulties in the market unless they are capable of expanding outside their original core area of business and expertise (Erriquez et al, 2017, October 17). As of now though, and as illustrated by Figure 18 (from Erriquez et al, 2017, October 17), no dominant model of sourcing and supply has emerged for EVs.

Figure 18: Selected EV supply chains



Tesla, for its part, has signed long-term agreements with Panasonic to be their manufacturing partner and supplier for lithium-ion cells at Gigafactory 1 in Nevada and photovoltaic solar cells/panels at Gigafactory 2 in Buffalo, New York (Tesla, Form 10-K 2017). As part of the agreement, Panasonic has reportedly invested over 1.8 billion USD in the first Gigafactory, but is has been disappointed with Tesla in 2018 missing several of its Model 3 production ramp up targets, which has caused an estimated drop of around 20 billion Yen in Panasonic's operating profits due to the shortfall in batteries delivered (Fujino et al., 2018, May 11). As such, should Panasonic decide to reconsider its partnership with Tesla, this could lead to a major supply chain disturbance (note in Figure 18 that Panasonic also supplies VW). Thus, Tesla's limited, and in many cases single source, supply chain exposes the company to multiple potential sources of delivery failure or component shortages for its car production, such as those experienced in 2012 and 2016 in connection with production ramp ups of Model S and Model X (Tesla, Form 10-K 2017). Additionally, Tesla has experienced quality issues with some of the suppliers it has added in order to try to meet its Model 3 production targets. As such, supplier power for Tesla is moderate. For Tesla's Energy segment, the above discussion on Panasonic also applies, though it is worth noting that that once the solar panels have been installed, the main input (sun) is free.

Buyer Power

For the American consumer, buying a car has historically been seen as a rite of passage and a statement about who you, the consumer, were (Wharton, 2017, February 21). Indeed, "*Americans were proud of building the largest and most competitive auto industry in the world*" (Cole & Flynn, 2009). Yet, as shown by the Industry Analysis, the dominance of the Detroit Three waned, and the US, let alone the global, automotive consumer today faces a wide menu of options when it comes to what car to purchase and even more information about each option from evermore sources than ever before. Though dealerships remain the dominant distribution channel in the US (Figure 3), their relative importance is declining when it comes to the choice of the consumer (Figure 15). As such, the consumer, particularly the private consumer, will remain fragmented and for that reason alone exhibit a low level of buyer power, despite having many options and lots of available information about a product that essentially provides just a basic mode of transportation. Moreover, though consumers are generally considered to be quite price sensitive as a car is a major purchase, strong brand equity and customer loyalty has been found to override such concerns, and even quality concerns, and thus provide a level of "lock-in" as long as the automaker can sustain its bond(s) with its consumer base(s) (Cole & Flynn, 2009). Thus, from this perspective, one could argue that there can be significant emotional/informal switching costs for some consumers. Yet, some current trends are weakening some of these constraints on the consumer. First of all, "*millennials buy cars more pragmatically. Maybe they missed that moment as teenagers when you deeply fall in love with cars, or a car, or personal autonomous transportation. And they are forever going to be more on the pragmatic car-as-commodity, car-as-appliance part of the equation*" (Wharton, 2017, February 21). Second, almost 30 percent of new vehicle sales in 2017 in the US, up from 22 percent in 2012, were leases (leasing in 2017 accounted for 11.5 percent of Tesla's automotive revenue (Tesla, Form 10-K 2017)) (Kessler, 2015, January 8; Henry, 2017, December 31). In leasing, the customer in effect borrows the difference between the upfront cost of a new car and its predicted value at the end of the lease, the so-called residual or resale value. Most leases are for 36 months, and at the end of that time most consumers turn their vehicles back in, at which point off-lease vehicles can potentially generate losses for automakers if they are not worth as much as expected when they are resold (Henry, 2017, December 31). Thus, automakers have recently started to shift buyer incentives away from leases and towards low-interest loans and cash-back incentives (Henry, 2017, December 31). Still, the consumer shift towards leasing is about much more than just ripple effects of financial constraint following the Great Recession, it represents yet another move towards the previously discussed "gadgetfication" of cars and the growing importance the consumer is attaching to be able to stay up to date with the latest technology in their cars (Kessler, 2015, January 8). As such, while both of the above trends will not make the private consumer any less fragmented, it will weaken some of the informal bonds that previously might have ensured a higher degree of customer retention / brand loyalty.

As the number of EVs available in most segments is set to grow significantly within the next two years, driven by the need to meet the EU's strict emissions and mileage targets for 2020 and the overall shift in consumer attitudes/preferences towards EVs, e.g. about 20 percent of Americans saying they are likely to buy an EV in the future (Barry, 2018), EVs will also be facing the same dynamics as described above. Thus, while Tesla has enjoyed the glow that comes from being a trend-setting first mover and the boost to brand equity this has provided, as EVs become more common this brand equity will have to be maintained and continuously reinforced by sustained innovation efforts if it is to last, and will likely also be tied to Elon Musk's reputation. However, Tesla does also enjoy some benefits that most automakers do not. Through its direct-to-customer sales model, Tesla will be able to maintain a close relationship with its consumers and, should the company choose to, listen to their feedback to reinforce brand equity and product features.

Some evidence that this is a strategy pursued by the company, at least in so far as Elon Musk being known for taking suggestions on Twitter for software updates, can be seen in the picture to the right. Thus, while customers might feel empowered in their dealings with Tesla, the end result would likely end up being that their buyer power is minimized as they grow attached to Tesla and its perceived brand qualities.

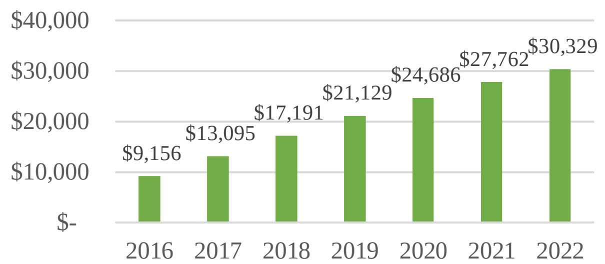
Thus, the buyer power facing automakers is overall low, despite some of the above trends.

For Tesla's energy segments, private buyers are fragmented as well, but utilities and corporates will obviously have more buyer power. However, as there is a growing trend toward mechanisms like Renewable Portfolio Standards that requires the increased production of energy from renewables, utilities are incentivized to buy energy solutions like those offered by Tesla.

Threat of Substitutes

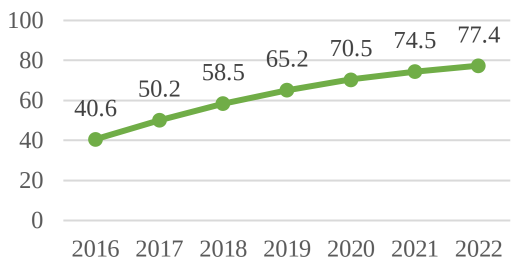
At the end of the day, a car is a tool to get from A to B. As such, several alternative modes of transport exist at various price points and levels of convenience, some of which have already been touched upon. One discussed alternative to owning a car is ride sharing through apps such as Uber and Lyft, a market which is expected to exhibit great growth as the figures below show.

Figure 19: US ride sharing revenue



Source: Statista, March 2018

Figure 20: US ride sharing users



Source: Statista, March 2018

Eventually, this a market Tesla aims to participate in together with its vehicle owners, as per Part 2 of Elon Musk's master plan for Tesla: "*You will also be able to add your car to the Tesla shared fleet just by tapping a button on the Tesla phone app and have it generate income for you while you're at work or on vacation, significantly offsetting and at times potentially exceeding the monthly loan or lease cost* […] *In cities where demand exceeds the supply of customer-owned cars, Tesla will operate its own fleet, ensuring you can always hail a ride from us no matter where you are*" (Musk, 2016, July 20). This plan hinges on Tesla meeting a number challenges, first and foremost achieving full, reliable autonomy with its driver software and succeeding in its production ramp up of the Model 3. Details as of now are scarce, but some estimates have Tesla capturing between 4 and 10 percent of the US ride sharing market in 2023 (Munster, 2018, March 7). As such, this is a substitute Tesla is actively seeking to mitigate and benefit from through what could arguably be called an act of 'self-cannibalization'.

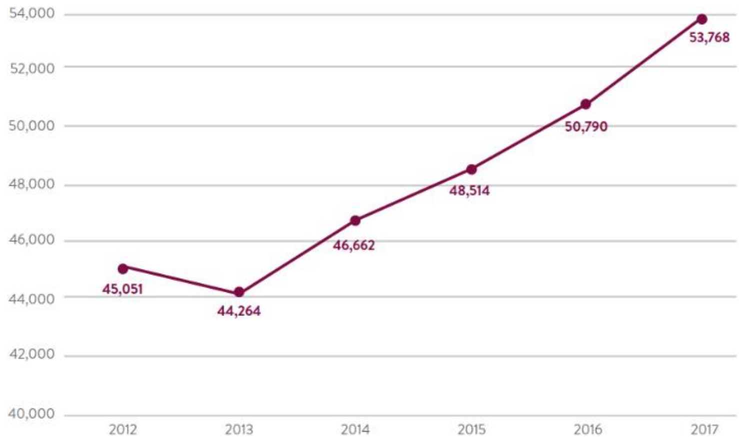


Figure 21: Global metro ridership in millions

The previously described worldwide trend of urbanization could arguably be expected to herald a shift towards an increasing use of public transportation. Taking a global view, metro, light rail and tram systems ridership is increasing, as can be seen in Figure 21 (from UITP, 2018). Similar data was not available on a global level for bus ridership, but an increasing trend would be expected. However, when looking at US ridership, especially when excluding the New York region, in Figure 22 (from Mallett, 2018), ridership growth has stagnated and has recently begun to fall. Whilst several local factors contributed to this, such as the chronic underinvestment in the New York metro system, the two main factors were the drop in the price of oil over the past few years and the growing

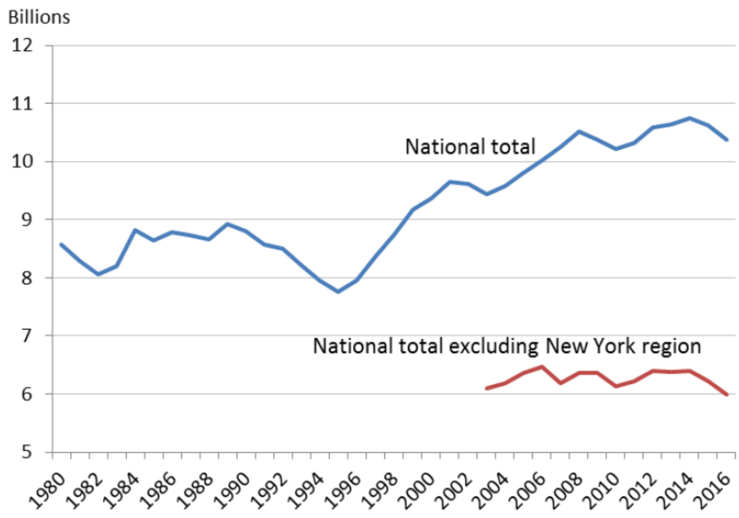


Figure 22: US public transportation ridership (unlinked) p.a.

popularity of bike and ride sharing services (Mallet, 2018). As such and as far as the US market goes, the threat of substitutability from public transport is low for Tesla. Though the price of oil has historically been considered to correlate negatively with the demand for EVs due to that a prime argument for purchasing one has historically been cost savings, consumer attitudes appear to be increasingly citing environmental benefits as their primary purchase motivator (Barry, 2018). Additionally, oil prices have in 2018 been on the rise, meaning EVs are becoming even more competitive to ICEs in comparison.[20]

For Tesla's energy segment, the basic technology of solar panels are by now fairly commoditized due to earlier price wars that forced several producers out of the market, yet novel applications, such as Tesla's solar roof tiles[21] can command a premium. Moreover, wind is regarded more of a complement than a substitute to solar, given that when the wind blows a lot, the sun tends to shine less and vice-versa (Shively & Ferrare, 2012). Additionally, until new battery technology becomes commercially available at scale, or alternative forms of energy storage is commercialized, such as thermal energy storage or hydro storage, then lithium batteries, such as Tesla's, will be the norm.

Competition

Holweg (2008) identifies four stages of the competitive cycle of the automotive industry as illustrated by his helix model (provided in Figure 23). The model illustrates how competition has shifted from being cost-leadership driven, as during the era of Ford's original mass production, to competition on the basis of variety and choice following GM under Alfred Sloan's portfolio strategy, to competition due to diversification on leadership in design, technology or manufacturing excellence, as observed in the case of Toyota for example, to competing on providing customized products, which marks the current competitive frontier (Holweg, 2008). Holweg (2008) also identifies the rise of alternative propulsion as the factor that despite several structural constraints to change in the automotive industry, such as the high capital

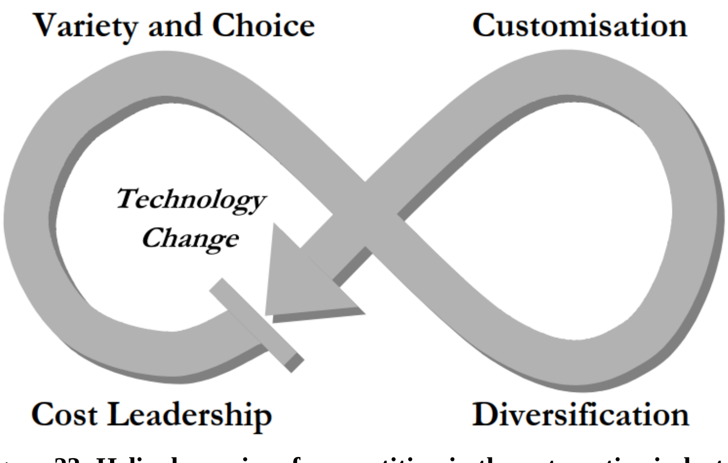


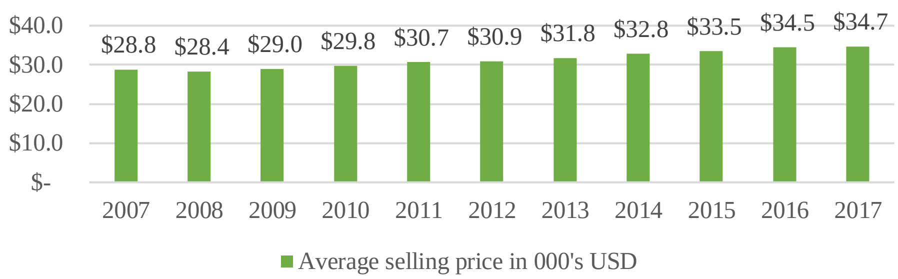
Figure 23: Helix dynamics of competition in the automotive industry

[20] Please consult www.bloomberg.com/energy for the most up to date oil prices.
[21] www.tesla.com/solarroof.

requirements of fundamental change for the industry, the lock-in provided by the ubiquity of the ICE and long average vehicle life, will finally prompt a restart of the competitive cycle as illustrated by the Helix model. From a trend perspective, this has both positive and negative implications for Tesla. On the one hand, Elon Musk's first "master plan" for Tesla dovetails nicely with the Fordian notion of winning the market via "an affordable, high volume car", i.e. the Model 3. On the other hand, it exposes Tesla to that a more established carmaker, provided they had comparable EV mileage and specifications, could do unto Tesla what GM did to Ford, as "*the 'Fordist model' should therefore only be seen as a historic stage, rather than a concurrent strategy*" (Holweg, 2008). Yet, it also bears remarking that Musk in his 'Master Plan Part II', establishes that it is a goal of Tesla's to "*expand the electric vehicle product line to address all major segments.*" (Musk, 2016, July 20). Whether Tesla can do so in sufficient time and at sufficient scale shall remain to be seen. Moreover, it can be argued that some of the established automakers could be quite content to be free riders on Tesla's R&D and market establishing efforts, and thereby letting Tesla fund validating EVs to the consumer (DeBord, 2017 September 16).

Looking at the US automotive industry at an absolute level, prices have over the past decade grown at modest compound annual growth rate ("CAGR") of 1.9 percent. Over the same time period, average inflation was also 1.9 percent.[22] As such, the average selling price for new vehicles have in real terms remained flat for the past decade. As automakers aim to contain costs by purchasing parts under contract with suppliers, which usually include provisions mandating annual price decreases, stagnant prices do not automatically translate into margin pressures, but they do point to an industry wherein charging a premium is hard, and thus indicate a competitive industry (Peters, 2017). Industry consolidation in developed economies and the emergence of domestic automakers in key emerging markets such as China and India further underscores a sense of heightened rivalry, as those automakers who lack scale and strong product innovation capabilities will be at a disadvantage or have to introduce EVs, even if these are

Figure 24: New vehicle average selling price in the US (2007 - 2017)



Source: Statista.com

[22] US Bureau of Labor Statistics.

not cost-efficient, or seek out last-minute alliances to not fall further behind. As such, competition in the industry is medium and the trend is increasing, which also shows in the proliferation of rebates, preferred financing and long-term warranties as ways to try to attract customers. This is also supported by the observation that companies in large but mature markets typically look to increase their market share inorganically due to growth limitations (MarketLine, 2018).

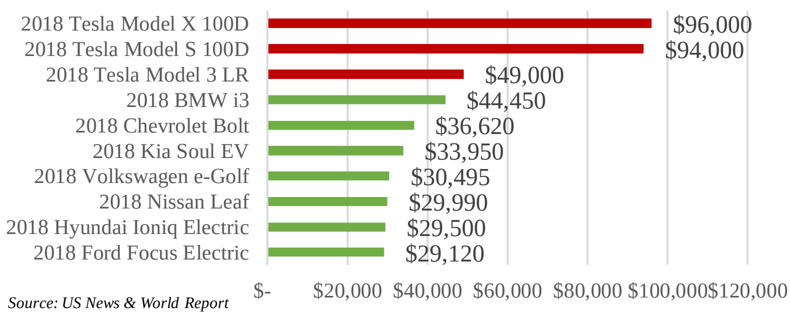
VRIN

As previously described, at the core of Tesla's technological advantage lies their battery technology and their capability to integrate this into their cars and other product offerings in a way that the consumer is comfortable with. Thus, when evaluating the degree to which Tesla has a sustainable competitive advantage, the above cannot but take center stage in the VRIN analysis.

<u>Valuable</u>

For a resource to constitute a competitive advantage, it must be valuable. As shown in Figure 7 in the Industry Analysis, Tesla has a clear advantage in terms of topping the chart for longest ranges of some the best-selling EVs currently on the US market. Moreover, as Figure 25 shows, Tesla is also able to command a price premium (which is not easy in the US auto market). Granted, the comparison is not strictly "apples to apples," as the EVs in question do not all compete in the same segment. Still, the overall observation that Tesla is capable of commanding a premium for its products still stand, particularly since the SUV and premium segments are currently underserved in terms of EVs (though not for much longer as established in the Fiver Forces analysis). Combining this with the projected growth of the EV market, and it should be clear that Tesla's battery capabilities constitute a valuable resource.

Figure 25: Price comparission of EVs in the US (USD)

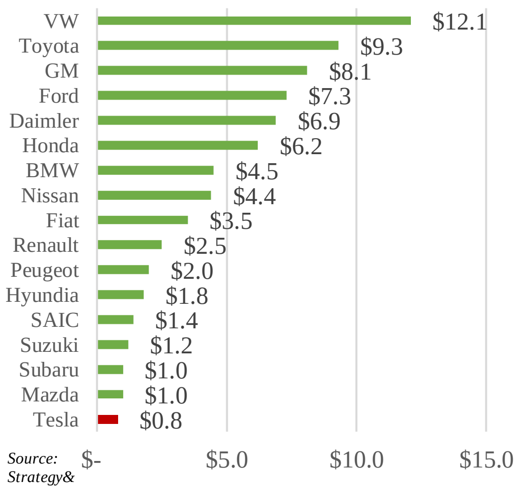


Source: US News & World Report

<u>Rare</u>

For a resource to be a competitive advantage, it must be rare. As previously discussed, Tesla supply chain and production wise has an unparalleled depth of integration of its battery technology into everything the company offers/does when currently compared to its leading competitors. Yet, others are realizing this: "*"We know very clearly that the future is electric and we simply have to catch up with this (battery) technology," said Maros Sefcovic, energy vice-president at the European Commission. "You cannot develop new models or high-quality cars if you do not master the skills, the innovation, and research link with batteries."*" (as in Toplensky, 2018, October 14). Indeed, the EU is planning to allow state aid for electric battery research and will offer billions of euros of co-funding to companies willing to build gigafactories. Moreover, as China has 69 percent of the world's existing and planned battery production capacity, Chinese automakers will undoubtedly reap some benefits from their close ties to "likeminded" state-sponsored companies (Toplensky, 2018, October 14). Still, as things currently stand, Tesla depth of battery knowledge, capabilities and integration is unrivalled and can therefore be considered a rare resource in the industry.

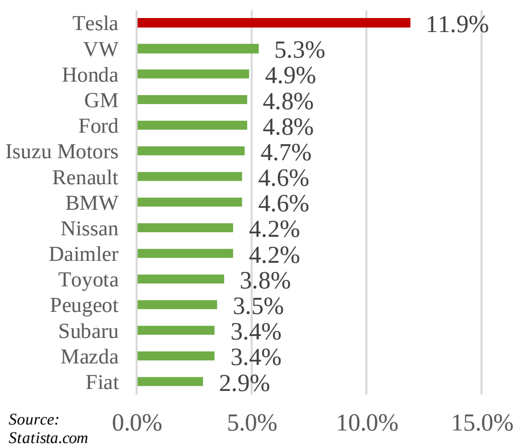
Figure 26: Leading automakers by R&D spending worldwide in 2017 (billion USD)



<u>Imperfectly Imitable</u>

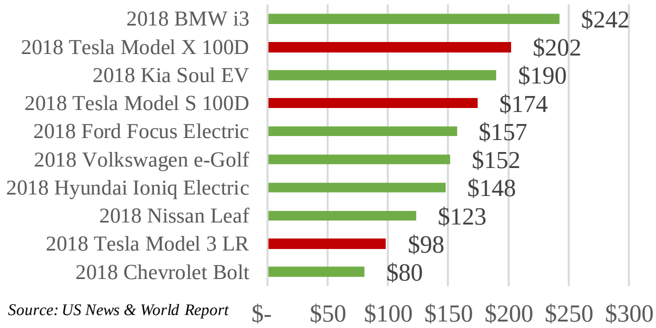
If a resource is to form the basis for a sustainable competitive advantage, it has to be imperfectly imitable. As discussed, battery capabilities will be a significant driver of competitive advantage and other automakers can therefore be expected to expand their capabilities in this area. Tesla is currently the industry leader in terms of R&D intensity, as illustrated by Figure 27. Yet, given the size of Tesla in comparison to its competitors this need not amount to much, as Tesla's R&D spending in absolute terms is far less impressive, which Figure 26 shows. Thus, given the resources available to and invested by Tesla's competitors and their announced plans and roll-out of new EV models within the next two to three years, it will likely only be matter of time before several competitors reach parity with some of the EV battery capabilities of Tesla. In fact, from a cost-benefit / efficiency perspective, GM has already reached parity with Tesla when it comes to offering consumers EV range at a more affordable

Figure 27: Selected automakers' R&D intensity worldwide in 2017



price than Tesla, as Figure 28 serves to highlight. Now, range is of course not the only key competitive factor for EVs (e.g. one of Tesla key selling points has always been its brand and design), but it is certainly one of the top ones, and if a competitor of Tesla is already capable of producing an EV at a better price-to-range ratio for the consumer, then it is only a matter of time before competitors with better brands and design than GM catches up with Tesla. Thus, from an EV perspective, Tesla's battery technology and capabilities are not imperfectly imitable.

Figure 28: Implied price of 1 range km (USD)



Source: US News & World Report

Non-Substitutional

If a resource can be substituted by a resource employed by a competitor, then it cannot form the basis for a sustainable competitive advantage. As previously discussed, solid state batteries are expected to make up the majority of EV batteries by 2030, which is an alternative technology to the on currently possessed by Tesla. Additionally, Toyota is aiming to win over costumers to its bet on hydrogen fuel cell vehicles ("FCV") as the alternative of the future to ICE vehicles. Hydrogen is the most abundant element in the universe and stores more energy than a battery of equivalent weight and Toyota wants to push the driving range of the next Mirai to 700-750 kilometers from around 500 kilometers, and to hit 1,000 kilometers by 2025 (Shiraki & Tajitsu, 2018). Thus, Tesla EV batteries will likely be a substitutionable resource in the future.

Conclusion

Thus, based on the strategic analysis, Tesla does not have a sustainable competitive advantage in the long term. Short to medium term, the company will likely be able to sustain some of its current advantage (i.e. over the next five years or so).

Financial Statement Reorganization

The purpose of this part of the thesis will be to reorganize the key financial statements of Tesla in order to derive the necessary variables and adjusted line items to calculate net operating profit less adjusted taxes ("NOPLAT") and invested capital. This will then enable the thesis to calculate the return on invested capital ("ROIC") of Tesla. In addition, the historical performance of Tesla from 2010 to 2018 (expected) will also be commented on as appropriate.

The reason for reorganizing financial statements is to identify the actual economic performance of a firm and separate out items that could distort the understanding thereof. The crux of such an exercise is to separate the operating from the non-operating activities of the firm so that ROIC may give a more accurate representation of the value created by Tesla. Following Koller et al. (2015), ROIC is calculated using the formula below:

$$ROIC = \frac{NOPLAT}{Invested\ Capital}$$

NOPLAT represents the net result (adjusted for taxes) of a firm's operating activities and is calculated based on the Income Statement ("IS"). Invested capital then represents the capital invested to fund said operating activities and is calculated based on the Balance Sheet ("BS". As such, when calculating NOPLAT, it is important to exclude non-operating items such as non-recurring restructuring costs, speculative gains and unrelated financial income. Concordantly, as net income represents the income available to equity holders, NOPLAT represents income available to all investors (Koller et al., 2015).

<u>IS Reorganization</u>

For Tesla (indeed, for most companies) NOPLAT is arrived at by deducting Costs of Goods Sold ("COGS"), SG&A and depreciation and operating derived amortization. The reason for deducting depreciation is that it represents the capitalization and reduction in value of time of an economic asset that is assumed to be employed in an operating capacity. Overall, amortization is a minor line item for Tesla and mainly fall into the category acquired intangibles, which are not deducted but expensed, from the Grohmann Engineering and Solar City acquisitions in 2017. Under 'Commitments and Contingencies' in Tesla's Form 10-Ks, one can see that Tesla leases some of their equipment and other tangible operating assets instead of outright acquiring them. As a result of leasing accounting rules, the leased operating assets do not appear as an asset or an liability on the BS, but rather as a rental expense in the IS, and a future lease obligation in the BS. Accordingly, companies that buy operating assets appear to have more assets than companies that lease. In order to adjust for the accounting discrepancy between leasing and acquiring assets, the leased asset need to be capitalized on the BS, and the rental expense must be added back to EBITA (Koller et al., 2015). The formula for capitalizing operating leases is presented below:

$$Asset\ Value_{t-1} = \frac{Rental\ Expense_t}{(k_d + \frac{1}{Asset\ Life})}$$

Asset life is estimated using an approach proposed by Lim et al. (2003), whereby Property, Plant and Equipment ("PP&E") is divided by the annual depreciation expense. The interest is calculated based on a weighted average of rates paid on debt obligations as recommended by Training the Street (2016). Please consult Appendix A for further details on Tesla's debt.

Table 4: Capitalizing Operating Leases

USD 000s	2010	2011	2012	2013	2014	2015	2016	2017	2018e
Rental expense	6,300	8,600	12,100	21,500	46,300	68,200	116,800	177,700	286,339
Cost of debt	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%
Estimated asset life	10.79	17.64	19.16	6.96	7.89	8.05	6.32	6.13	8.01
Operating lease asset value	52,226	101,584	150,947	125,284	299,188	448,294	627,072	929,811	1,873,553
Implicit interest expense	1,460	2,841	4,221	3,503	8,366	12,536	17,535	26,000	52,390

Another area where adjustments are needed concerns R&D. Currently, Tesla treats R&D as an operating expense as per US accounting practices. However, given that "*capital expenditures are defined as those expenditures that are likely to create benefits over multiple periods*," a fair argument can be made that R&D expenses more likely to yield benefits over time and more long term than investments in PP&E at many firms (Damodaran, 1999). In addition, not capitalizing R&D also punishes firms, like Tesla, for investing early in R&D, as it will depress EBITA early on, and it can understate invested capital and overstate return on capital (Koller et al., 2015). However, it will not have an effect on overall computed value as such, but it will affect the timing of ROIC. The assumed asset life of the created R&D asset is an important assumption for this calculation. Given the still nascent stage of the EV industry, the high degree of competition to arrive soon in key segments for Tesla and the concordant short life cycle of intellectual property and innovation, an asset life of four years has been assumed. The calculated annual amortization is then added to the depreciation line item as amortization of an operating intangible. On the BS, the created R&D intangible is treated as another operating asset and an equity equivalent in order to balance total funds invested (Koller et al., 2015).

Table 5: Capitalizing R&D

USD 000s	2010	2011	2012	2013	2014	2015	2016	2017	2018
R&D Intangibles, starting		92,996	278,728	483,024	594,244	910,383	1,400,687	1,884,923	2,791,766
R&D Expense	92,996	208,981	273,978	231,976	464,700	717,900	834,408	1,378,073	1,472,097
Amortization		(23,249)	(69,682)	(120,756)	(148,561)	(227,596)	(350,172)	(471,231)	(697,941)
R&D Intangibles, ending	92,996	278,728	483,024	594,244	910,383	1,400,687	1,884,923	2,791,766	3,565,922

Due to its net operating losses ("NOLs"), Tesla has also accumulated deferred tax assets over its lifetime, which has been part of Elon Musk's strategy of aggressively pursuing investments in R&D and in scaling up the business of Tesla in order to prepare tesla to pursue the mass market. These deferred tax assets can be used to realize tax benefits in the future. However, due to the passage of the Tax Cuts and Jobs Act of 2017 ("TCJA"), the value of said assets was reduced between 2017 and 2018. Yet, Tesla does "*not expect any adjustments to have a material impact on the consolidated financial statements due to our historical worldwide loss position and the full valuation allowance on our net U.S. deferred tax assets*" (Tesla, Form 10-Q 2018, Q3). In general, the value of a firm's deferred tax assets should reflect only the amount that is likely to be realized in the future. In order to adjust the value of the deferred tax assets with the amount that is expected to be realized, the counter account valuation allowance is established. The value of the valuation allowance account is highly subjective as it is based on internal projections of the company's future earnings (Koller et al., 2015). As such, due to the above uncertainty, deferred tax assets were recorded net of the valuation allowance, as any further adjustment would arguably not have provided any further clarity. Lastly, as this analysis was conducted with third quarter data for 2018, the values reported for 2018's first 9 months were annualized by dividing by 9 and multiplying by 12. This approach is arguably conservative as it potentially understates Q4 2018, as it would not be unreasonable to expect the quarter to match Tesla's profitable Q3. Still, ceteris paribus, accounting conservatism will here take precedent.

Table 6: Reorganized IS

USD 000s	2010	2011	2012	2013	2014	2015	2016	2017	2018e
Revenues	97,078	148,568	385,699	1,997,786	3,007,012	3,740,973	6,350,766	9,641,300	16,255,685
Other Operating Revenues	19,666	55,674	27,557	15,710	191,344	305,052	649,366	2,117,451	1,146,512
Cost of Goods Sold	(79,982)	(115,482)	(371,658)	(1,543,878)	(2,145,749)	(2,823,302)	(4,750,081)	(7,432,704)	(12,516,999)
SG&A. Expenses	(84,573)	(104,102)	(150,372)	(285,569)	(603,660)	(922,232)	(1,432,189)	(2,476,500)	(2,889,385)
Depreciation and R&D Amortization	(10,623)	(40,168)	(98,507)	(226,839)	(380,492)	(650,186)	(1,297,271)	(2,107,234)	(2,548,277)
Other Operating Expense	(6,031)	(27,165)	(11,531)	(13,356)	(170,936)	(299,220)	(650,794)	(2,103,560)	(1,616,447)
Reported EBITA	(64,465)	(82,675)	(218,812)	(56,146)	(102,481)	(648,915)	(1,130,203)	(2,361,247)	(2,168,910)

Lastly, the tax on the adjusted EBITA should be determined for both actual and projection calculations. The effective tax on operations can be affected by various factors, such as the tax jurisdictions of various revenue streams, state and local tax rates, and the aforementioned deferred taxes, which can result in future tax benefits, and thus influence the effective tax on operations (Koller et al., 2015). A typical workaround to this issue is to focus on taxes paid on financial expenses, as these tend to be more predictable and still closely resembles the net financial expense times the marginal tax rate. Yet, because Tesla is not projected to actually record a positive NOPLAT until 2022 (as will be further discussed later), this thesis has opted for a more practitioner-oriented approach to estimating the effective tax on operations to use once Tesla turns profitable in the projections, also because of the uncertainty created by the TCJA. As such, this thesis will rely on a sampling of analyst assumptions in order to arrive at a consensus driven estimate that reflect the expectations of market participants. Thus, an effective tax rate of 24 percent was utilized for projections, which reflects the new US income tax rate of 21 percent and the various state and local taxes Tesla is subject to due to its California location (California being considered a high tax state). It was also assumed that Tesla would continue to realize tax benefits through 2023. For the calculation of interest on long-term operating provisions, the same rate that was used for operating leases was applied.

Table 7: NOPLAT

USD 000s	2010	2011	2012	2013	2014	2015	2016	2017	2018e
Reported EBITA	(64,465)	(82,675)	(218,812)	(56,146)	(102,481)	(648,915)	(1,130,203)	(2,361,247)	(2,168,910)
Adj. for Operating Leases	1,460	2,841	4,221	3,503	8,366	12,536	17,535	26,000	52,390
Interest Associated with Long-Term Operating Provisions	-	148	148	256	421	1,255	2,961	6,156	9,967
Adjusted EBITA	(63,005)	(79,686)	(214,443)	(52,387)	(93,694)	(635,125)	(1,109,707)	(2,329,091)	(2,106,553)
Taxes on EBITA	(173)	(489)	(136)	(2,588)	(9,404)	(13,039)	(26,698)	(31,546)	(47,945)
NOPLAT	(63,178)	(80,175)	(214,579)	(54,975)	(103,098)	(648,164)	(1,136,405)	(2,360,637)	(2,154,498)

BS Reorganization

In order to determine invested capital, the BS needs to be separated into operating, non-operating, and financial activities. Invested capital is the sum of operating working capital, operating non-current assets, and intangible assets less the non-current operating liabilities (Koller et al., 2015). The BS of Tesla was reorganized into the following line items, some of which are conventional/self-explanatory, and others which require some further elaboration:

- Operating Cash: cash required in order to fund the operations of Tesla. This figure has to be estimated, and, as suggested by Koller et al. (2015), is determined to be 2 percent of revenue;
- Excess Cash and Marketable Securities: excess cash, equivalents and liquid securities held in excess of what is required to fund ongoing operations;
- Accounts Receivable: as reported;
- Inventories: as reported;
- Other Current Assets: includes restricted cash and prepaid expenses;
- Net PP&E: as reported in most years, but includes SolarCity operating leases following the acquisition;
- Goodwill: as reported and only relevant after the acquisition of SolarCity in 2016 and Grohmann Engineering GmbH in 2017;
- Acquired Intangible Assets : as reported and only relevant after the acquisition of SolarCity in 2016 and Grohmann Engineering GmbH in 2017;
- Other Operating Assets (incl. R&D Asset): long-term restricted cash and operating lease vehicles, which, given that offering lease arrangements in order to facilitate sales, along with other similar measures, have largely become common practice in the automotive industry, is classified under operating assets. Lastly, this line item also includes the accumulated R&D asset;
- Deferred Tax Asset: as reported net of the valuation allowance;
- Other Non-operating Assets: as reported and including MyPower customer notes receivable from the SolarCity acquisition;
- Short-Term Debt and Equivalents: current portions of convertible and long-term debt;
- Accounts Payable: as reported;
- Tax Payable: as reported under ‘Accrued Liabilities and Other Current Liabilities’;
- Dividends Payable: included to highlight that Tesla has not and is not expected to in

the foreseeable future pay any dividends;

- Other Current Liabilities: a residual, current liabilities line item, including current portions of deferred, revenue, resale value guarantees, customer deposits, current portion of long-term debt and capital leases;
- Long-Term Debt and Equivalents: estimated based on 'Long-term debt and capital leases,' where the debt portion is separated using data from Thompson Reuters. Also includes senior note to related partied;
- Deferred Income Taxes: as reported;
- Other Operating Liabilities: includes estimated capital leases, and long-term portions of deferred, revenue, resale value guarantees, customer deposits;
- Restructuring Provisions: includes financing obligations, a liability for receipts from an investor and solar bonds issued to related parties incurred in connection with the SolarCity acquisition;
- Ongoing Operating Provisions: includes an accrued warranty reserve (as per Koller et al., 2015), a build-to-suit lease liability and deferred rent expense;
- Long-Term Operating Provisions: includes deferred tax liabilities and environmental liabilities deemed related to ongoing operations;
- Minority Interest: reported as non-controlling interests in subsidiaries, both current and long-term; and
- Total Common Equity and Equivalents: this line item includes the accumulated R&D asset, which as per Koller et al. (2015) should be treated as an equity equivalent in order to make the BS balance.

Table 8: Reorganized BS

USD 000s	2010	2011	2012	2013	2014	2015	2016	2017	2018e
Operating Cash	1,942	2,971	7,714	39,956	60,140	74,819	127,015	192,826	325,114
Excess Cash and Marketable Securities	97,616	277,356	194,176	805,933	1,854,546	1,133,403	3,266,201	3,175,088	2,642,390
Accounts Receivable	6,710	9,539	26,842	49,109	226,604	168,965	499,142	515,381	1,155,001
Inventories	45,182	50,082	268,504	340,355	953,675	1,277,838	2,067,454	2,263,537	3,314,127
Other Current Assets	84,436	32,890	27,532	30,586	85,108	136,543	299,984	423,688	483,859
Total Current Assets	**235,886**	**372,838**	**524,768**	**1,265,939**	**3,180,073**	**2,791,568**	**6,259,796**	**6,570,520**	**7,920,491**
Net Property, Plant, and Equipment	114,636	298,414	552,229	738,494	1,829,267	3,403,334	5,982,957	10,027,522	11,246,295
Goodwill	-	-	-	-	-	-	-	60,237	65,226
Acquired Intangible Assets	-	-	-	-	-	-	376,145	361,502	291,476
Other Operating Assets (incl. R&D Asset)	105,826	298,553	498,254	983,104	1,688,501	3,223,612	11,207,048	13,697,582	12,450,431
Deferred Tax Asset	-	-	-	39,345	86,456	190,469	731,463	579,956	254,300
Other Non-operating Assets	22,730	22,371	21,963	23,637	43,209	74,633	723,053	729,775	854,716
Total Assets	**479,078**	**992,176**	**1,597,214**	**3,050,519**	**6,827,506**	**9,683,616**	**25,280,462**	**32,027,094**	**33,082,935**
Short-Term Debt and Equivalents	-	7,916	50,841	182	61,110	63,317	98,421	79,655	210,654
Accounts Payable	28,951	56,141	303,382	303,969	777,946	916,148	1,860,341	2,390,250	3,596,984
Tax Payable	2,686	967	9,710	38,067	71,229	101,206	152,897	185,807	187,968
Dividends Payable	-	-	-	-	-	-	-	-	-
Other Current Liabilities	53,928	126,315	175,175	332,942	1,196,881	1,735,603	3,715,346	5,018,958	5,779,719
Total Current Liabilities	**85,565**	**191,339**	**539,108**	**675,160**	**2,107,166**	**2,816,274**	**5,827,005**	**7,674,670**	**9,775,324**
Long-Term Debt and Equivalents	71,828	268,335	401,495	586,119	1,430,326	1,607,140	4,933,686	8,599,493	8,831,613
Deferred Income Taxes	-	-	-	39,345	86,456	190,469	731,463	579,956	254,300
Other Operating Liabilities	12,649	20,158	23,717	430,334	1,226,805	2,215,126	4,007,647	4,305,817	2,246,788
Restructuring Provisions	-	-	-	-	-	-	260,352	97,742	102,333
Ongoing Operating Provisions	3,692	4,271	16,032	43,151	109,795	259,100	1,510,117	1,988,877	2,080,258
Long-Term Operating Provisions	5,300	5,300	9,138	15,046	44,865	105,876	220,144	356,451	372,828
Minority Interest	-	-	-	-	-	-	1,152,214	1,395,080	1,344,731
Total Common Equity and Equivalents	**300,044**	**502,773**	**607,724**	**1,261,364**	**1,822,093**	**2,489,631**	**6,637,834**	**7,029,008**	**8,074,760**
Total Liabilities and Equity	**479,078**	**992,176**	**1,597,214**	**3,050,519**	**6,827,506**	**9,683,616**	**25,280,462**	**32,027,094**	**33,082,935**

Invested capital is calculated both excluding and including goodwill and intangibles as suggested by Koller et al. (2015). The purpose for calculating invested capital excluding goodwill is to discern and gain insights regarding the operations of the underlying business, removing the impact of acquisitions. When comparing operating performance of companies with different M&A strategies, the ROIC including goodwill could give misleading results regarding a company's effectiveness in light of the impact of acquisition premiums (Koller et al., 2015). However, given Tesla's limited M&A activities, the difference between the two ROICs is largely negligible. Thus, having established this and reorganized the BS, invested capital can now be presented:

Table 9: Invested Capital

USD 000s	2010	2011	2012	2013	2014	2015	2016	2017	2018e
Operating Working Capital	52,705	(87,941)	(157,675)	(214,972)	(720,529)	(1,094,792)	(2,734,989)	(4,199,583)	(4,286,569)
Net Property, Plant, and Equipment	114,636	298,414	552,229	738,494	1,829,267	3,403,334	5,982,957	10,027,522	11,246,295
Other Assets Net of Other Liabilities	93,177	278,395	474,537	552,770	461,696	1,008,486	7,199,401	9,391,764	10,203,643
Ongoing Operating Provision	(3,692)	(4,271)	(16,032)	(43,151)	(109,795)	(259,100)	(1,510,117)	(1,988,877)	(2,080,258)
Value of Operating Leases	52,226	101,584	150,947	125,284	299,188	448,294	627,072	929,811	1,873,553
Op. Invested Capital (excl. Goodwill)	309,051	586,181	1,004,006	1,158,424	1,759,828	3,506,222	9,564,325	14,160,637	16,956,663
Goodwill & Intangibles	-	-	-	-	-	-	376,145	421,739	356,702
Cumulative Written Off & Amortized	-	-	-	-	-	-	-	-	22,082
Op. Invested Capital (incl. Goodwill)	309,051	586,181	1,004,006	1,158,424	1,759,828	3,506,222	9,940,470	14,582,376	17,335,447
Excess Cash and Marketable Securities	97,616	277,356	194,176	805,933	1,854,546	1,133,403	3,266,201	3,175,088	2,642,390
Non-operating Assets	22,730	22,371	21,963	23,637	43,209	74,633	723,053	729,775	854,716
Total Investor Funds (Uses)	**429,398**	**885,908**	**1,220,145**	**1,987,995**	**3,657,583**	**4,714,258**	**13,929,723**	**18,487,239**	**20,832,554**
Total Common Equity & Pref. Stock	300,044	502,773	607,724	1,261,364	1,822,093	2,489,631	6,637,834	7,029,008	8,074,760
Cum Goodwill Written Off & Amortized	-	-	-	-	-	-	-	-	22,082
Adjusted Equity	300,044	502,773	607,724	1,261,364	1,822,093	2,489,631	6,637,834	7,029,008	8,096,842
Non-controlling Interest	-	-	-	-	-	-	1,152,214	1,395,080	1,344,731
Restructuring Provisions	-	-	-	-	-	-	260,352	97,742	102,333
Long-Term Operating Provisions	5,300	5,300	9,138	15,046	44,865	105,876	220,144	356,451	372,828
Interest-Bearing Debt	71,828	276,251	452,336	586,301	1,491,436	1,670,456	5,032,107	8,679,148	9,042,267
Value of Operating Leases	52,226	101,584	150,947	125,284	299,188	448,294	627,072	929,811	1,873,553
Total Investor Funds (Sources)	**429,398**	**885,908**	**1,220,145**	**1,987,995**	**3,657,583**	**4,714,258**	**13,929,723**	**18,487,239**	**20,832,554**

Financial Statement Review & Evaluation

Having reorganized the financial statements, now comes the task of evaluating Tesla's financial performance from 2010 to 2018. Doing so is what lays the foundation for the subsequent forecasting of the company's future performance (Koller et al., 2015; Petersen et al., 2017). Important areas to highlight and investigate as part of such a review are ROIC, growth in revenues and Tesla's level of production over time.

Growth and production trends

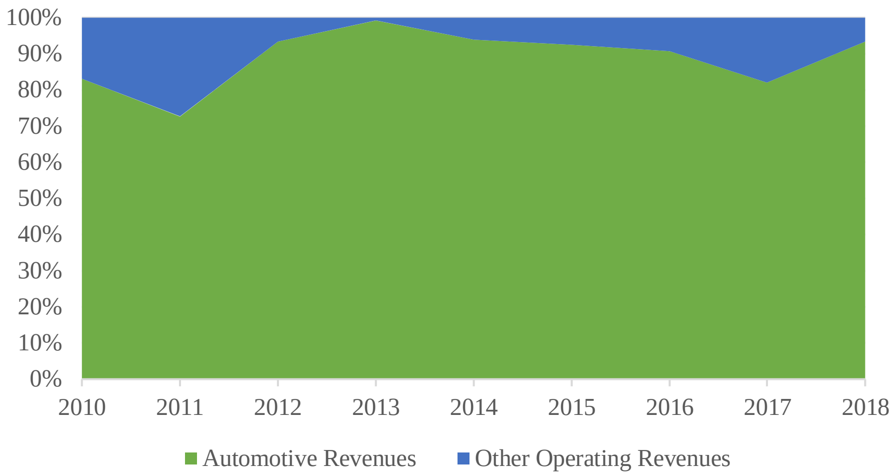
Without some form of growth, not much value creation is going to take place, as cost savings can only take a company so far (Ravenscraft, 2013). From 2010 to 2018, Tesla's topline grew year on year according to the following schedule:

Table 10: Historical Revenue Growth Rates

	2011	2012	2013	2014	2015	2016	2017	2018e	CAGR
Revenue YoY Growth	53.0%	159.6%	418.0%	50.5%	24.4%	69.8%	51.8%	68.6%	89.7%

The above reflects automotive revenues, which, as the next figure will show, have throughout the company's history generated the great majority of its revenue. Examining the above, it reflects Elon Musk's unrelenting vision of scaling Tesla to achieve various levels of economies of scale according to his first 'Master Plan' (Musk, 2006, August 2). Admittedly from a low base, it is no small accomplishment to grow a 97 million USD topline to an expected 16 billion USD topline in eight years at a CAGR of 89.7. Of course, no one will expect Tesla to continue to exhibit such start-up growth rates going forward. Yet, it does point to that the company has managed to shift from operating at one level of scale to another at a previous point in time. Specifically, when looking at the years 2012 and 2013, Tesla had a significant growth spurt, growing from a 148.6 million USD topline at the end of 2011 to almost a 2 billon USD topline at the end of 2013. During this time, Tesla went from having "*a few Model S prototypes in hand and the goal of going from producing hundreds of Roadsters per year to producing hundreds of Model S vehicles per week*" (Tesla, Q4 & Full Year 2012 Shareholder Letter), to by year-end 2013 having delivered over 23,000 vehicles.[23] A similar growth spurt occurred in 2016 as the Model X was introduced. As such, as Tesla emerges from its 2017 and 2018 'production hell' and starts achieving its model 3 production goals, as its Q3 results indicate, its growth rate in the near to medium term could be at high and, for that period, sustainable level. As shown by Figure 29 above, the decision of this thesis to focus most of its analysis on Tesla's automotive segment is more than justified, as it has historically, and even after the SolarCity acquisition, constituted the majority of Tesla business. Thus, even though Musk already back in 2006, long before the Solar City acquisition, stated that it was

Figure 29: Tesla Revenue Breakdown



[23] From: Teslike.com (https://docs.google.com/spreadsheets/d/1p5vN-xTC5yM0siwdP9XCldds2b_CGV36yuJvs1PHp48/edit#gid=461909316)

one of Tesla's goals to "*provide zero emission electric power generation options,*" Tesla is and should mainly be evaluated as a car company going forward. Having then established that the question then becomes what the sources Tesla's automotive revenues are from a production perspective. As illustrated by Figure 30,[24] the model S formed the basis of Tesla's production for several years before an additional model was introduced. Moreover, examining the production numbers reveal the significance and the size of the challenge that is the ramp up of the Model 3's production – and the experience and scale curve that Tesla has climbed on its way through 'production hell.' Combining revenue and production numbers then allows the thesis to also gain insight into how much revenue is generated per vehicle produced. As expected, given that it is Tesla's stated objective to focus on its mass market Model 3, a clear trend is evident whereby the volume of vehicles produced increases, whilst revenue per vehicle decreases sharply the year production of Tesla's mass market car ramps up, providing a stark contrast to prior years, when revenue was derived solely from premium models. Going forward, one would therefore expect to see this trend continue in the medium term, whilst Tesla also capitalizes on its remaining head start in the

Figure 31: Revenue per Vehicle Produced (USD 000s)

Source: Author, Tesla & Teslike.com

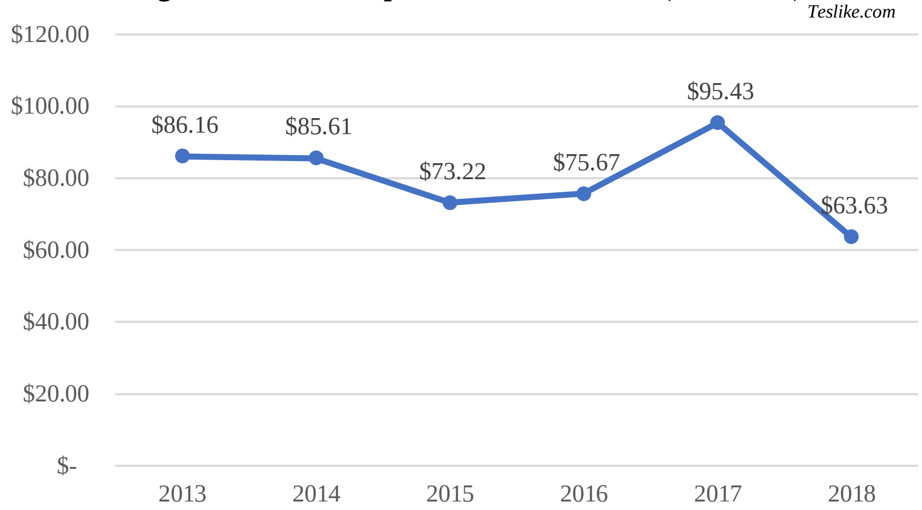
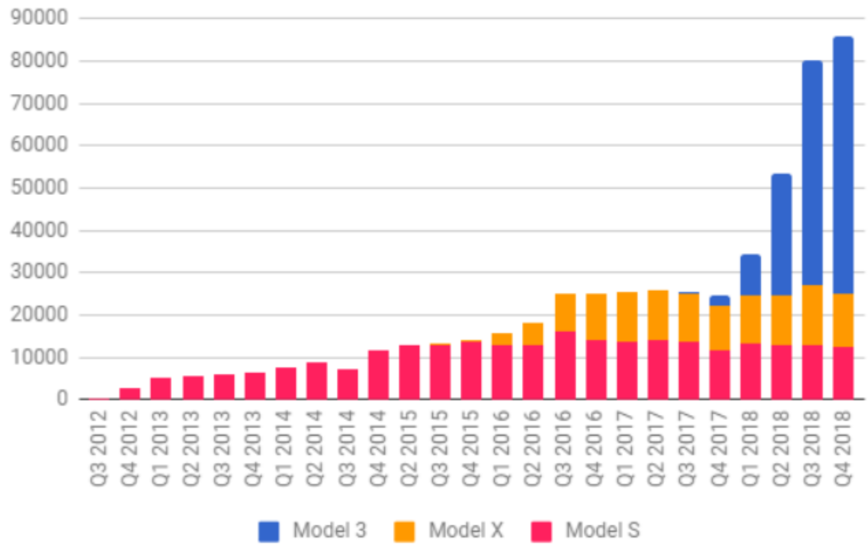


Figure 30: Quarterly Model S/X/3 Production



[24] From: Teslike.com (https://docs.google.com/spreadsheets/d/e/2PACX-1vQEngD_RcaBne5UPtMOVJ3Hhd8MuHDvu_Xtd_QjwAg1eysu_17iJKm0mt3Z_3NijFCqQDbwUyvycGyJ/pubhtml?gid=1690783525

premium EV segment, as the Model 3 ramp up continues and Tesla brings its planned Shanghai factory online in 2021, as this factory will focus on batteries and on the Model 3, with an initial full capacity of 250,000 vehicles per year (Hancock, 2018, October 18).

ROIC

Compared to other measures of value that are utilized by analysts and the wider financial community, such as return on equity or return on assets, ROIC is a preferable measure of value and value creation, as it is the combination of growth and ROIC relative to its cost that drives value (Koller et al., 2015). For instance, a change in capital structure may have a significant effect on a company's cost of equity, as an increase in leverage can increase the risk of default and thus increase the risk to the residual claimants of profits, the equity holders (Bodie et al., 2013). As such a change does not necessarily affect a company's operating fundamentals, but would change its value, ROIC is a more reliable and preferable measure. As long as a company is earning a ROIC higher than its cost of capital, then it will be generating value (Koller et al, 2015).

Table 11: ROIC

USD 000s	2011	2012	2013	2014	2015	2016	2017	2018e
Revenues	148,568	385,699	1,997,786	3,007,012	3,740,973	6,350,766	9,641,300	16,255,685
Op. Invested Capital (excl. Goodwill)	586,181	1,004,006	1,158,424	1,759,828	3,506,222	9,564,325	14,160,637	16,956,663
Op. Invested Capital (incl. Goodwill)	586,181	1,004,006	1,158,424	1,759,828	3,506,222	9,940,470	14,582,376	17,335,447
NOPLAT	(80,175)	(214,579)	(54,975)	(103,098)	(648,164)	(1,136,405)	(2,360,637)	(2,154,498)
After-Tax ROIC (pre-Goodwill)	-25.9%	-36.6%	-5.5%	-8.9%	-36.8%	-32.4%	-24.7%	-15.2%
After-Tax ROIC (incl. Goodwill)	-25.9%	-36.6%	-5.5%	-8.9%	-36.8%	-32.4%	-23.7%	-14.8%

As evident from the above, Tesla has not created value for investors at any point during its time as a public company. As economic theory would have it, the fact that Tesla's stock despite this has continued to perform well must then be attributed to investor irrationality, expectations, some intangible source of value – or a combination of these or other unknown factors (Bodie et al., 2013).

Table 12: ROIC Drivers

Profitability	2010	2011	2012	2013	2014	2015	2016	2017	2018e
Cost of Goods Sold / Revenues	82.4%	77.7%	96.4%	77.3%	71.4%	75.5%	74.8%	77.1%	77.0%
SG&A Costs / Revenues	87.1%	70.1%	39.0%	14.3%	20.1%	24.7%	22.6%	25.7%	17.8%
EBITDA / Revenues	-69.5%	-47.8%	-35.3%	8.4%	8.6%	-0.1%	2.7%	-2.8%	5.2%
Depreciation & Op. Amort. / Revenues	10.9%	27.0%	25.5%	11.4%	12.7%	17.4%	20.4%	21.9%	15.7%
Efficiency									
Net PPE / Revenues		77.2%	77.4%	27.6%	24.6%	48.9%	53.6%	62.1%	61.7%
Rev. / Inv. Capital (pre-Goodwill)		0.5	0.7	2.0	2.6	2.1	1.8	1.0	1.1
Rev. / Inv. Capital (incl. Goodwill)		0.5	0.7	2.0	2.6	2.1	1.8	1.0	1.1

Examining the above drivers reveals a pattern for Tesla in that following the start- and scale-up period of 2011 to 2012, Tesla's ROIC comparatively improved significantly as the investments into scaling the production of the Model S started to bring in revenue and the company climbed up the experience curve for that specific production line. In fact, on an EBITDA basis, Tesla was profitable in 2013 and 2014. Likewise, as Tesla has been expanding, absorbing SolarCity and focusing on developing/scaling Model 3 production, its ROIC has suffered, as growth initiatives proved costly, as when looking in the growth in SG&A and the increased the level of PPE and invested capital used to generate revenue. In fact, looking ahead, SG&A in particular is an area where Tesla can improve, as the average SG&A share of comparable companies is 9.4 percent (based on Thompson Reuters data and own calculations).

The Valuation

Finally, after having analyzed the historical financial statements of Tesla, the thesis will now proceed to the valuation itself of Tesla utilizing the approach of the EDCF model. A good starting point is the important step of estimating the cost of capital, i.e. the WACC. Subsequently, the key value drivers of Tesla for the purposes of valuation will be extrapolated and forecasted as per findings hitherto brought forth by the thesis. This then leads to the final step of calculating the present values of free cash flows for the forecasted period using the WACC, including the CV, in order to arrive at the true/intrinsic value of Tesla. The arrived at value will then be compared to comparable companies using multiples analysis in order to check the validity/robustness of the result.

<u>The WACC</u>

The cost of capital is generally defined as 'the opportunity cost of all capital invested in an enterprise' (Bodie et al., 2013). The opportunity cost is generally thought of as what you give up as a consequence of your decision to use a scarce resource in a particular way. As the cost of capital must reflect the cost of all capital invested in a company, both the cost of debt and the cost of equity must be estimated (Petersen et al., 2017). Hence why the final cost is a weighted average between the two. The calculations is weighted by an appropriate and representative capital structure that should reflect the target structure of the company being valued, which may deviate from its present structure (Koller et al., 2015). Thus, WACC is calculated accordingly:

$$WACC = \frac{D}{V} k_d (1 - T) + \frac{E}{V} k_e$$

In this formula, D is the value of debt, E is the value of equity, V = D + E, kd is the cost of debt, T is the marginal tax rate, and ke is the cost of equity (Koller et al,, 2015). An implicit assumption is that the tax rate remains unchanged. As in previous calculations, this thesis will use an estimated tax rate of 24 percent.

- Cost of equity

The cost of equity consists of three components: the risk-free rate of return, the market-wide risk premium (the expected return of the market portfolio minus the return of risk-free bonds), and a risk adjustment that reflects each company's riskiness relative to the average company (Koller et al., 2015). The most commonly used model to estimate the cost of equity in the industry is the Capital Asset Pricing Model ("CAPM"), though it exhibits several, well-documented limitations. Established, alternative models include the Fama-French three-factor model and the Arbitrage Pricing Theory model ("APT"). The Fama-French three-factor model is an asset pricing model that expands on the CAPM by adding size risk and value risk factors to the market risk factor in CAPM. This model considers the fact that value and small-cap stocks outperform markets on a regular basis. By including these two additional factors, the model adjusts for this outperforming tendency (Bodie et al., 2013). However, the model suffers from similar implementation issues as the CAPM, but with a lesser degree of parsimony (Koller et al., 2015). The APT further expands on some of the same principles as the Fama-French model by stating that a security's actual returns are generated by k factors and random noise, and that a security's expected return must equal the risk-free rate plus the cumulative sum of its exposure to each factor times the factor's risk premium (Koller et al., 2015). As this exercise in practice becomes quite unwieldy in terms of which and how many factors to include, the model is rarely used in the industry.

The CAPM assumes that the market portfolio is efficient, that investors have homogeneous expectations, and that the risk premium on a risky asset is proportional to its beta,[25] which then becomes a key input of the model (Bodie et al., 2013). Indeed, this is why how to calculate beta and what adjustments to make is one of the more debated topics on the CAPM model, with issues such as lack of stability, lack of ex-ante price observations, lack of observations and the sensitivity to the choice of time period and frequency being raised (Petersen et al., 2017; Koller et al., 2015). However, as most practitioners still rely on the basic CAPM, without utilizing adjustments such as adding a liquidity premium, so too will this thesis in order to maximize the comparability of results. Thus, the CAPM model in its following shape will be utilized:

$$E(R_i) = r_f + \beta_i[E(R_m) - r_f]$$

With $E(R_i)$ being the expected return of security i, rf the risk-free rate, β_i the stock's sensitivity to the market and E(Rm) the expected return of the market. I.e., the expected equity return consists of the return investors can receive risk-free from the market, plus an additional return for the risk they are taking on by investing in equity (Bodie et al., 2013).

[25] "Beta measures a stock's co-movement with the market and represents the extent to which a stock may diversify the investor's portfolio" (Koller et al., 2015).

- The risk-free rate

The risk-free rate of return is the theoretical rate of return of an investment with zero risk, i.e. a beta of zero. The generally accepted approach amongst practitioners is to use the yield on government bonds as a proxy for the risk-free rate. Although not necessarily risk free, long-term government bonds in the US and Western Europe have very low betas. As such, Koller et al. (2015) recommend using US Treasury STRIPS ("Separate Trading of Registered Interest and Principal of Securities"), which are fixed-income securities that offer no interest payments because they mature at par. Though each cash flow should ideally be discounted using a government bond with the same maturity, Koller et al. (2015), in line with industry practices, recommends using a 10-year government STRIPS, the current rate on which as of November 24, 2018 was 3.10 percent, which will be utilized for the purposes of this valuation. The decision to use US treasuries is further supported by the importance of matching the functional currency of a company to the rate used for valuation purposes in order to minimize inflation discrepancies (Koller et al., 2015).

- The equity market risk premium

The equity market risk premium ("MRP") is the average return that investors require over the risk-free rate for accepting the higher variability/risk of returns that are common for equity investments (i.e. the MRP reflects a minimum threshold for investors in order to be willing to invest) (KPMG, 2018, September 30). Two main approaches exist to estimating the MRP: historical observations and an implied premium (Koller et al., 2015). Other approaches include the multi-factor model, the yield spread build-up and the survey approach (KPMG, 2018, September 30). The implied approach is based on the assumption that stocks are correctly priced in the aggregate and that the expected cash flows from buying stocks can be estimated. Assuming that, an expected rate of return on stocks can be computed as an internal rate of return. Subtracting out the risk-free rate should yield an implied equity risk premium (Damodaran, 2006). However as demonstrated by Koller et al. (2015), the method should ideally arrive at a similar value as the historical approach. The survey approach has the advantage of being forward looking and based on the actual expectations of investors in the marketplace, but is then subject to common pitfalls for surveys, such as biases introduced via survey wording or the short time horizons of many investors (Damodaran, 2006). Finally, the historical approach then estimates the premium that stocks have historically earned over the risk-free rate. It is the most widely used method in the industry, but it is subject to several issues, chief amongst which are that the longer time horizon used (to minimize the standard error), the more will the results be backward and not forward looking, and that the longer the time horizon, the greater the potential for survivorship bias (Damodaran, 2006). Koller et al. (2015), based on their historical research, estimates a range for the MRP of 4.7 to 5.4 percent, and selects 5 percent as a good rule-of-thumb MRP. KPMG (2018, September 30), based on historical analysis and internal surveys of valuation professionals, recommends an MRP of 5.5 percent as of Q3 2018. Lastly, calculating the implied premium of the NASDAQ index yields a result of 3.3 percent. Taking the average of these 3 estimates then results in a value of 4.6 percent, which this thesis will then opt to adjust to 4.7 in order for it to correspond to Koller et al.'s (2015) range of 'reasonable' historical MRPs.

- Beta

Beta is a measure of the volatility, or systematic risk, of a security or a portfolio in comparison to the entire market or a benchmark. The most common approach to estimate beta is to regress stock returns against market returns. As per Damodaran (2006), the method has three main drawbacks: it has a high standard error, it reflects the firm's business mix over the period of the regression, not the current mix, and it reflects the firm's average financial leverage over the period rather than the current leverage. Still, the approach has remained the industry standard and the implementation of it can be optimized via following certain best practices from both practitioners and academics – as recommended by Koller et al. (2015), at least five years of data should be used, returns should be monthly and the index regressed on should be of significant width and depth. Moreover, the arrived at beta should be compared to that of its industry peers and potentially smoothed. Calculating based on trailing 5-year prices, on a monthly basis, relative to the S&P 500 and the NASDAQ, yields a beta of 1.47 for the NASDAQ, of which Tesla is a part, and 0.59 for the S&P 500. To then determine which of these were most in line with general industry dynamics and conditions and whether to implement smoothing, betas from Thompson Reuters were obtained.

Table 13: Betas of Comparable Firms

GM	1.27
Ford	0.71
Fiat	1.45
Toyota	1.14
VW	1.49
BMW	1.31

As the beta based of the S&P 500 is an outlier when compared to comparable firms, the NASDAQ beta was selected. However, to then bring beta more in line with the industry average and to acknowledge that the S&P value was at the other end of the spectrum, this thesis will therefore opt to smooth the beta using the Bloomberg method, whereby: adjusted beta = 0.33 + 0.67 * raw beta (Koller et al., 2015). This then results in an adjusted beta of 1.31 for Tesla.

- Cost of debt

The cost of debt is the rate at which a firm can borrow at currently. It will reflect not only its default risk but also the level of interest rates in the market (Damodaran, 2006). The two main approaches to estimating the cost of debt for investment-grade companies is to either use the yield to maturity of the company's long-term, option-free bonds, or to look up the rating for the firm and estimating a default spread based upon the rating (Koller et al., 2015; Damodaran, 2006). Tesla's credit rating was last revised on March 27, 2018, when Moody's downgraded Tesla's corporate family rating to B3, senior notes to Caa1, with a negative outlook.[26] In order to be considered an investment grade issue, the company must be rated at 'Baa3' or higher by or Moody's.[27] However, given that this rating was largely based on Tesla's 'production hell' and reflected the 'significant shortfall in the production rate of the company's Model 3,' this thesis deems it likely that this rating will be revised given Tesla's Q3 2018 performance. As such, data from the St. Louis Fed on 'Ba2' rated bonds was ultimately used to calculate the cost of debt.[28] Using the 12 months rolling average of effective yields for high yield US corporate bonds rated Ba2/BB, the thesis averaged the spot rate and the 1 year average of said yields, to arrive at an estimated cost of debt for Tesla of 5.33 percent.

- Capital structure

As previously established, the capital structure used for the WACC calculations should be representative of what a company in the applicable industry would trend towards over the long term. This is particularly apt when applying the same WACC in all time periods, as one is then implicitly assuming the company keeps its capital structure constant over time at a target ratio of debt to equity (Koller et al., 2015). For a company like Tesla that is still investing heavily in growth and climbing up the scale and experience curve, using today's ratio would overstate the interest tax shield given Tesla's high degree of leverage. As the WAAC should incorporate a sustainable capital structure and an underlying estimate of business risk consistent with expected industry conditions, Koller et al. (2015) recommends utilizing the capital structures of comparable companies to derive a

Table 14: Comparable firms' capital structures

	D/E	D/V	E/V
VW	1.53	0.60	0.40
Toyota	1.00	0.50	0.50
Ford	4.37	0.81	0.19
GM	2.85	0.74	0.26
Fiat Chrysler	0.80	0.45	0.55
BMW	1.70	0.63	0.37
Averages	**2.04**	**0.62**	**0.38**

[26] https://www.moodys.com/credit-ratings/Tesla-Inc-credit-rating-823642219.
[27] https://www.moodys.com/sites/products/ProductAttachments/AP075378_1_1408_KI.pdf.
[28] https://fred.stlouisfed.org/series/BAMLH0A1HYBBEY.

representative capital structure to use for the WACC calculation. Based on this comparative analysis, representative average weights of a D/V of 0.68 and an E/V of 0.38 is arrived at for the WACC of this valuation.

➢ WACC calculation

Having calculated and analyzed the inputs of Tesla's WACC, this thesis can now proceed to putting the pieces together and calculate the WACC to be used for this valuation. Based on the arrived at inputs, Tesla's WACC is found to be 6.02 percent.

Table 15: Tesla's WACC

Risk-Free Rate	3.10%
Market Risk Premium	4.70%
Beta	1.31
Cost of Equity	9.27%
Cost of Debt	5.33%
Tax Rate	24%
D/V	0.62
E/V	0.38
WACC	**6.02%**

The Forecast

With the support of the preceding chapters covering Tesla, its industry and its strategic position and outlook, this section will now lay out the key assumptions, inputs and value drivers that will be used to forecast the future free cash flows of Tesla. This thesis follows the three-forecast time period methodology described by Koller et al. (2015), comprising five years of detailed forecasts, 10 years of a simplified key driver forecasts, and a CV period. For most line items, forecasts will be tied directly to revenues, as recommended by Koller et al. (2015) and Petersen et al. (2017). As such, revenues become a key item to forecast, as its results will flow through to several other line items. Most attention will be paid to forecasting automotive revenues, as these are expected to still constitute the majority of Tesla's revenues going forward.

➢ Revenues

The detailed forecast of revenues will, in line with most analysts' expectations, assume that in the near term, the main constraint to how many cars Tesla can sell will be how many cars they can produce, as demand thus far in Tesla's history has for outstripped their production capacity.

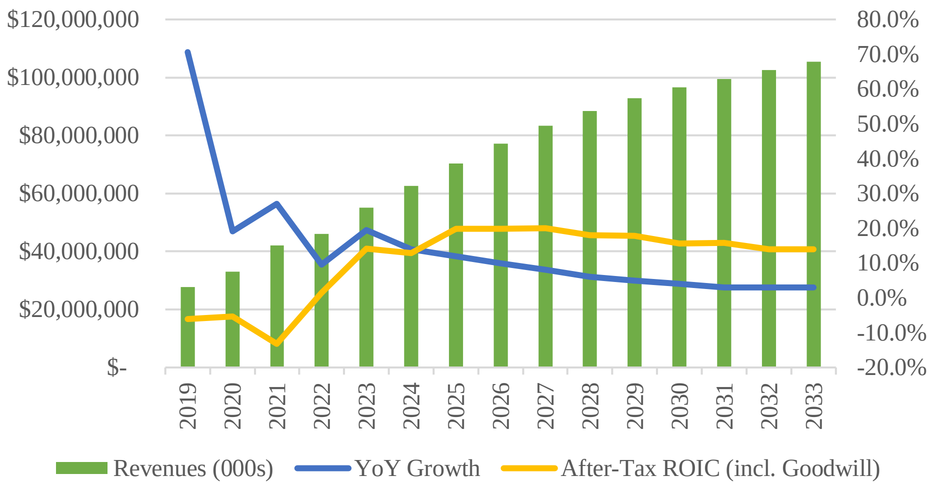
Table 16: Detailed period automotive revenue drivers

	Vehicle prod. per quarter	**Quarterly Revenue (000s)**	**Revenue per vehicle**
2019	104,903	$6,933,614	$66,095
2020	125,000	$8,261,935	$66,095
2021	175,000	$10,500,000	$60,000
2022	200,000	$11,500,000	$57,500
2023	250,000	$13,750,000	$55,000

As per common microeconomic theory (Frank, 2009), Tesla can be expected to act rationally according to available information in the market. Thus, this thesis will assume that Tesla will make a near term push for its Models S and X in order to sell as many as possible before competition ramps up in the premium segment. This has the effect that revenue per vehicle used for 2019 and 2020 is higher than what third party sources forecast for 2018 overall. However, the $66,095 revenue per vehicle is also the last real data point available for the thesis for this input, as it is from Tesla Q3 financials. For these reasons, revenue per vehicle as a forecast input does not begin to decline until 2021. In terms of production per quarter, the rationale behind these estimates is that this thesis will assume that by 2020 the Freemont factory is operating at its estimated maximum capacity with an annual production of 1 million vehicles, and that the Shanghai factory in 2021 will come online with an annual production slightly below Tesla's expectations of 250,000 (Hancock, 2018, October 18), but that by 2023 it will have reached the same estimated maximum capacity as the Freemont plant. As for solar and energy storage revenues, the thesis will rely on the industry wide forecasts cited in the Industry Analysis section and assume that this smaller revenue segment will grow in line with overall industry expectations, which is forecasted to grow at a CAGR of 13.7 percent from 2016 to 2030.

From 2024 to 2033, the thesis will assume a stable annual decline of Tesla's overall revenue growth rate, starting at 14 percent annual growth in 2024 and then declining at 2 percent per year until 2028, after which point growth declines at 1 percent per year until 2030, where growth stabilizes at 3 percent annually. This reflects not only the maturing of the EV industry and the catch up of competitors, but also the maturing of Tesla as a company, and the conclusion that Tesla currently cannot be deemed to have a sustainable competitive advantage (as per the Strategic Analysis). For the CV, a growth rate of 2 percent was used, as one should be conservative when picking a CV growth

Figure 32: Tesla's Growth Trajectory

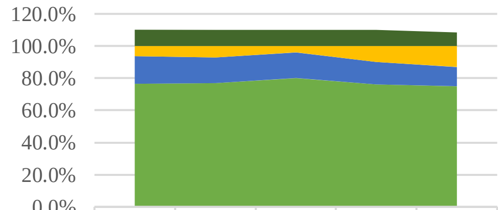


rate (Koller et al., 2015).

- ➢ Costs and profitability

Based on Thompson Reuters data and the six previously identified comparable competitors (GM, Ford, Fiat Chrysler, Volkswagen, Toyota and BMW), the costs/profitability ratios of these comparables were computed for the years 2013 to 2017. After this, simple averages were computed and the results are presented in Table 17. Then over the detailed five year forecast period and also over the subsequent 10 year forecast period, these ratios were then utilized to gradually "normalize" the cost structures and profitability levels of Tesla, where the five year forecast phase is expected to be a period of above average growth and, towards the end, performance, as the opening / ramp up of the Shanghai plant starts to pay off.

Figure 33: Tesla 5-Y forecasted costs & profitability



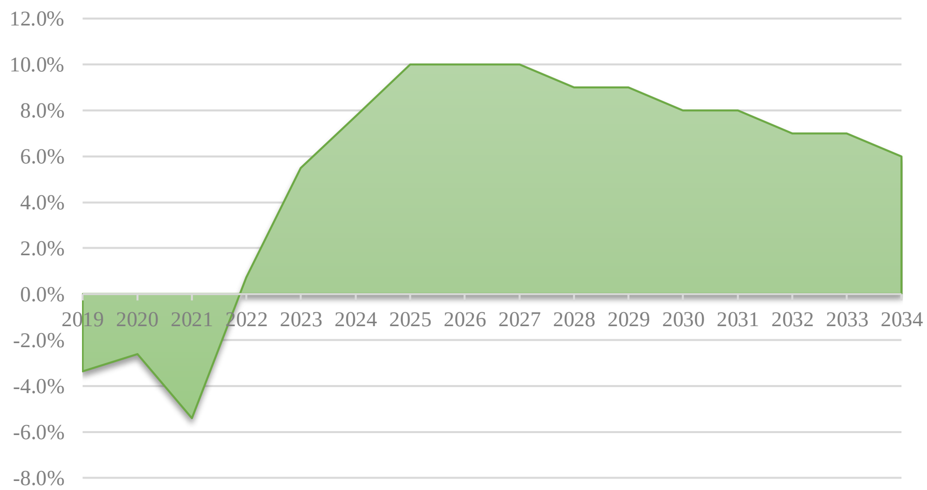
	2019	2020	2021	2022	2023
Depreciation / Revenues	10.1%	10.1%	10.0%	10.0%	8.4%
EBITDA / Revenues	6.4%	7.0%	4.0%	10.0%	13.0%
SG&A / Revenues	17.0%	16.0%	16.0%	14.0%	12.0%
COGS / Revenues	76.6%	77.0%	80.0%	76.0%	75.0%

Table 17: Average cost and profitability ratios of comparable competitors (2013 – 2017)

COGS (% of Rev.)	83.2%
SG&A (% of Rev.)	9.4%
Operating Margin	6.0%
PP&E (% of Rev.)	38.5%
Depreciation (% of PP&E)	16.1%
Operating Cash Assumption (% of Rev.)	2.0%
Inventory (% of Rev.)	10.4%
Accounts Receivables (% of Rev.)	29.1%
Accounts Payables (% of Rev.)	13.0%
Other Current Assets (% of Rev.)	3.7%
Other Current Liabilities (% of Rev.)	13.3%
Tesla's own results/targets	
Tesla Q3 2018 Auto Gross Margin	23.4%
Tesla's Long Term Gross Margin Goal	25.0%

For the subsequent 10 year forecast period, besides revenue growth, the key input utilized by this thesis is the adjusted (for operating leases and interest associated with long-term operating provisions) EBITA margin, which, as Tesla following a period of continued rapid expansion is assumed to start to focus on further performance optimization and cost reduction measures, will initially improve and then gradually settle at a level more in line with industry averages towards the end of the forecast period, as shown in Figure 34 below.

Figure 34: Forecasted adj. EBITA margin



Lastly, it is assumed that Tesla's convertible notes due in 2019, 2021 and 2022 will be converted into equity, adding 2,556,479, 3,834,718 and 2,984,733 shares to total common shares, respectively (please consult Appendix A for an overview of Tesla's debt). Moreover, it is also assumed that Tesla during 2020 to 2021 will have to take on a total of 3 billion USD in additional debt to finance its new Shanghai factory.

For a more comprehensive view of Tesla's forecasted financials, please consult Appendix B.

Valuing Tesla

Having laid out the key drivers, inputs and assumptions for valuing Tesla, this thesis will now put the pieces together, using the computational formulas described in the Literature Review, to calculate first the value of operations, enterprise value and then the equity value in order to in the end arrive at an estimate of Tesla's value per share. Enterprise value represents the value of the entire company, while equity value represents the portion owned by shareholders (Koller et al., 2015). This process entails summing the discounted free cash flows from operations, and then, to determine enterprise value, adding to the value of core operations the value of non-operating assets. To then convert enterprise value to equity value, debt, debt equivalents and hybrid securities (such as employee stock options) will be subtracted (Koller et al., 2015). Finally, to estimate value per share, the resulting equity value will be divided by the most recent number of shares outstanding.

Table 18: Detailed forecasted Free Cash Flow (2019 – 2023)

USD 000s	2019	2020	2021	2022	2023
NOPLAT	(1,066,579)	(991,961)	(2,545,235)	314,470	3,630,629
Depreciation	2,811,574	3,328,135	4,180,539	4,620,000	4,636,800
Gross Cash Flow	1,744,995	2,336,174	1,635,304	4,934,470	8,267,429
Increase in Working Capital	2,771,184	4,066,781	2,326,893	(3,371,775)	(2,625,951)
Capital Expenditures	(5,432,507)	(7,637,164)	(7,004,282)	(5,700,000)	(5,656,800)
Incr. in Ongoing Operating Provisions	50,000	50,000	50,000	50,000	50,000
Inv. in Operating Leases	(1,322,988)	(612,384)	(1,031,795)	(461,021)	(1,037,297)
Gross Investment	**(3,934,312)**	**(4,132,766)**	**(5,659,184)**	**(9,482,795)**	**(9,270,048)**
Free Cash Flow (incl. Goodwill)[29]	**(2,189,317)**	**(1,796,592)**	**(4,023,880)**	**(4,548,326)**	**(1,002,618)**

Table 19: Forecasted Free Cash Flow (2024 – 2033)

USD 000s	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
NOPLAT	3,888,661	5,337,024	5,870,726	6,340,385	6,048,727	6,351,163	5,871,298	6,047,436	5,450,252	5,613,760
Net Investment [30]	(3,276,504)	2,533,080	2,176,944	2,086,200	2,025,433	1,789,133	537,198	1,143,270	1,177,568	1,212,895
Free Cash Flow	7,165,165	2,803,944	3,693,782	4,254,185	4,023,293	4,562,030	5,334,100	4,904,167	4,272,684	4,400,865

Table 20: The EDCF approach to operating value (USD 000s)

Year	Free Cash Flow	Discount Factor	PV of FCF
2019	(2,189,317)	0.943	(2,064,936)
2020	(1,796,592)	0.890	(1,598,253)
2021	(4,023,880)	0.839	(3,376,283)
2022	(4,548,326)	0.791	(3,599,510)
2023	(1,002,618)	0.746	(748,386)
2024	7,165,165	0.704	5,044,452
2025	2,803,944	0.664	1,861,895
2026	3,693,782	0.626	2,313,423
2027	4,254,185	0.591	2,513,032
2028	4,023,293	0.557	2,241,617
2029	4,562,030	0.526	2,397,374
2030	5,334,100	0.496	2,643,850
2031	4,904,167	0.467	2,292,656
2032	4,272,684	0.441	1,883,963
2033	4,400,865	0.416	1,830,238
Cont. Value	99,727,098	0.416	41,474,651
Operating Value			55,109,783
Continuing value % of operating value			75.3%

Table 21: Value of Equity (USD 000s)

Operating Value	56,745,277
Excess Cash and Securities	2,642,390
Financial Investments	854,716
Enterprise Value	60,242,383
Debt	(9,042,267)
Capitalized Operating Leases	(1,873,553)
Non-controlling Interest	(3,296,287)
Long-Term Operating Provision	(372,828)
Restructuring Provision	(102,333)
Stock Options	(2,864,016)
Equity Value	42,691,099
No. Shares (millions)	172
Value per Share	**248.59**

[29] It is assumed that there will be no additional investments in goodwill and intangibles, as this would be outside the capacity of tis thesis.
[30] I.e. net increase in invested capital.

Midyear Adjustment Factor[31]	1.030
Operating Value (Adj.)	**56,745,277**

For the CV, a long-term growth rate of 2 percent was assumed, as this matches the consensus long-term inflation rate employed by the US Federal Reserve. In addition, a long term ROIC of 11.0 percent was assumed. This represents that Tesla's ROIC will have stabilized at a level between what can be expected of a high performing automotive company and a low performing technology company.[32] In other words, Tesla is assumed to achieve returns above its WACC for a long time, and accordingly the CV ends up forming the majority of the estimated operating value of Tesla.

Comparative Multiples Valuation

As discussed in the Literature Review, it is widely considered a best practice to benchmark EDCF valuation results using multiples to see whether the valued company is potentially over or undervalued (Petersen et al., 2017; Koller et al., 2015). In multiples valuation, it is important to ensure that one selects a comparable group of companies for the benchmarking. For consistency purposes, this thesis will utilize the same six comparables that have previously been relied upon throughout the analysis. As previously established, this benchmarking will rely on enterprise value multiples. Although the price-to-earnings ratio is commonly used, it is distorted by capital structure and non-operating gains and losses (Koller et al., 2015). Koller et al. (2015) recommend enterprise value to EBITA for most analyses. However, given Tesla has exhibited and is forecasted to continue exhibit volatile earnings, negative profits and a high spending on R&D, then enterprise value to revenues is deemed to be more appropriate for achieving an appropriate level of comparability in the benchmarking. Moreover, when using multiples, the denominator should use a forecast of profits, rather than historical profits, as unlike backward-looking multiples, forward-looking multiples are consistent with the principle that a company's value equals the present value of future cash flows.

[31] As recommended by Koller et al. (2015), the value of operations includes a midyear adjustment equal to one-half of a year's value discounted at Tesla's WACC. This is to adjust for the fact that free cash flows were conservatively discounted as if they were entirely realized at the end of each year, when, in fact, cash flows occur evenly throughout the year. The six-month factor assumes that cash flows will come in on average in the middle of the year.
[32] See: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/mgnroc.html.

Table 22: Enterprise Value / Revenues Valuation[33]

USD Millions	Market Cap.	PV of lease debt	Total Debt	Total Debt incl. leases	Firm Value	Cash	Enterprise Value	Revenues	EV/Rev.
VW	88,541	5,534	203,248	208,782	297,323	18,585	278,738	276,996	1.01
Toyota	199,925	-	182,172	182,172	382,097	22,509	359,589	276,630	1.30
Ford	47,381	1,214	158,334	159,548	206,929	9,174	197,755	156,776	1.26
GM	59,563	1,246	99,728	100,974	160,537	10,056	150,481	145,588	1.03
Fiat Chrysler	31,680	1,461	20,010	21,471	53,152	14,038	39,113	133,028	0.29
BMW	63,385	2,497	115,603	118,100	181,485	8,337	173,148	118,489	1.46
Tesla (presently)							60,242	16,256	3.71
Tesla (1Y forward)							60,242	27,734	2.17
Tesla (5Y forward)							60,242	55,000	1.10
Avg. of Comparables									**1.06**

To test different scenarios, enterprise value to revenues was calculated using 2018, 2019 and 2023 revenue values. Under normal circumstances, a one year forward denominator is considered sufficient for purposes of being forward-looking. However, for companies whose performance is expected to change, using projections further out can be appropriate (Koller et al., 2015). As evident in Table 22 above, different denominator years yield vastly different results as to whether Tesla is valued in line with the comparables or expensive (i.e. selling at a significant premium). Comparing the one versus the five-year forward multiples results, shows Tesla being valued at an implied premium of either 105 or three percent, respectively. Given that using multiples is not an “exact science” and any conclusions largely directional, considering the simplification of reducing companies to a single ratio, the three percent premium derived from the five year forward multiple will be considered as supportive of the results of the EDCF valuation. Furthermore, as the five-year detailed forecast illustrates, the next few years are forecasted to show both volatile earnings and performance from Tesla, and using the five-year multiple from the end of the detailed forecast period is thus considered appropriate. Thus, as the point of this multiples valuation was to ascertain the reasonableness the EDCF valuation, it can be concluded that based on the above enterprise value to revenues valuation, the results of the EDCF valuation appear sound when compared to the relative value of Tesla versus its comparable automotive competitors.

[33] Source: Bloomberg and Capital IQ.

The Premium

As of Monday, December 31, 2018 at the close of the NASDAQ (January 1, 2019 being the valuation date used by this thesis), Tesla was selling at 332.80 USD per share. Compared to the estimated share price based on the EDCF approach, which yielded a price of 248.59 USD per share, Tesla's stock is currently selling at a 33.9 percent premium. Given the previously described difference in fundamentals between Tesla and that of its comparable competitors in terms of their performance and revenue magnitude vis-à-vis Tesla, i.e. all of them being larger in terms of revenues and more profitable, it is not surprising to find that Tesla is selling at a premium. Having said that, the magnitude of the premium is quite significant, and could thus very well indicate that classic valuation methods, such as the EDCF approach, is not capturing all of the value perceived by actors in the marketplace. Thus, instead of concluding just that Tesla is overvalued, this thesis will, as it set out to do, now proceed to estimate how much of this premium can reasonably be attributed to the reputation of Elon Musk.

From an explanatory point of view, the 'low-hanging fruit' in terms of attributing the premium would be to conclude that it is just a matter of differing expectations – i.e. that it is merely different analysts making different assumptions in their valuation models, and while this of course is not incorrect, this thesis will argue that it is preferable to then try to 'dig a little deeper' and reasonably estimate what could be motivating analysts to make such 'bullish' assumptions according to what they perceive. Having outlined the key theory pertaining to the role of reputation in a corporate context in the Literature Review, this finds it quite plausible that reputation as an intangible asset is a factor motivating the premium Tesla is currently selling at for the following reasons. First, as argued by Brammer et al. (2004) and Gamez et al. (2016), one should not be surprised to find companies with a good corporate reputation selling at a premium vis-à-vis their intrinsic/fundamental value, as traders and analysts are subject to the same human biases as everyone else, thus exposing them to herd behavior and 'buying euphoria.' As Tesla is widely considered a company that "creates meaningful difference by, quite simply, being meaningful and different," has "built an enthusiastic, nearly rabid fan base" and was named the world's 4th most innovative in 2018 by Forbes, [34] it is almost to be expected to find Tesla selling at a premium (Brandz, 2017). Second, as established, it is not only Tesla that has a strong reputation – since Steve Jobs's death in 2011, Tesla's CEO, Elon Musk, has "emerged as the leading celebrity of

[34] https://www.forbes.com/innovative-companies/#4b6204c11d65.

Silicon Valley" (for better or worse) and to believers he "is steering the history of technology" (Schaffer, 2015). As (perceived) management quality has been found to be the main driver of corporate reputation (Wang et al., 2016), and given that "CEO reputation is more important than corporate reputation" (Weng & Chen, 2017), then given Musk's 'superstar' like status, this then lends further support to the hypothesis that a premium should be expected for Tesla and that it is likely that a significant portion hereof is attributable to the company's reputation, and its CEOs reputation in particular. Third, even the US Securities and Exchange Commission ("SEC") indirectly endorsed the (perceived) indispensableness of Elon Musk to Tesla, by arguing as part of its September 29, 2018 settlement with Elon Musk that "the skills and support of certain individuals may be important to the future success of a company."[35]

Supplemental Regression Analysis

To then attempt to quantify the relationship between the relationship and interaction between the reputation of Tesla and that of Elon Musk, this thesis obtained data from Google Trends.[36] Specifically, the data obtained were index values for 'Interest over Time,' where numbers represent search interest relative to the highest point on the chart for the given region and time. A value of 100 is the peak popularity for the search term, a value of 50 means that the term is half as popular, and a score of zero means there was not enough data for the term. The time period was the past five years, i.e. 2014 to 2018, and the region was the US. The thesis also tried running the search with the region set to 'worldwide,' but this had the effect of making only a few events dominate the data. Furthermore, as the US is still the main market for Tesla, particularly on a five year backwards-looking basis, the selection of the US as region for the data was deemed appropriate.

Table 23: Regression of Tesla on Elon Musk using interest over time data

Regression Statistics						
Multiple R	0.591718	R Square	0.35013	Adjusted R Square	0.347621	
Standard Error	7.771701	Observations	261			
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	15.82832	0.674982	23.45	5.34E-66	14.49917	17.15747
Elon Musk	1.361761	0.115279	11.81277	4.79E-26	1.134758	1.588764

Since the p-value is less than 0.05 the thesis reject the null hypothesis that the regression parameter for Elon Musk is zero at significance level 0.05. However, the absolute impact of

[35] https://www.sec.gov/news/public-statement/clayton-settlements-elon-musk-and-tesla.
[36] https://trends.google.com/trends/.

the coefficient is somewhat weak, giving the slope of the regression equation a slope of 1.36. Still, R Square indicates that approximately 35 percent of the variation of the interest in Tesla can be explained by the interest in Elon Musk (as this regression only has one x variable, Adjusted R Square was not used). While the presence of confounding factors is technically not a bias per se, as bias is usually a result of errors in data selection, data collection or measurement, there are undoubtedly some that possibly could have an effect on the above results (Agresti & Franklin, 2009). Still, as this is a supplementary analysis that is supposed to provide a rough estimate, this thesis will not further refine this analysis due to scope constraints.

Comparing Estimates of CEO Reputation

This thesis will now undertake a (limited) survey approach and summarize the few other estimates (and 'guestimates') of CEO reputation made by investors, academics and other business professionals that have been encountered as part of conducting research for this thesis. None appeared to have utilized the same approach as this thesis, which thus contributes to the value this thesis can add to the body of literature on the topic. An upside of this survey will be that it reflects the actual expectations of participants in the marketplace. The downside is the risk of selection bias. Standard search engines, both academic and practitioner oriented, were utilized, yet this thesis cannot guarantee that other estimates do not exist due to feasibility constraints.

Weber Shandwick and KRC Research in 2015 conducted a global survey of 1,750 executives in 19 markets and found that executives estimate that 44 percent of their company's market value is attributable to the reputation of their CEO. During the SEC's investigation and public negotiation with Elon Musk in late September, 2018, where investors had to confront the real possibility that Elon Musk would not be allowed to continue in an executive role at Tesla, John Coffee of Columbia Business School and Brian Johnson were both asked to opine on how much Elon Musk is worth to Tesla. As the latter put it: "should the SEC be successful in barring Mr. Musk from serving as an officer or director, investors would focus back on the value of Tesla as a niche automaker, rather than a founder-led likely disrupter of multiple industries" (Campbell ,2018, September 28). Lastly, an indirect estimate of Musk's value to Tesla was observable through the stock's reaction to Musk's settlement allowing him to remain at Tesla as CEO. Though the estimates of course wary, this thesis still finds it remarkable that most estimates converge around the upper 30s – indeed, it is the arguably most “noisy” estimate that is the biggest outlier (i.e. the market reaction), which drags down the average to 33 percent (if excluded, the average increases to 37 percent).

Table 24: Limited Survey of CEO Reputation Premium Estimates

	Estimate	In %
Weber Shandwick (2015)	44%	44.0%
John Coffee (in Waters (2018, September 29))	25% - 40%	25.0%
		40.0%
Brian Johnson (in Campbell (2018, September 28))	$130 per share	39.1%
Market reaction on October 1, 2018 to SEC deal (in Shubber (2018, October 2))	17%	17.0%
Avg. of Estimates		**33.0%**
R Square (as calculated by the author)		35.0%

Coincidentally, the median value between the two averages happens to be the calculated R Square from Table 23. Thus, though the supplemental regression analysis was originally meant to provide a rough estimate of the percentage of Tesla’s reputation that was attributable to Elon Musk, an argument could be made that since Google presumably provides access to the vast majority of publicly information regarding Tesla, then since this would be the same information available to most analysts and investors, it could be argued that explaining 35 percent of all interest in a company could be a proxy for not just explaining reputation but also all perceived value. Still, this thesis will also fully acknowledge the tenuous nature of such causal rationalizing and recommend further investigation of the subject by other academics and professionals. Thus, the thesis will limit its conclusion on the presence and size of the CEO reputation premium for Tesla to concluding that it likely exists and that it is more likely than not to lie within a range of 33 to 37 percent of Tesla’s current market value, i.e. the CEO reputation premium for Tesla is worth between 18.860 and 21.146 billion USD at 332.80 USD per share, and thus presumably could account for almost all of the premium Tesla is currently trading at vis-à-vis the valuation results computed by this thesis.

Paying for Iron Man – considerations & limitations

As established by Schaffer (2015), separating fact from perceived mythos when it comes to Elon Musk can prove problematic – the man was after all an inspiration for Robert Downey Jr.’s iteration of the superhero character Iron Man, and even had a cameo in the second film of the series. This then begs the question of how generalizable / how much can be extrapolated from the finding of a significant CEO reputation premium for Tesla, given that most CEOs, to put it figuratively, do not get to be, nor probably should be, “Iron Man”? As such, the value of the findings of this thesis lies more in providing a thorough, valuation-based example of that CEO reputation premiums do exist as a source of intangible value for companies and that said premium can in some cases be quite significant, and that investors and analysts thus need to pay attention to it, particularly in valuation cases involving CEOs with larger-than-life public personas. Indeed, as the discipline of Behavioral Finance long ago established, analysts and investors can be subject to irrational biases like everyone else (Bodie et al., 2013). On the other hand though, the Weber Shandwick (2015) survey provided the highest estimate of the examined selection, indicating that even with all the reservations attached to this thesis’ conclusions, the estimated CEO reputation premium could still be on the conservative side, meaning that even “normal” CEOs could have significant reputation premiums associated with them. Yet, the thesis will also acknowledge that Tesla, as a young founder-driven firm, faces different reputation dynamics than more mature firms. As such, more research is needed to shed further light on the spectrum of CEO reputation premiums.

Tesla as CSR – implications & observations

Evaluating Tesla as an investment, it is arguably a useful thought experiment to think of it as CSR. Take the finding by Borghesi et al. (2014) that many CSR investments are not aligned with shareholder interests and that they are instead made for the private benefit of firm managers – either because they believe they have a moral obligation or they believe these investments enhance their personal reputation. Both of these arguments could be made with regards to Elon Musk. In addition, with Tesla’s history of burning cash, it is quite apt to note Bhandari and Javakhadze’s (2017) observation that CSR tends to aggravate financial constraints. Investors should thus be mindful of what type of investment they want to regard Tesla as, and also pay attention to the degree of oversight provided by Tesla’s board, both from the point of view of making sure CSR like spending is aligned with shareholder interests and expectations, and more broadly from the risk management and corporate governance perspective of making sure Musk takes seriously the likely fact that approximately 1/3 of the value of the company is directly tied to him and his reputation. Unfortunately, even taking into account the recent SEC ruling that Musk pay a fine of 20 million USD, step down as chairman for the next three years, submit any future market-moving tweets for clearance and see two more independent directors appointed to the board, he remains “unlikely to change his wayward behavior” nor is the board expected to be any more effective in standing up to him (Waters and Campbell, 2018, September 30).

Conclusion

This thesis examined the degree to which Tesla was selling at a premium as of January 1, 2019, and the degree to which this could reasonably be attributed to a hypothesized CEO reputation premium. The motivation for this investigation was primarily driven by an interest in the subject arising from the recent increase in the importance of intangible assets. Existing literature and empirical findings show that there is a theoretical case to be made for the existence of such a premium, but also showed a dearth of valuation-based studies quantifying said premium. The thesis then conducted a thorough valuation of Tesla based on the EDCF approach, grounded in strategic and financial analyses, and corroborated with a sanity check valuation using the enterprise value to revenue multiple.

The industry and strategic analyses concluded that Tesla does have a competitive advantage in the EV market. The advantage is driven by Tesla's current technological capabilities when it comes to battery technology and its head-start in the EV segment. Due to increased competition, particularly in the premium segment, a lack of alliance partners, especially in ridesharing, and a cost advantage that competitors in the medium to long term will likely be able to match, Tesla competitive advantage is ultimately not sustainable. Tesla's smaller energy segment was assumed to be largely an undefined 'blue ocean' market where Tesla will grow in line with the rest of the industry.

The estimated enterprise value of Tesla is 60,242 million USD, which results in a share price of 248.59 USD. The primary driver of this value is Tesla's increase in production capacity under the assumption that the EV market can absorb what Tesla can produce. Over the medium to long term, growth, margins and costs were normalized vis-à-vis comparable, established competitors. Comparing this valuation to Tesla's current share price shows that Tesla is currently selling at a 33.9 percent premium. The multiple valuation then found that the results, on a forward-looking basis, were reasonable. Lastly, a combination of regression and survey analyses found that the CEO reputation premium for Tesla likely exists and that it is more likely than not to lie within a range of 33 - 37 percent of Tesla's current market value.

The thesis contributes to existing research by attempting to quantify the theorized value of a CEO's reputation through a valuation-based approach and supporting the results of this with analysis of Google Trends data. The results have important implications for both investors and managers by highlighting the need to further develop valuation approaches when it comes to intangible assets and the importance of risk management to include CEO reputation.

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Appendix A

Tesla's Main Debt Positions as of Q3 2018

Type	**From**	**Maturity**	**Coupon**	**Size**	**Conv. Price**
Maturing Before		*Dec-19*			
Convert	SC	Nov-18	2.75%	$230 million	$560.64
Convert	TM	Mar-19	0.25%	$920 million	$359.87
Convert	SC	Nov-19	1.63%	$566 million	$759.36
Prom. Note	SC	Aug-18	6.5%	$100 million	
Subtotal				*$1.816 billion*	
Non-Recourse					
Term Loan	SC	Dec-18	4.80%	$157 million	
Term Loan	SC	Jan-21	4.90%	$176 million	
				$333 million	
Future Maturities					
Convert	TM	Mar-21	1.25%	$1.38 billion	$359.87
Convert	TM	Mar-22	2.38%	$977.5 million	$327.50
Senior Notes	TI	Aug-25	5.30%	$1.8 billion	
Subtotal				*$4.157 billion*	

SC=SolarCity
TM=Tesla Motors
TI=Tesla, Inc.

Appendix B

Projected Income Statement (USD 000s)

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Revenues	27,734,457	33,047,740	42,000,000	46,000,000	55,000,000	62,700,000	70,224,000	77,246,400	83,426,112	88,431,679	92,853,263	96,567,393	99,464,415	102,448,347	105,521,798
Other Operating Revenues	1,303,049	1,480,959	1,683,160	1,912,967	2,174,151										
Cost of Goods Sold	(21,244,594)	(25,446,760)	(33,600,000)	(34,960,000)	(41,250,000)										
SG&A Expenses	(4,714,858)	(5,287,638)	(6,720,000)	(6,440,000)	(6,600,000)										
Dep. & R&D Amort.	(2,811,574)	(3,328,135)	(4,180,539)	(4,620,000)	(4,636,800)										
Other Operating Expense	(1,303,049)	(1,443,935)	(1,599,002)	(1,721,671)	(1,848,029)										
Reported EBITA	(1,036,569)	(977,769)	(2,416,381)	171,297	2,839,323										

Projected NOPLAT (USD 000s)

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Reported EBITA	(1,036,569)	(977,769)	(2,416,381)	171,297	2,839,323										
Adj. for Operating Leases	89,385	106,509	135,361	148,252	177,258										
Interest Associated with Long-Term Operating Provision	11,185	11,185	11,185	11,185	11,185										
Adjusted EBITA	(935,999)	(860,076)	(2,269,836)	330,734	3,027,766	4,860,826	7,022,400	7,724,640	8,342,611	7,958,851	8,356,794	7,725,391	7,957,153	7,171,384	7,386,526
Taxes on EBITA	-	-	-	-	-	(972,165)	(1,685,376)	(1,853,914)	(2,002,227)	(1,910,124)	(2,005,630)	(1,854,094)	(1,909,717)	(1,721,132)	(1,772,766)
Change in Deferred Taxes Operating	(130,580)	(131,885)	(275,399)	(16,264)	602,864	-	-	-	-	-	-	-	-	-	-
NOPLAT	(1,066,579)	(991,961)	(2,545,235)	314,470	3,630,629	3,888,661	5,337,024	5,870,726	6,340,385	6,048,727	6,351,163	5,871,298	6,047,436	5,450,252	5,613,760

Projected Invested Capital (USD 000s)

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Operating Working Capital	(7,057,753)	(11,124,535)	(13,451,428)	(10,079,653)	(7,453,703)										
Net Property, Plant, and Equipment	13,867,228	18,176,257	21,000,000	22,080,000	23,100,000										
Other Assets Net of Other Liabilities	10,203,643	10,203,643	10,203,643	10,203,643	10,203,643										
Ongoing Operating Provision	(2,130,258)	(2,180,258)	(2,230,258)	(2,280,258)	(2,330,258)										
Value of Operating Leases	3,196,541	3,808,925	4,840,720	5,301,741	6,339,038										
Op. Invested Capital (excl. Goodwill)	18,079,401	18,884,032	20,362,677	25,225,473	29,858,720	26,961,000	29,494,080	31,671,024	33,757,224	35,782,657	37,571,790	38,108,988	39,252,257	40,429,825	41,642,720
Goodwill & Intangibles	356,702	326,702	326,702	326,702	316,702										
Cumulative Written Off & Amortized	22,082	52,082	52,082	52,082	62,082										
Op. Invested Capital (incl. Goodwill)	18,458,185	19,262,816	20,741,461	25,604,257	30,237,504	26,961,000	29,494,080	31,671,024	33,757,224	35,782,657	37,571,790	38,108,988	39,252,257	40,429,825	41,642,720