

**DISCOUNTED CASH FLOW VALUATION OF  
TESLA, INC.**

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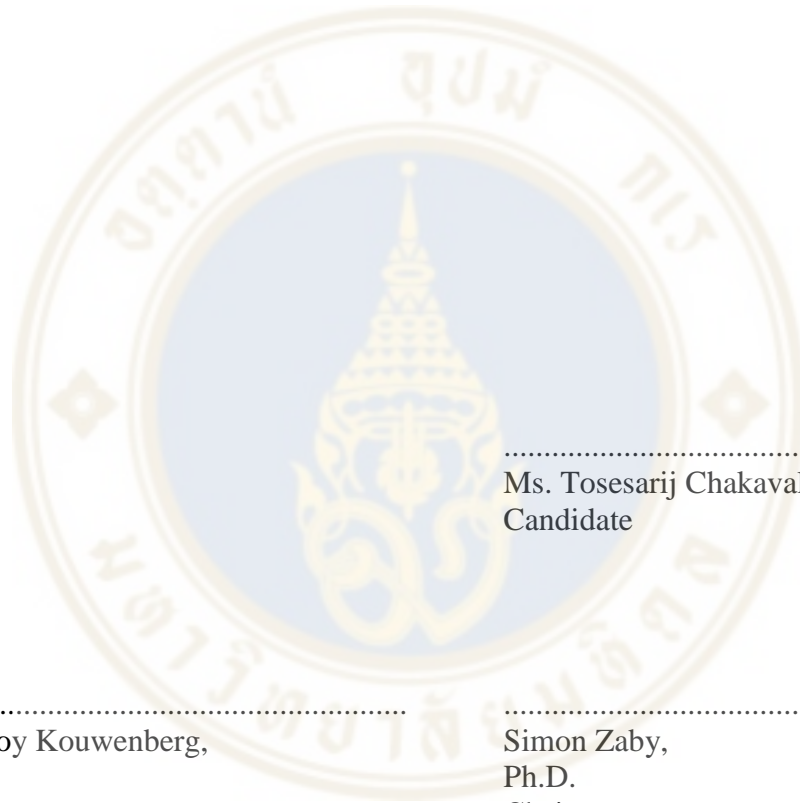
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**A THEMATIC PAPER SUBMITTED IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR  
THE DEGREE OF MASTER OF MANAGEMENT  
COLLEGE OF MANAGEMENT  
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TESLA, INC.**

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**DISCOUNTED CASH FLOW VALUATION OF TESLA, INC.**

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M.M. (FINANCIAL MANAGEMENT)

THEMATIC PAPER ADVISORY COMMITTEE: ROY KOUWENBERG,, Ph.D.,  
SIMON ZABY, Ph.D., WORAPONG JANYANGYUEN,, Ph.D.**ABSTRACT**

This thematic paper illustrates how to value the stock price of Tesla, Inc based on a discounted cash flow valuation model. The three-stage growth discount model was adapted to match with the Tesla situation in 2020. The value we demonstrate will reflect the expected growth of the firm and provide information to help address the risk. The forecast price from valuation was 418.09 which was 36% lower than the closing price of 571.4 on November 25, 2020. Therefore, the valuation is indicative of a recommendation to sell the stock. Tesla had three consecutive profitable quarters for the first time. The firm expanded its factory to supply the demand of its cars and increase its capability for development.

In summary, the model provides an intrinsic valuation of the firm, although it still has some limitations. Therefore, investors should look at the stock value carefully. This study will only provide guidance of the intrinsic valuation of the emerging electric vehicle industry in the internet of things era which differs from traditional automaker.

**KEY WORDS:** TESLA/ Technology/ Discounted Cash Flow/ Valuation

38 pages

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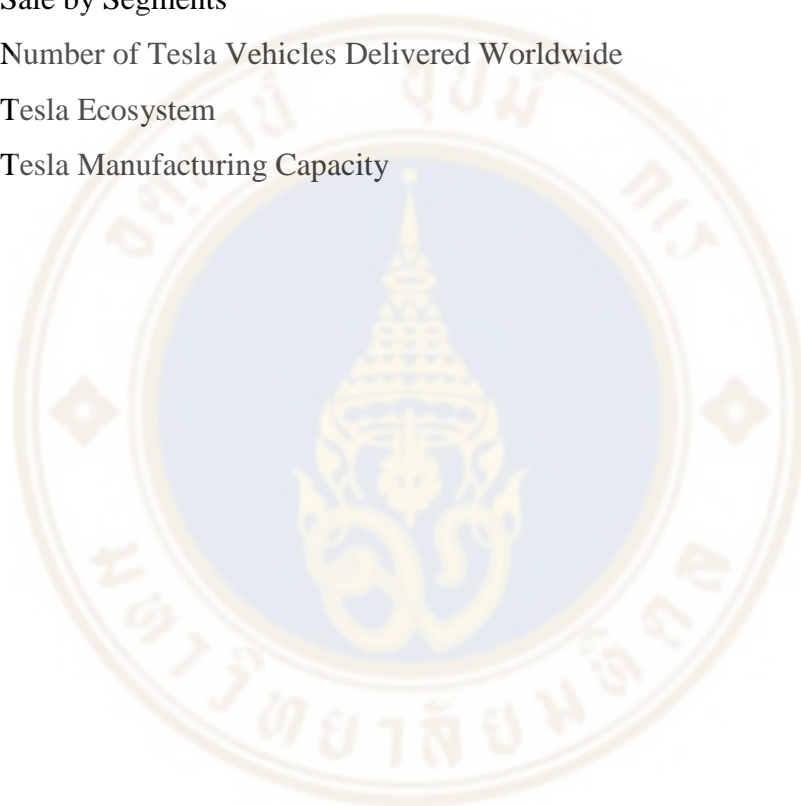
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# CHAPTER I

## INVESTMENT SUMMARY

### 1.1 Investment summary

Based on our evaluation, we set a target price of 418.09 USD for Tesla. On November 25, 2020, the price of Tesla stock was 571.4 USD, which is overvalued according to our valuation. A discounted cashflow (DCF) valuation was applied to analyze the firm. The result depends on the effect of several major factors on driving the Tesla stock price. However, we recommend to sell Tesla stock because the stock value is overvalued from the present discounted value of the firm.

### 1.2 Success of Tesla Model 3

Currently, the Model 3 is the cheapest model of Tesla's vehicles. However, the model offers most of the features found in the higher tier models. The car price start from 35,000 USD which allows it to compete directly with traditional fossil fuel cars in the middle to high tier price segment. The Tesla Model 3 has become the first mass production Tesla vehicle offered on the market. It meets the demand for vehicle that incorporate ecofriendly and technological advances especially in developed countries. The success of the Model 3 has enabled the firm to achieves its first profitable year.

### 1.3 Ability to Manage Positive Cash Flow

Although Tesla has not made any profit since its IPO, the firm has been managed to make its cash flow positive. This keeps operations, R&D, and SG&A going well. Elon Musk is one of the most famous entrepreneurs in the world. His charisma and success allow him to persuade investor to invest in Tesla. The firm limits the number of shares issued in order to keep Tesla stock scarce.

These actions are the starting point of Tesla's stock price drastically increasing. Tesla has very high leverage for gaining credit and issuing stock due to the technological advancements they introduce and Elon Musk's success. This allows Tesla to negotiate for debt financing as needed. Tesla has spent most of its earnings after tax and interest for R&D and expanded their capacity over many years. The result is to reduce tax and negate dividend payouts while maximizing its production and development.



## **CHAPTER II**

### **BUSINESS DESCRIPTION**

#### **2.1 Business**

Tesla, Inc., or Tesla Motors is a company which designs, develops, manufactures and sells electric vehicles and energy storage systems. It also provides vehicle service centers, supercharger stations, and self-driving capability. The company operates through two segments: automotive & energy generation and storage. The Automotive segment includes the design, development, manufacturing, and sale of electric vehicles. The energy generation and storage segment include the design, manufacturing, installation, sale, and lease of stationary energy storage products and solar energy systems, as well as the sale of electricity generated by its solar energy systems to customers.

Tesla is a firm aiming to achieve a transition into using sustainable energy to power people's daily needs. The firm was founded in 2003 with the concept of proving that electric cars can be as good as gasoline cars. Its first car, the Tesla Roadster, was released in 2008 and came with groundbreaking technology. The firm raised funds through an IPO and was listed in June 2010. Today, the company's vision has expanded to cover more products that promote zero emission concepts from electric cars to solar panel products. The concept is also incorporated into every Tesla facility which aims to reduce emission as much as possible from each plant. At Tesla's three current plants, two of which are located in the US and the other of which is in China. the latest Tesla technology is applied to use as much alternative energy as possible. The same technology will also be installed in future facilities when the company expands its presence into Germany, the UK, central Asia, and central US within 2021. The firm currently has 48,000 employees across the globe.

SUPPORT ACTIVITIES	<b>Infrastructure</b> Building & place management, General management, accounting, finance					Profit Margin
	<b>Human Resource Management</b> Recruit and train staffs					
	<b>Technology</b> Software & Hardware support					
	<b>Procurement</b> Punchers office supplies and equipment					
PRIMARY ACTIVITIES	<b>Inbound Logistics</b>	<b>Operations</b>	<b>Outbound Logistics</b>	<b>Marketing &amp; Sales</b>	<b>Service</b>	
	<ul style="list-style-type: none"> <li>• Receipt and storage of raw materials to build electric vehicles, energy storage system and solar panels</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive: Design, development, manufacturing, and sales of electric vehicles</li> <li>• Energy generate and storage: design, manufacturing, installation and sales or lease of stationary energy storage systems to customers</li> </ul>	<ul style="list-style-type: none"> <li>• Warehousing and distribution of electric vehicles, energy storage systems and solar panels produced by the company</li> <li>• Ships electric vehicles to store and galleries</li> <li>• Directly deliveries of electric vehicles to customers</li> </ul>	<ul style="list-style-type: none"> <li>• Advertising</li> <li>• Increasing brand awareness in the global scale</li> <li>• Sale of used car, trade- in</li> <li>• Sale vehicles online and the company owned showroom</li> </ul>	<ul style="list-style-type: none"> <li>• Deal with customer's complain</li> <li>• Post sales service</li> <li>• On demand service van</li> <li>• Service center</li> </ul>	

**Figure 2.1: Value Chain Analysis**

Source: Team assessment

### 2.1.1 Sources of Revenue and Growth

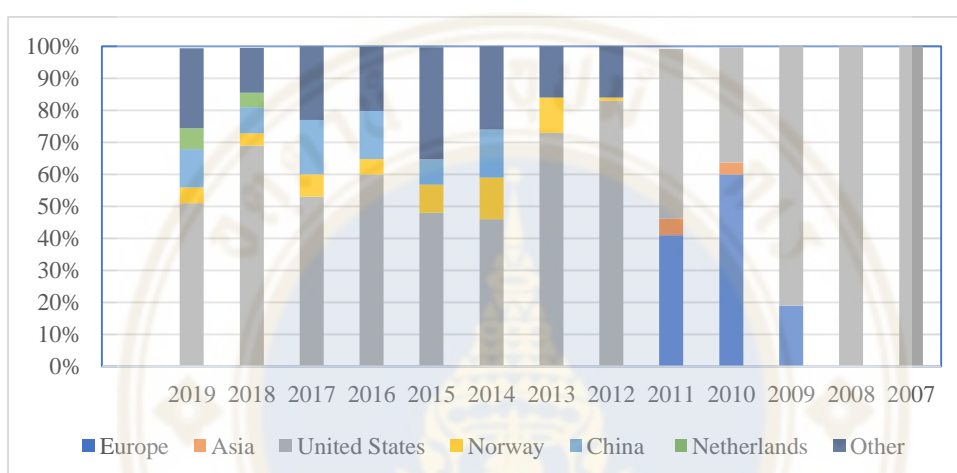
According to the company's annual report, the business was divided into two main categories which are automotive related products (94%), and energy generation and storage (6%) in 2019 (Figure 2.2). Both segments were growing rapidly.

Segments		2019	2018	2017	2016	2015
Annual Business Line by Segment in Millions of U.S. Dollars		31-Dec-2019	31-Dec-2018	31-Dec-2017	31-Dec-2016	31-Dec-2015
<b>Automotive</b>	NAICS: 336111	<b>94%</b>	<b>93%</b>	<b>91%</b>	<b>97%</b>	<b>100%</b>
External Revenue		23,047	19,906	10,642	6,819	921
Total Revenue		23,047	19,906	10,642	6,819	921
Gross Profit		3,879	3,852	1,981	1,596	4,032
Gross Margin (%)		16.83%	19.35%	18.61%	23.41%	437.59%
<b>Energy generation and storage</b>	NAICS: 335912, 33531	<b>6.2%</b>	<b>7.2%</b>	<b>9.5%</b>	<b>2.6%</b>	<b>0.2%</b>
External Revenue		1,531	1,555	1,116	181	2
Total Revenue		1,531	1,555	1,116	181	2
Gross Profit		190	190	242	3	14
Gross Margin (%)		12.41%	12.24%	21.66%	1.69%	661.05%
<b>Consolidated Total</b>		<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
External Revenue		24,578	21,461	11,759	7,000	924
Total Revenue		24,578	21,461	11,759	7,000	924
Gross Profit		4,069	4,042	2,222	1,599	4,046
Gross Margin (%)		16.56%	18.83%	18.90%	22.85%	438.12%

**Figure 2.2 Source of Revenues**

Source: Reuter as of October 2020

In geographical terms, in 2019, Tesla was focused heavily on the United States of America (51%), followed by China (12%), the Netherlands (6.5%) and Norway (4.9%) while currently aiming to expand into other countries in the near future (Figure 2.3). The rest of Tesla's products were provided into other countries' proxy and third-party providers worldwide. As a result, the firm relies heavily on the US and China market, both of which have been hit hard during the COVID situation. Even so, Tesla has still be able to achieve growth in these markets.



**Figure 2.3 Sale by Segments**

Source: Reuter as of October 2020 and team assessment

### 2.1.2 Tesla's current situation

Tesla initiated a plan to expand its factory facilities to increase productivity to meet the growing demand in 2020. The firm had finished half of the construction on Gigafactory Shanghai early in the first quarter of 2020. However, due to the COVID pandemic, production from the factory and construction of the remaining facilities had to be temporary halted. Once permission was given to re-open the factory, Tesla continued production rapidly to deliver its orders. The firm was able to deliver almost the same number of units as in the second quarter of 2019 even in the pandemic situation. The firm went into the third quarter of 2020 showing stronger results of growth over 54% in the number vehicles produced. This reflects that Tesla can operate effectively even under the restriction of a global pandemic and that demand for Tesla products is still high even in an economic recession.

Tesla also plans to build the factory in Germany, as the European Union has increased tariffs on cars imported from outside the EU to support the automobile business within the bloc. Construction on the Gigafactory in Germany is also on schedule. This factory will be different from those in the US and China as, most of facilities at the factory in Germany will be built for research and development.

The company is working to develop its Tesla application and a full self-driving system, both of which are going according to plan. The beta version of the self-drive system was released in October to allow the software to learn and develop itself. Additional services will also be rolled out by Tesla from other Musk-owned firms such as Starlink. The software development also includes improving of productivity cycle and ability to adjust Tesla's features by both users and the firm. These developments will allow Tesla cars to be more versatile and adjustable to suit the individual user experience.

In terms of the hardware, several products have been announced for this year. The Cyber Truck and Tesla Semi are ready to pre-order and will be delivered in 2021. These products expand the portfolio of Tesla products to compete in the truck manufacturing market. As the firm developed the battery by itself, this makes Tesla vehicles cheaper than other brands. The plan is to increase the battery capacity to include more charge cycles and extend its effective range. Tesla expects to deliver a new battery within 3 years. The result from this development will allow Tesla to sell its cheapest car at roughly 25,000 USD which is lower than its current cheapest car, the Model 3, which sell at 35,000 USD. Elon Musk also claims that the battery will be able to power the car for a million miles before it needs to be changed. This will increase the battery's efficiency by roughly 50-70% compare to the current generation of Tesla batteries which claim to be able to run for 300,000-500,000 miles before they need to be replaced.

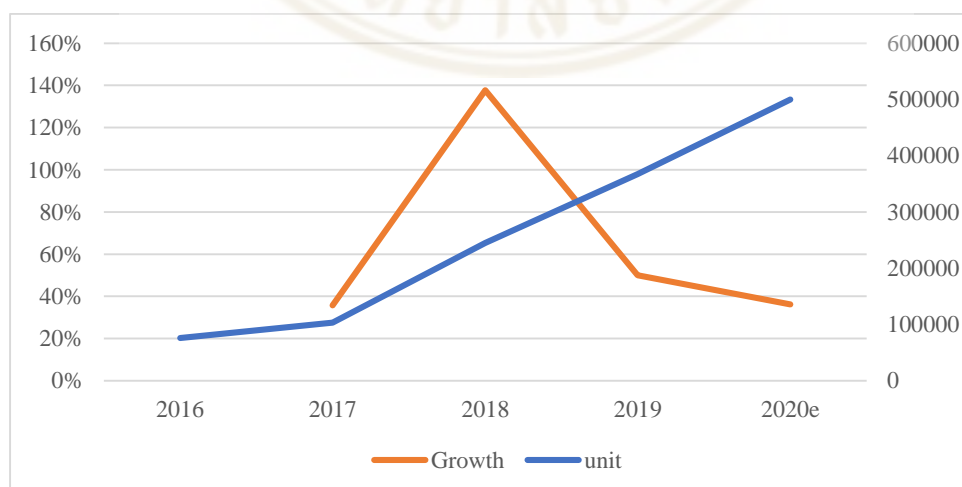
### **2.1.3 Products**

Tesla products are technological advancements that push current technology limits. The firm offers electric vehicles with other technological advances that are ahead of their gasoline competitors. All Tesla vehicles are equipped with a surround sensor and an advanced processor that is packed with many features which

are ahead of its time. The technology enables advanced driver assistance with the capability of full self-driving features which create many future possibilities for the vehicles. Tesla batteries, packed used in both their electric vehicles and their energy storage solutions, are among the most advanced batteries on the market and enable its vehicles to have the highest operating range in the market. The battery is also used as a solar panel storage device to increase efficiency and reduce the average cost of electricity compare to energy from ordinary sources. Tesla products will change the way we use energy in the future by offering a sustainable energy source that can compete with ordinary fuel in terms of both price and efficiency.

## 2.2 Strategy

The strategy is to catalyze the use of alternative energy by providing technologically advanced products. Elon Musk, as the company's CEO stated that the firm aimed to achieve 30-40% growth in their production number in 2020. This translates into roughly 500,000 vehicles within the year (Figure 2.3). The firm currently has the cheapest model offering at 35,000 USD and aims to produce a 25,000 USD model within 2023 to accelerate the more widespread transition to electric vehicles. Tesla also focus its effort on battery manufacturing to be able to produce cheaper and better batteries by itself.



**Figure 2.4 Number of Tesla Vehicles Delivered Worldwide**

Source: Statista as of October 2020 and team assessment

According to its announcement, Tesla stated that its new battery will be even cheaper and more efficiency. In addition, It will require less material to build the battery which reduce the mining and use of energy in the manufacturing process and thereby reduce emissions. The battery will enable a higher range per charge for the Tesla car and increase the per charge kilowatt by over 15%. These battery advances have pushed Tesla to re-release its high-performance Roaster model next year as well as an unnamed cheaper model which aims to target more mainstream car users and penetrates the lower market segment.

The firm is also expanding into other vehicles segments, which are sport utility trucks and cargo trucks. Both models will be available within 2021 and are already available for preorder. Supporting the company's expansion, the Giga factory in Germany will be running at full capacity in early 2021 and expected to produce 500000 extra vehicles per year for Tesla. Moreover, central USA is the next location Tesla is targeting to support its expansion by building another Gigafactory in late 2021. It is expected that demand for Tesla products will keep growing globally as its ecosystem expands to support production around the globe.

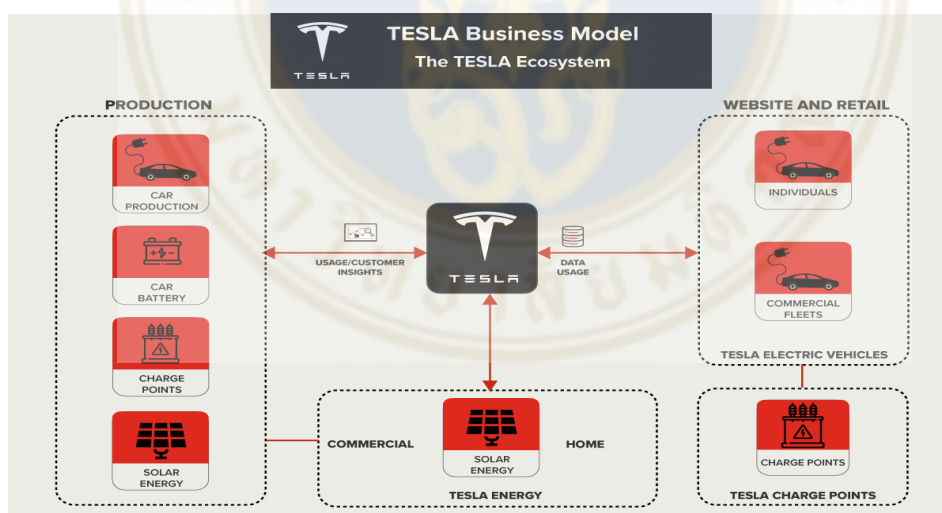
The expansion of production capacity will allow Tesla to optimize its production to meet the increasing demand from the third quarter of 2020. Tesla is able to sell 96% of vehicles produced within the same quarter. The firm also uses a very effective manufacturing process which reduces both the cost and time of manufacturing. This allows Tesla to be able to achieve just-in-time delivery whereby customers can order their vehicle and the firm will be able to produce it to the customer's specification in just 3-8 weeks.

This waiting period is expected to be shorter as Tesla's expansion continues. Since its capacity of production will increase. The current time required to build one Tesla car is between 3 to 5 days which is already fast. However, the high demand for Tesla products is causing a longer wait period for people who order a car despite Tesla already increasing its capacity in 2020.



### 2.2.1 Tesla Ecosystem

Tesla has targeted building an ecosystem to accelerate the adoption of sustainable energy solutions. The firm concluded that in order for it to make sustainable energy become the norm, Tesla needed to develop an ecosystem that could support it in this endeavor. The firm is developing a super charge station network in the US and plans to develop a charging network worldwide in a few years. This will encourage a higher adoption rate for electric vehicles also benefits Tesla. Tesla already offers a charge station system that can store solar energy to encourage people to adopt more clean energy as well. The system aims to allow Tesla car owners to be able to charge their electric vehicles at home and be able to charge their car more quickly on the road thereby enabling electric vehicles to match gasoline vehicles for long haul driving. Beyond that Tesla products are built to work with the products of other firm's own by Elon Musk. Those firms were created to push technology implementation further to provide better and more efficient energy usage.



**Figure 2.5 Tesla Ecosystem**

Source: 2020 GaryFox

Tesla sees that in order to achieve its objectives of transitioning the world to use more sustainable energy the firm needs to build an eco-system that supports it. Tesla vehicles are integrated with processors that can be used to communicate with

drivers via both mobile applications and on the car screen. The application could be used to assist the driver to use the battery more efficiently. In addition, having solar panel with Tesla power storage allows Tesla car owners to be able to get clean energy that also make it cheaper to charge their vehicles. Tesla vehicles are also developed with modular upgrades in mind that mean all Tesla vehicles can be used for longer and can be updated to match current model performance and efficiency.

The ecosystem is supported not only by Tesla, but also by other businesses that Elon Musk owns. The car's artificial intelligence system is supported by one of the best AI company's in the industry OpenAI. In addition, a global internet service provided by SpaceX through its Starlink network of satellites will be available in Tesla cars. These other products and services from Tesla and related firms will support people to transition to using sustainable energy faster and allow the world to be cleaner.

### **2.3 Management and Governance**

Tesla has an organizational structure that supports continuous business growth by using a functional organizational structure, centralization, and division to facilitate extensive control of the organization. Tesla has a structural group of employees for engineering, which is divided into many departments depending on the type of work and type of products. Even though there are many top managers at Tesla, the most influential person over the company management hierarchy is Elon Musk, the CEO and co-founder of Tesla. Musk leads all of the product design, engineering and global manufacturing of the company's electric vehicles, battery products and solar energy products. He is the biggest shareholder of Tesla and he invests not only his money to in the company but also his daily physical energy. He communicates a clear vision the about core goal and objective of the company to employee to ensure their understanding of expectation. Tesla staff often receive emails from Musk reinforcing what they have already achieved and what the next plan is.

In August 2018, Musk share a post on the Twitter app in which he talked about Tesla out of the stock market bringing it under his private ownership. That Tweet caused Tesla's stock price to skyrocket because investors wanted to buy Tesla stock and sell it to Musk at 420 USD per share. He was sued by the Securities and Exchange

Commission (SEC) and agreed to pay 20 million USD. He had to resign from Tesla's board of directors for three year but remained as chief executive. The structure of the board changed to included two more new independent directors and make the company's management more independently.



## **CHAPTER III**

### **ANALYSIS OF MACROECONOMY, INDUSTRY AND COMPETITORS**

#### **3.1 Industry Analysis**

Tesla has been growing in terms of both market capitalization and market share in the electric vehicle (EV) industry. The firm has already expanded the EV field from a niche market and is transitioning into competing with mainstream auto makers, and other industries. After Tesla decided to focus on accelerating sustainable energy adoption, it had to develop its own products and its own parts which expanded its capability to compete in other industries. The Tesla ecosystem has disrupted the automaker market since it can improve the operating system and lower its price compared to similar priced-gasoline cars. Tesla leads the way in the EV car industry which also allow it to compete with chipmaker firms on the central processing unit for cars.

##### **3.1.1 Electric Vehicles Industry**

According to a report by McKinsey Global Institute, (G. Thomas,2020) the growth of the EV market resulted in to 2.5 % of total vehicle sales being EVs in 2019 despite US and Asia markets facing the negative growth rates, while the European market was expanding dramatically. Tesla accounted for 16% of total EV sales in 2019 and it increased its market share to 28% at the beginning of the following year according to its 2020Q1 report.

The EV market is expected to grow steadily due to wider market penetration among consumers. Tesla also expect to have higher growth than the overall EV trend as the firm establishes itself as the industry leader in the EV market and produces other EV related products. Tesla's innovation and technology allow the firm to dominate the EV market due to its vehicles having the highest effective range. While the advanced features of the car are already ahead of its competitors, Tesla still focuses

on its R&D to keep its ahead. According to an article by Deloitte the compound annual growth rate for EVs is forecast to be roughly 29% for the next ten-years even accounting for the COVID situation. This number is in line with Tesla's sales growth which we forecast will be approximately 30-35% annually in any year that Tesla does not release a new model. However, there is likely to be a spike in sales growth each time the firm releases a new model. Even in 2020 the firm still achieved growth in each quarter. Since Tesla can sell over 97% of its cars, its sales growth could be forecast from the expected number of Tesla car produced. Moreover, as none of its competitors among EV manufacturers have shown any promise of developing the same level of technology as Tesla, the firm will remain the dominant player in this industry until other EV firms are able to catch up with it.

### **3.1.2 Automotive Industry**

When it comes to automakers as a whole industry, Tesla has become a disruptive firm, which along with the sale growth in the EV market has forced traditional automakers to push their development to compete in the EV market. Those firms with the capital and other resources required are striving to develop EVs to compete with Tesla or even provide plugin hybrids as an option that offers some EV benefits combined with combustion engine benefits.

The automotive industry is committing its effort to achieve the same level of technology that Tesla feature in its cars and the adopt these innovations to use in their own EV and combustion engine cars. The technologies they are targeting are those that aim to make their vehicles become more intelligent and better able to enhance the driver or passenger trust in the car. The reason why traditional automakers see Tesla as a main target among competitors is due to Tesla offering EV cars which can compete with combustion engine cars on the market. The way that these EV cars are able to penetrate the market of gasoline dominance is by reducing their price and increase their efficiency to compete with gasoline cars. Tesla has been able to achieve its first disruption by offering EVs that can almost match the effective range of gasoline cars in their segment, while they are ahead in terms of performance and technology with lower energy consuming and the ability to use cleaner energy.

Currently the cheapest Tesla model is offered at 35000 USD, which is its Model 3. This model can compete directly with many traditional combustion engine cars of the same price while retaining the advantages it gains from clean energy, cheaper maintenance, and a higher performance engine. According to a Forbes article (J. Morris,2020) the next Tesla model which will have a MSRP of 25,000 USD, will create another big disruption of the industry and penetration into the market share of gasoline cars. At this price, the car will not be considered as expensive and will enter the price range that mainstream car users will be able to afford. The car will also be equipped with high-end technology like the more expensive models and have an effective range that is ahead of every other EV and comparable with a traditional gasoline car in this price range. This will allow Tesla's market capitalization to skyrocket to the highest in the automaker market and establish it as the world most valuable automaker.

### **3.1.3 Technology Industry**

Digitalization and machine learning will also become a new trend integrated into our daily lives. The internet of things (IoT) will become common within a few years. This will require many physical products to be able to connect to the internet and have a processing unit for performing multi-purpose tasks. This allows any firm with technological advancements to hold advantage over others especially in times of crisis like COVID. According to a Thomson Reuter article, firms like Tesla and Nvidia both increased in value in 2020 since the start of the COVID pandemic because their technology is not affected directly by a crisis or most physical factors. The software can still be developed, and the product can be pushed further and updated. Tesla is using the advantage the firm has in this field to get ahead of its competitors in the EV and automotive markets in this aspect, while also establishing itself as a rival to hardware companies.

According to a Forbes article (S. Sawant,2020), individual vehicle owner numbers will be reduced and there will be greater preference for a car that has more driver assistance features and other quality-of-life improvements in the future. Consumer behavior is also changing, since drivers will prefer a car with a longer product life cycle that could be upgraded instead of changing to a whole new car, which offers the ecological benefit of reduced consumption of resources. Tesla's cars have

been driven by this factor long before any of its competitors. In 2016 Musk stated that all Tesla cars will be equipped with enough hardware that could support full self-driving features. The beta version for testing that allows individual users to use those services was released in 2020. The car could be upgraded in terms of both hardware and software to make its performance and efficiency to be adjusted and tweaked further. This allows every Tesla car to update its features such as providing better driver assistance or self-driving features so that it can keep improving and benefiting from software development and implementation. The processor of the Tesla car is also modular and can be upgraded with a newer one from a Tesla dealer. This processor puts Tesla cars ahead of the competition. The processor is integrated in every Tesla car to process the surrounding environment to support driving assistance and self-driving.

Some other automakers also have these technologies, but most of them are only prototype cars or very limited in terms of capability and upgrade paths. Some competitors such as Daimler partner with one of the biggest processing unit makers, Nvidia, to develop their processor to compete with Tesla. Tesla processors have the capability to work with the products of other Elon Musk firms and to gain extra advantage from the sustainable ecosystem that those firms has establish. Tesla processors can handle tasks in the same way as home computers while also acting as an interface to link between systems. This allows services like subscription and application to be developed and featured in Tesla cars. The features in Tesla cars also become a subscription model which allow users to unlock additional features in software via subscription fee since every Tesla already installs hardware to run that service software. According to a McKinsey article (G. Thomas,2020) the rise of ecommerce allows for a subscription model to become more popular these days. Making up roughly 49% of all online shopping, subscription goods account for half of the growth in e-commerce products. Tesla cars owner will be offered extra subscription services such as streaming and extra driving features to enhance their user experience.

### **3.2 Competitive Positioning**

Tesla is a firm that compete in many industries from EV and, automotive to technology. According to the EV sales database Tesla's Model 3 is the model with

the highest number of deliveries in the first half of 2020 at approximately 142,000 cars. Despite the shutdown for seven weeks due to the COVID situation the firm was already surpassing the equivalent number from the first half of 2019. The number also exceeds the second placed competitor by around 100,000 cars which is approximately 3.7 times. Far ahead of any other EVs or even Plug in Hybrid Electric Vehicle (PHEV) in numbers, Tesla dominates the electric vehicle market.

When it came to the Automotive as a whole, Tesla has disrupted the market. Even competing the biggest automaker, which is Toyota, Tesla's vehicle deliveries around 3.6% of the automaker market. Tesla also aims to increase its number of vehicle deliveries to approximately 500,000 worldwide in 2021. While the biggest challenge to Tesla currently is the demand for vehicles is higher than the number Tesla could produce, the firm aims to ramp up their production to be able to deliver over 1 million vehicles per year in 2021. This will put Tesla in a position where it can compete with other automakers directly.

In terms of technology, Tesla is ahead of competitors and even offer the same major hardware in every Tesla car. This is a feature which competitors cannot offer. According to an article by The Verge, Tesla was replacing Nvidia chips in its processors with its own chips. In this way, Tesla proved that it could develop its own chip which could rival even one of the biggest chipmaker firms in the industry- Nvidia. Nvidia recently partnered with Daimler to develop of processor for the next generation Mercedes which will be a 2021 model. While the Nvidia-Daimler chip focuses on graphical assistance and AI voice assistance, self-driving and driving assistance are still in the prototype state compared to Tesla which has already released its beta in October 2020. This positions Tesla as the best chip maker for vehicles currently due to the firm offering the best performance computing hardware for cars.

In addition, Tesla expanded into the clean energy business in 2015 offering solar panels and power storage. Adapting the battery technologies from its car Tesla offered energy storage that could be charged from solar panels. The product offers the best cost per kilowatt hour compared to its competitors and remains the best value solar panel to this day. As a result, the firm value has skyrocketed since last year due to its market leading performance and it shows no sign of stopping its commitment to innovation development.



### 3.3 Macro Economic Analysis

With more consciousness of sustainability, people today are finding ways to be more environmentally friendly. In 2014, the top carbon dioxide (CO<sub>2</sub>) emitters were China, the United States, the European Union, India, the Russian Federation, and Japan. In 2010, the transportation sector created 14% of global greenhouse gas emissions. The emissions from this sector primarily involve fossil fuels burned for road, rail, air, and marine transportation and with almost all the world's transportation energy coming from petroleum-based fuels, largely gasoline and diesel. In the USA, vehicles are a major cause of global warming. The US transportation sector creates 30% of all US global warming emissions, more than almost any other sector (United States Environment Protection Agency: EPA, 2014). These data are driving governments around the world to focus more on controlling their emissions.

The booming trend for clean technologies leads electric vehicle market growth. Global warming makes people care about the world. People need other products that can replace environmentally-unfriendly one and save the environment. Electric vehicles (EV) replace the traditional internal combustion engine (ICE) vehicles. In the past, EVs were unaffordable. The battery is the main product component of EVs and, the price of an EV battery replacement for hybrid car was very expensive. As the cost premium of this product was so high many customers could not afford an EV. Now, because of technology developments the price of an EV battery has decreased significantly (BloombergNEF, 2019). Another factor is that the cost of owning an EV has been falling compared to ICE vehicle because in some countries government subsidies as well as value added tax and registration tax exemption make lead EVs more affordable. For example, UK government launched an initiative whereby it contributed up to 3,500 GBP to individual customers towards purchasing for battery electric vehicles (Deloitte, 2019).

Overtime, the cost of EV production has continuously decreased driven by improved technology and economies of scale. In particular, technology developments are delivering substantial cost reductions and these advances in technology and cost cutting are expected to continue. A supportive policy environment is another factor that drives EVs market growth. Creating optimal circumstances for the uptake of EVs requires the adoption of a progressive set of measures such as have already been

introduced in many countries. In Europe, Paris intends to ban all gasoline and diesel vehicles from the city center by 2030, while Copenhagen banned diesel cars from 2019. Central London and town centers across the UK will see zero emission zones (ZEZS) introduced from 2025, while Oxford has proposed banning all non-electric vehicles from its center from 2020. In Asia, China also announced a ban on diesel and gasoline vehicle sale since 2017 (Deloitte, 2019). As a result, the new coming rules of many countries will increase demand for EV cars and sustainable energy products in the future.



## CHAPTER IV VALUATION

### 4.1 Financial Analysis

#### Profit / Loss – Compared with Peers

**Table 4.1: Growth of Tesla**

	Tesla						Growth				
	2019	2018	2017	2016	2015	2014	2019	2018	2017	2016	2015
Revenue	24,578.20	21,461.30	11,758.80	7,000.00	4,046.10	3,198.30	14.52%	82.51%	67.98%	73.01%	26.51%
Net Sales	24,578.20	21,461.30	11,758.80	7,000.00	4,046.10	3,198.30	14.52%	82.51%	67.98%	73.01%	26.51%
Cost of Revenue, Total	20,509.30	17,419.20	9,536.20	5,400.90	3,122.50	2,316.80	17.74%	82.66%	76.57%	72.97%	34.78%
Selling/General/Admin. Expenses, Total	2,646.20	2,834.60	2,476.60	1,432.20	922.30	603.70	-6.65%	14.46%	72.92%	55.29%	52.77%
Research & Development	1,343.10	1,460.30	1,378.00	834.50	717.90	464.70	-8.03%	5.97%	65.13%	16.24%	54.49%
Total Operating Expense	24,647.40	21,849.30	13,390.90	7,667.50	4,762.70	3,385.00	12.81%	63.17%	74.64%	60.99%	40.70%
Operating Income	(69.30)	(388.10)	(1,632.00)	(667.30)	(716.60)	(186.70)	-82.14%	-76.22%	144.57%	-6.88%	283.82%
Interest Inc.(Exp.),Net-Non-Op., Total	(592.30)	(649.40)	(399.40)	(168.10)	(117.40)	(97.30)	-8.79%	62.59%	137.60%	43.19%	20.66%
Net Income Before Taxes	(664.60)	(1,004.70)	(2,209.00)	(746.30)	(875.60)	(284.70)	-33.85%	-54.52%	195.99%	-14.77%	207.55%
Net Income	(862.40)	(976.10)	(1,961.50)	(674.90)	(888.70)	(294.00)	-11.65%	-50.24%	190.64%	-24.06%	202.28%
Basic EPS Including Extraordinary Items	(0.99)	(1.16)	(2.36)	(0.98)	(1.38)	(0.47)	-14.66%	-50.85%	140.82%	-28.99%	193.62%
Normalized EBIT	126.50	(252.90)	(1,632.00)	(667.30)	(716.60)	(186.70)	-150.02%	-84.50%	144.57%	-6.88%	283.82%
Normalized EBITDA	2,233.60	1,648.30	4.00	279.70	(294.00)	45.20	35.51%	41107.50%	-98.57%	-195.14%	-750.44%
Free Cash Flow	(339.20)	(4,385.00)	(10,930.70)	(3,076.40)	(5,558.00)	(1,940.10)	-92.26%	-59.88%	255.31%	-44.65%	186.48%

Source: Reuter and Group calculation

**Table 4.2: Growth of Daimler**

	Daimler						Growth				
	2019	2018	2017	2016	2015	2014	2019	2018	2017	2016	2015
Net Sales	172,745	167,362	164,154	153,261	149,467	129,872	3.22%	1.95%	7.11%	2.54%	15.09%
Total Revenue	172,745	167,362	164,154	153,261	149,467	129,872	3.22%	1.95%	7.11%	2.54%	15.09%
Cost of Revenue	136,899	134,295	129,626	121,298	118,017	101,593	1.94%	3.60%	6.87%	2.78%	16.17%
Selling/General/Admin. Expenses, Tot	16,851	17,103	16,759	15,645	15,510	14,809	-1.47%	2.05%	7.12%	0.87%	4.73%
Research & Development	6,586	6,581	5,938	5,257	4,760	4,519	0.08%	10.83%	12.95%	10.44%	5.33%
Total Operating Expense	168,649	157,111	151,107	141,148	136,728	120,484	7.34%	3.97%	7.06%	3.23%	13.48%
Operating Income	4,096	10,251	13,047	12,113	12,739	9,388	-60.04%	-21.43%	7.71%	-4.91%	35.69%
Interest Expense, Net Non-Operating	(683)	(660)	(371)	(319)	(309)	(365)	3.48%	77.90%	16.30%	3.24%	-15.34%
Net Income Before Taxes	3,830	10,595	13,967	12,574	12,744	10,173	-63.85%	-24.14%	11.08%	-1.33%	25.27%
Net Income	2,377	7,249	10,278	8,526	8,424	6,962	-67.21%	-29.47%	20.55%	1.21%	21.00%
Basic EPS Including Extraordinary Ite	2.23	6.77	9.61	7.96	7.87	6.51	-67.06%	-29.55%	20.73%	1.14%	20.89%
Normalized EBIT	10,059	10,251	12,662	13,216	13,469	9,643	-1.87%	-19.04%	-4.19%	-1.88%	39.68%
Normalized EBITDA	26,857	24,990	26,274	19,292	18,859	14,642	7.47%	-4.89%	36.19%	2.30%	28.80%
Free Cash Flow	(8,891)	(23,210)	(16,710)	(9,444)	(12,116)	(9,465)	-61.69%	38.90%	76.94%	-22.05%	28.01%

Source: Reuters and Group calculation

The revenue growth rate of Tesla and Daimler are markedly different. Comparing trend by CAGR of sale from 2015 to 2018, it can be seen that Tesla had an upward trend with 46% CAGR while Daimler showed a downtrend of - 49.4% CAGR.

The selling general and administrative (SG&A) expenses of Tesla grew even faster than its sales. However, Daimler was better able to control its SG&A to near the same growth rate as its sales. Tesla spent more on R&D in the early years compared to Daimler. Tesla also generates a respectable amount of gross profit relative to its production. The firm plans to increase its production rate to achieve higher margins for spending on its operation expenses. Tesla aims to spend its gross profit on R&D and SG&A. Therefore, Tesla made a loss from 2015 until 2019 and it preferred not to slow down its expansion plan. However, the net loss amount is improving over the period and Tesla is expected to be profitable once the firm establishes its new factories and showrooms by 2023. On the Daimler side, even though the net income decreased from 2017 to 2019, it still made profit and posted a positive EPS.

Both Tesla and Daimler have negative FCFF. However, both firms have improved in 2019. Financial activities, debt and stock issues provide a positive stream of cash for Tesla to continue its business operation. For Daimler, it has a positive cash flow from its operating activities but a negative cash flow from its investing activities.

**Table 4.3: Dupont Analysis**

Ratios - Key Metrics	2019	
	Tesla	Daimler
Profit Margin	(0.03)	0.02
Asset Turnover	0.77	0.15
Leverage (Assets/Equity)	5.18	4.81
ROE	(0.13)	0.01

Source: Reuters and Group calculation

Tesla reported a profit margin before tax at negative 3% in 2019. The firm has never reached a positive profit margin since its IPO in 2010. This is due to high spending on R&D and SG & A to expand the firm in a very short period. Tesla took the risk and believed that the firm could deliver the result from spending within a short period. Daimler has a higher profit margin than Tesla. Therefore, we can conclude that Daimler has better cost management than Tesla.

Tesla has asset turnover of 0.77, which is greater than Daimler at 0.15. It shows that Tesla has better operating and marketing excellence. For leverage ratio, Tesla has higher leverage ratio of 5.18 compare to Daimler with only 4.81. This means that Tesla funds more assets by issuing debt than equity. However, both companies have leverage ratios greater than 2, Indicating that they are risky companies. In terms of return on equity (ROE), Tesla has negative ROE compared with Daimler which still generates positive ROE, meaning that Daimler has managed its equity investment more effectively to generate a return for its shareholders.

In 2020, Tesla generated 16 million USD pf net profit in the first quarter of 2020, and this figure also increased in the second and third quarter of 2020.

**Table 4.4: First Three Quarter Performance in 2020**

(Million USD)	2019	Q1 2020	Q2 2020	Q3 2020
<b>Revenue</b>	24,578	5,985	6,036	8,771
<b>Cost of Revenue, Total</b>	20,509	4,751	4,769	6,708
<b>Gross Profit</b>	4,069	1,234	1,267	2,063
<b>Selling/General/Admin. Expenses, Total</b>	2,646	627	661	888
<b>Research &amp; Development</b>	1,343	324	279	366
<b>Total Operating Expense</b>	24,647	5,702	5,709	7,962
<b>Operating Income</b>	(69)	283	327	809
<b>Interest Inc.(Exp.),Net-Non-Op., Total</b>	(593)	(140)	(143)	(51)
<b>Net Income Before Taxes</b>	(665)	70	150	555
<b>Provision for Income Taxes</b>	110	2	21	186
<b>Net Income After Taxes</b>	(775)	68	129	369
<b>Minority Interest</b>	(87)	(52)	(25)	(69)
<b>Net Income Before Extra. Items</b>	(862)	16	104	300
<b>Net Income</b>	(862)	16	104	300
<b>Diluted Normalized EPS</b>	0.11	0.02	0.10	0.27

Source: Reuters

Elon Musk is a strong figure who can raise equity funds by leveraging his personality and characteristics. All of firms he founded are making good progress, especially SpaceX and Tesla. Tesla's stock value is dependent on perspective because some brokers may state that it is undervalued, while some are of the opinion that it is currently overvalued. The stock reached a new height in August 2020 at 2213.4 USD

per share before the firm announced a stock split of 5:1. This ramped up the demand for Tesla stock and increased the value by a further 8%. All of this had driven Tesla's market value to grow beyond that of Toyota which is currently the global number one in terms of car deliveries in the car manufacturing industry.

## 4.2 Discounted Cash Flow Valuation

The discounted cash flow model is used to estimate the value of Tesla based on the company's estimated future cash flows and find the intrinsic value of the firm. The three-state growth model is used to find the discount value of Tesla. We expect Tesla to reach its highest growth in 2020. The growth will depreciate over the next 5 years due to higher competition, and more challenges in R&D.

### 4.2.1 Sale forecast

**Table 4.5 Sale forecast.**

	2017	2018	2019	2020	2021
Revenue	11758.8	21461.3	24578.2	29563	39718
Car Production (unit)	103020	244920	367200	469000	806400
Revenue Growth -		83%	15%	20%	34%
Car Production Growth -		138%	50%	28%	72%
Correlation of growth	0.96				

Source: Reuters and team assessment

The sale forecast was initially projected from Tesla's production number. We found that the production of Tesla vehicle has a high correlation with the revenue of Tesla as the company can sell approximately 96% of the car they produce. We use this number to calculate with the expected maximum capacity of Tesla production per annum. The Tesla production capacity will be approximately 840,000 Units of car in 2021 according to the number of operating plants in Tesla's most recent annual report. We assume that the ratio or 96% car deliveries will remain the same since demand for Tesla cars is still higher than its level of productivity. We expect this trend to continue

but depreciate over the years when competitor provide more available option for the market. The number of car deliveries will therefore be approximately 806,400 Units in 2021. The growth of production can be calculated at 72%. We use the growth of production multiplies with the correlation and then multiplied with last year's growth to generate the projected revenue. Therefore, the forecasted revenue for 2021 will be approximately 39,718 Million USD.

#### **4.2.2 Capital Expenditures**

Tesla does not plan to stop its expansion anytime soon. We can expect CAPX to be spent on R&D and Gigafactory expansion. We expect that Tesla's depreciation rate will not intersect with CAPEX anytime soon. Tesla has plans to build additional Gigafactories around the world in the near future. The firm schedules the finish of its Gigafactory Berlin in July 2021 and plans to start another factory in one additional destination. We forecast that Tesla will acquire more PP&E at approximately 30% growth rate per quarter until 2023. The firm will increase CAPEX until its products mature and provide enough products to achieve penetration into wider segments.

#### **4.2.3 Projected Free Cash Flows**

The free cash flow is calculated by taking the EBIT and multiplying by 1-current tax rate of the firm. We assume that Tesla will bear this tax rate until the legal and exception for EV manufacturing change in the future. We take the results with depreciation added and then subtract the CAPX and change in capital.

For the Three Stage Growth Model DCF forecast, our results are presented in Table 4.6.

**Table 4.6 Cash Flows Forecast.**

	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Revenues	\$ 29,563	\$ 39,718	\$ 48,380	\$ 55,899	\$ 61,080	\$ 62,913
EBIT (1-t)	\$ 1,566	\$ 4,476	\$ 8,340	\$ 12,974	\$ 17,823	\$ 22,114
+ Depreciation	\$ 2,288	\$ 2,547	\$ 2,781	\$ 2,980	\$ 3,132	\$ 3,226
- Capital Expenditures	\$ 3,099	\$ 3,449	\$ 3,839	\$ 4,273	\$ 4,756	\$ 5,293
- Change in WC	\$ (423)	\$ 1,056	\$ 901	\$ 782	\$ 539	\$ 191
= FCFF	\$ 1,178	\$ 2,517	\$ 6,382	\$ 10,899	\$ 15,660	\$ 19,856
Terminal Value (in '05)						\$ 535,433

**Table 4.7 Reuters Cash Flows Forecast.**

	FY 2020	FY 2021	FY 2022
<b>REVENUE</b>	<b>30056</b>	<b>42045</b>	<b>53649</b>
<b>EBITA</b>	<b>1971</b>	<b>3533</b>	<b>6749</b>
<b>DEPRECIATION</b>	<b>2207</b>	<b>2501</b>	<b>2800</b>
<b>CAPITAL EXPENDITURES</b>	<b>2557</b>	<b>3083</b>	<b>3036</b>
<b>CHANGE IN WORKING CAPITAL</b>	<b>-274</b>	<b>495</b>	<b>589</b>
<b>FREE CASH FLOW</b>	<b>326</b>	<b>2434</b>	<b>3948</b>
<b>EARNINGS PER SHARE</b>	<b>1.79</b>	<b>3.22</b>	<b>4.80</b>

We compare our forecast results from Table 4.2 with Reuters forecast results from table 4.3. Our results are on the same trend as Reuters result. However, our forecast predicts higher growth and lower operating expenses for Tesla than Reuters results. We also projected higher cash flow than Reuters from in our model.



**Table 4.8 Free Cash Flow Forecast.**

	2020	2021	2022	2023	2024	2025
<i>Growth in Revenue</i>		34.35%	21.81%	15.54%	9.27%	3.00%
<i>Growth in Deprec'n</i>		11.30%	9.23%	7.15%	5.08%	3.00%
Revenues	\$ 29,563	\$ 39,718	\$ 48,380	\$ 55,899	\$ 61,080	\$ 62,913
<i>COGS</i>						
% of Revenues	92.46%	83.97%	75.48%	66.99%	58.49%	50.00%
- \$ COGS	\$ 27,335	\$ 33,351	\$ 36,517	\$ 37,444	\$ 35,728	\$ 31,456
EBIT	\$ 2,228	\$ 6,366	\$ 11,864	\$ 18,455	\$ 25,353	\$ 31,456
Tax Rate	29.70%	29.70%	29.70%	29.70%	29.70%	29.70%
Tax	\$ 662	\$ 1,891	\$ 3,524	\$ 5,481	\$ 7,530	\$ 9,343
EBIT (1-t)	\$ 1,566	\$ 4,476	\$ 8,340	\$ 12,974	\$ 17,823	\$ 22,114
+ Depreciation	\$ 2,288	\$ 2,547	\$ 2,781	\$ 2,980	\$ 3,132	\$ 3,226
- Capital Expenditures	\$ 3,099	\$ 3,449	\$ 3,839	\$ 4,273	\$ 4,756	\$ 5,293
- Change in WC	\$ (423)	\$ 1,056	\$ 901	\$ 782	\$ 539	\$ 191
= FCFF	\$ 1,178	\$ 2,517	\$ 6,382	\$ 10,899	\$ 15,660	\$ 19,856
Terminal Value (in '05)						\$ 535,433

**Table 4.9 Nominal GDP Forecast**

2019	2020	Last 3 Year Cagr	2021	2022	2023	2024	2025	Next 5 Year Cagr	Production Capacity Expected in 2025	Product ion Ratio	Total Growth
21427	19800	4.63%	20204	21113	22063	23056	24094	3.58%	840000	0.53	1.89%
2.30%	-7.59%	-11.25%	2.04%	4.50%	4.50%	4.50%	4.50%	17.13%			
15626	15593	4.01%	15833	16149	16472	16802	17138	1.60%	500000	0.31	0.50%
1.55%	-0.21%	1.05%	1.54%	2.00%	2.00%	2.00%	2.00%	5.40%			
14343	14000	8.49%	14819	15709	16651	17650	18709	4.77%	250000	0.16	0.75%
6.11%	6.10%	-4.20%	5.85%	6.00%	6.00%	6.00%	6.00%	0.50%			
									1590000	1	3.15%

The terminal value is calculated from the GDP of each location where Tesla's has a Gigafactory located. Using data from Table 4.5 we chose to calculate CAGR for 3 years from 2017 to 2019 except for the European Union for which we choose to calculate CAGR from 2016 to 2018 to avoid the impact of the recession caused by Brexit. The reason for avoiding the 2020 GDP is that the economic recession produced an abnormal GDP. We multiplied these CAGR from the chosen periods by the annual GDP growth in year 2019 to get the 2021 growth. The US GDP growth is expected to grow at 2.04% in 2021 and at a stable 4.5% after that. In the European

Union it expected to grow at a stable 2% after recovering from the Brexit-induced recession in the European region and from the COVID situation. However, we expect that the growth will be negative in 2021 until COVID vaccines become widely available and take up. Additionally, China is expected to grow at approximately 6%. Then we calculate the CAGR to get the next five years forecast results. We multiplied the CAGR ratio by the production number ratio of each location. The ratio of each location is estimated from the production capacity of each location. We multiplied the ratio by the CAGR of the GDP growth and then we combined the growth of each location. The predicted growth result are approximately 1.89% from US, 0.5% from European Union, and 0.75% China. The total growth is estimated at 3.15%. However, we expect Tesla to be able to achieve approximately 3% terminal growth over 3.15% of GDP growth. This is due to the track record of the firm which started to have delays and less innovative announcements over the last few years. It will be more challenging for Tesla to be able to meet the expectations for creating their own innovation. The firm will likely reach a perpetuity state which is less than the average GDP numbers if we forecasted conservatively.

According to Damodar's article, we expect Tesla to reach a transition period of 3-stages model growth. The reason for this is that Tesla is reaching its peak growth for being the catalyst for the global transition from fossil fuels to EVs. There are likely to be many new competitors emerging to compete with Tesla and this will hinder Tesla's growth. We believe that Tesla will reach a stage of stable growth within 5 years. This prediction is supported by their expansion plan which introduce for building enough Gigafactories over the next four years to serve the market demand. We can estimate the production number roughly for each factory from data in Tesla's annual report and from our own assumptions. We expect that all Tesla's Gigafactories will be able to produce over 250,000 units of cars to serve demand except for the Berlin plant. The firm is currently searching for an Asian location to build its 6th Gigafactory to serve the Asian market as well. We expect that Tesla will reach a maximum capacity of 1,590,000 cars per year within 2025. The expansion will make the firm have relatively high growth, but the growth rate will depreciate over 5 years as a result of more competition and saturated demand. After 2025, Tesla's revenue will shift to energy segment, services and products jointly-produced with Elon Musk's other firms.

Installed Annual Capacity		Current	Status
Fremont	Model S / Model X	90,000	Production
	Model 3 / Model Y	500,000	Production
Shanghai	Model 3	250,000	Production
	Model Y	-	Construction
Berlin	Model 3	-	In development
	Model Y	-	Construction
Texas	Model Y	-	Construction
	Cybertruck	-	In development
United States	Tesla Semi	-	In development
	Roadster	-	In development

**Figure 4.1 Tesla Manufacturing Capacity**

Source: Tesla Annual Report Q3 2020.

The growth rate for 2020 was calculated by taking the quarterly growth figures since 2018. The reason for taking quarterly figures to calculate growth in this way is that it enables us to get more detail of the historical trends of Tesla's growth. The factor we use to measure Tesla's growth is the production Number of Tesla car. The number has a high correlation with the firm revenue at 0.96 for the growth rate since 2018. We expect that tesla will have the growth rate similar to the trend of car production growth from last 3 years. We calculate the growth rate from the number of car production from 2018 to 2020 to determine the growth of Tesla's car production. The growth rate we get is approximately 34%. According to the expected trend we previously mentioned that the growth rate will depreciate to terminal growth, and we have predicted this outcome base on an optimistic view for Tesla.

The outcome we forecast is based on Tesla's previous performance and the continuation of this trend going forward. The terminal growth is calculated from the nominal GDP growth of major locations of Tesla markets which are Europe, China, and the U.S. Then we assume that the firm will continue with at 3% of the growth from these countries GDP due to the firm's high demand for establish its ecosystem. In addition, within a few years Tesla will be able to penetrate more segments of the car market, ranging from the value to the luxury market.

Three stage growth model start with high growth in the first period, but we adjusted the model and put the transition period to start from 2021. The forecast we got from the model leads us to terminal growth of 3% in 5 years after which, it will continue its growth at this rate in perpetuity.

#### 4.2.4 Weighted average cost of capital

The calculation

Req. Return on equity = Risk free rate+(Beta\*Equity risk Premium)

=0.88%+(1.7\*5.28)

=9.77%

**Table 4.10 Weighted Average Cost of Capital**

Share price	574.1	TERMINAL GROWTH	3.0%
# shares (Mn)	932	BETA	1.7
Equity Value (USDMn)	16,031	RISK FREE	0.88%
Net Debt (USDMn)	13,733	EQUITY RISK PREMIUM	5.23%
NET DEBT / (EQUITY + NET DEBT)	46.140%	<b>RQD. RETURN ON EQUITY</b>	<b>9.77%</b>
		COST OF DEBT	4.8%
		AFTER TAX COST OF DEBT	3.4%
		Tax	30%
		<b>WACC</b>	<b>6.82%</b>

WACC = [After tax cost of debt\*(Net Debt/(Equity + Net Debt)))+( Req. Return on equity\*(Equity/(Equity + Net Debt))

WACC = 6.82%

WACC is calculated by the CAPM model. We use the 10 years US government bond yield as of November 13, 2020 provide by the U.S. Department of the treasury website at 0.89% as the risk-free rate (U.S. DEPARTMENT OF THE TREASURY,2020). Beta of the company is at 1.7 from Reuter's average for 5 years. The beta value of Eikon Reuters is calculated by monthly trailing the 5 years return relative to NASDAQ. The equity risk premium was calculated according to the Damodar's result at 5.23%. Based on the income statement, the cost of equity is 13.11% and it is expected to remain constant for 5 years. The after the tax cost of debt of 3.37% calculated by average 5 years interest expense divided by net debt. The weight of Tesla

equity will be expected to be 53.86% with 46.14% of debt. We can calculate the weighted average cost of capital at 6.82% from the information we have (Table 4.6)

#### 4.2.5 The Result of the Discounted Cash Flow Valuation

**Table 4.11: Estimated Share Value**

	2020	1	2	3	4	5
Cost of Equity	9.77%	9.77%	9.77%	9.77%	9.77%	9.77%
Proportion of Equity	53.86%	53.86%	53.86%	53.86%	53.86%	53.86%
After-tax Cost of Debt	3.37%	3.37%	3.37%	3.37%	3.37%	3.37%
Proportion of Debt	46.14%	46.14%	46.14%	46.14%	46.14%	46.14%
Cost of Capital	6.82%	6.82%	6.82%	6.82%	6.82%	6.82%
Cumulative WACC	100%	106.82%	114.10%	121.89%	130.20%	139.08%
Change in WACC		6.82%	7.28%	7.78%	8.31%	8.88%
Present Value		\$ 2,356	\$ 5,593	\$ 8,942	\$ 12,028	\$ 399,267
Value of Firm		\$ 428,187				
+ Cash and marketable securities =		\$ 20,900				
- Value of Debt		\$ 13,733				
Value of Equity		\$ 435,354				
- Value of Equity options issued by firm		\$ 45,691				
Value of Equity per Share		\$ 418.09				

Source: Team Assessment

We calculate the terminal value from free cash flow with 6.82% WACC. In 5 years, we expect the value of the firm will be 386,918 million. Then we can calculate the value of equity at 574.1 USD per share based on present value. We can expect discounted cash flow to be 418.09 USD.

The discount Terminal value of Tesla is estimated to be 428,187 USD. The result of the estimated share value is 418.09 USD with the market price as of November 25, 2020 at 574.1 USD. The number is calculated from the depreciation of Tesla growth over 5 years until it reaches its terminal growth state. We conclude that the value of Tesla is overvalued. The reason is that the DCF value reflects the value of the firm in the next 5 years which we discount back to find the value of each share at today's value.

The value we found is lower than the current market value. It reflects that the market is currently trading Tesla stock at a higher value than our expected value. We recommend selling this stock based on the DCF valuation.

### 4.3 Sensitivity Analysis

**Table 4.12: Sensitivity Analysis**

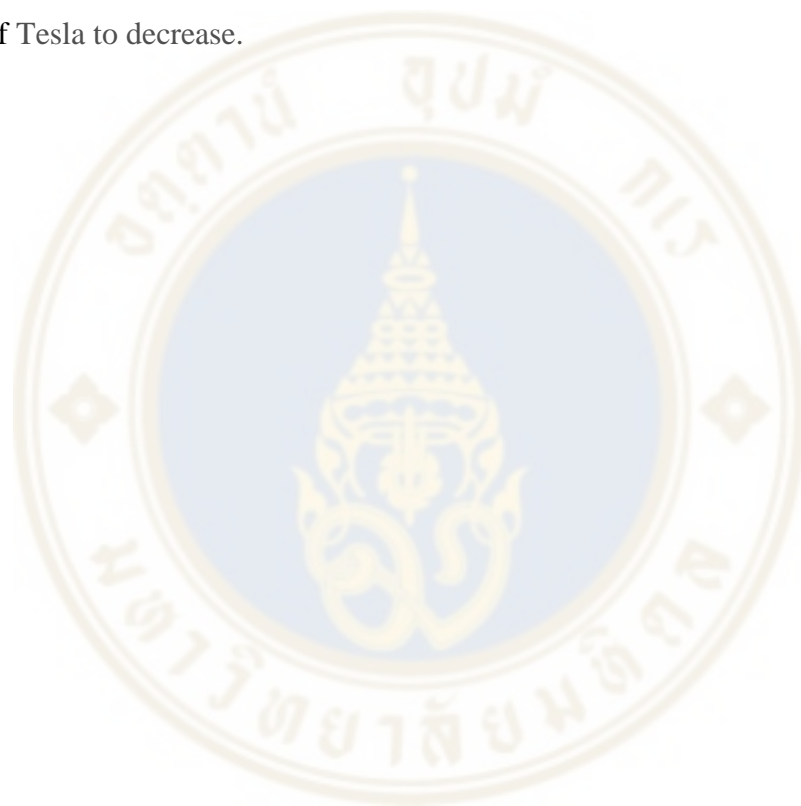
	New Est.	Sensitivity	Change in Value
Value	<b>418.09</b>		
Terminal Growth+50	4.50%	726.60	<b>74%</b>
Terminal Growth+40	4.20%	636.63	<b>52%</b>
Terminal Growth+30	3.90%	565.15	<b>35%</b>
Terminal Growth+20	3.60%	506.99	<b>21%</b>
Terminal Growth+10	3.30%	458.75	<b>10%</b>
Terminal Growth	3.00%	418.09	<b>0%</b>
Terminal Growth- 10	2.70%	383.36	<b>-8%</b>
Terminal Growth- 20	2.40%	353.34	<b>-15%</b>
Terminal Growth- 30	2.10%	327.15	<b>-22%</b>
Terminal Growth- 40	1.80%	304.08	<b>-27%</b>
Terminal Growth- 50	1.50%	283.62	<b>-32%</b>
Risk Free +10	0.97%	411.91	<b>-1%</b>
Equity Risk Premium+10	5.75%	358.86	<b>-14%</b>
After Tax Cost of Debt+10	3.71%	401.88	<b>-4%</b>
Beta+10	1.87	363.20	<b>-13%</b>
WACC+10	7.50%	353.32	<b>-15%</b>
Terminal Value 2.5%	2.50%	362.89	<b>-13%</b>
Terminal Value 5%	5.00%	942.50	<b>125%</b>
Terminal Value 10%	10.00%	NA	

Source: Team Assessment

From the target price of the discounted cash flow valuation method, we performed a sensitivity analysis with 10% change in the terminal growth, risk free rate, equity risk premium, after tax cost of debt, beta, and WACC to compare the change in the firm's value. As shown in the table above, terminal growth has the most impact on the firm's value at a range of 74% to -32% change.

We also calculate sensitivity of Tesla stock at steps of 10% for both negative and positive changes to find the price range. According to our result the highest growth is 5% terminal growth at a 125% increase in value, while the lowest is -32% at terminal growth of 1.5%

This sensitivity analysis show that Tesla's stock value could have high volatility. The value of its stock can reach the current trading price if the terminal growth of Tesla is expected to be higher than approximately 30% of terminal growth from our forecast, while the effect of higher risk free rate will be to cause the expected value of Tesla to decrease.



## **CHAPTER V**

### **INVESTMENT RISK**

#### **5.1 Risk factors**

##### **5.1.1 Volatility Risk**

Tesla has very high volatility due to the nature of being a high growth firm. We calculate the sensitivity analysis based on +50% to -50% relative change in growth rate for covering the possible volatility of Tesla stock. Table 4.8 present the possible value change of tesla stock for each 10% of increase and decrease terminal growth. We conclude that the stock price has very high sensitivity as we can see from the table that even a small percentage changes in the terminal value can swing the price significantly, especially in term of growth, while the increase of 10% on other major ratios cause the target price to decrease.

##### **5.1.2 Corporate Governance**

Tesla has total of 9 director members on its board and 4 executives leading the firm. Elon Musk is the CEO of Tesla and, has the highest influence on the firm. Musk's comments and speeches can influence many investors, which the has a major impact on Tesla stock price. His presentation can lead to both increase or decrease in Tesla's stock price, which is a risk factor. While most of his speech create positive value for Tesla, in the past, some of his comments and action have negatively affected the value of the firm, such as the leak of a relationship or news about his substance use causing the value of the firm to decrease.

##### **5.1.3 Environmental and Social Responsibility**

Tesla aims to encourage the use of electricity to replace fossil fuels although, there are still some arguments about whether this energy resource is "cleaner"



and concern about its higher cost. However, electricity can be generated from various sources other than fossil fuels and therefore produce less pollution.

According to the Tesla's environmental impact report, carbon dioxide emissions released from Tesla EVs are less than half of those from fossil fuel cars at less than 5 Lbs. from EVs and over 12k Lbs. from gasoline cars per year. In addition, Tesla has developed one of the most technological advances for recycling any byproduct and pollution from the production process. Recycled batteries and excess heat are reused to generate the electricity supplied in the factory while a large portion of the electricity used in the factories is generated from solar panels.

The firm does not support the use of material sources that are not transparent and that use illegal labor such as cobalt from Africa. The firm also aims to achieve zero accidents and prevent all pollution into environment.

## **5.2 Investment Risk**

### **5.2.1 Target Risk**

Tesla relies on technological advances that position the firm ahead of other competitors. If the firm cannot achieve the target they set, the growth of its stock price is likely to decrease. In addition, the cost of further research and development will be increasing due to new technology requirements.

### **5.2.2 Competitor Risk**

There are many emerging competitors in the EV vehicle market recently because Tesla has made EV cars more normal in developed countries. Particularly in China many models are released for every segment of the market, although the ecosystem and technologies are still behind those of Tesla. We can expect that competition in the EV market will increase over the next few years. This competition also includes traditional automakers which are starting to shift their development to EV vehicles. They have high capital to work with and partnerships that enable them to compete with Tesla.

### **5.2.3 Legal and Regulatory Risk**

As Tesla's operations and services are mostly controlled under Californian law, many features of Tesla's cars cannot be used out of their specified location which could be an obstacle hindering the value of the cars.

### **5.2.4 Merger and Acquisition Risk**

Musk has stated that Tesla has the possibility to acquire or partner with other businesses. If not managed correctly, the process can potentially lead to failure and wasteful investment.

### **5.2.5 Elon Musk Activity**

Elon Musk is full of charisma that can influence people and his personal speeches or actions can impact Tesla's stock price. There are still many people who are upset by his activities and provide negative feedback as a result.

## **5.3 Operational Risk**

### **5.3.1 Technological Risk**

New emerging technology can compete directly with Tesla. One example is the partnership between Daimler and Nvidia which has developed an AI system that is equivalent to Tesla's in terms of both hardware and software. There are many semiconductor firms which also have specialized hardware and software that can compete with Tesla.

### **5.3.2 Employee Risk**

Since Tesla has very highly skilled engineers and technical advances, many firms and institutions are trying to reach them to harvest information. For example, there is a group of hackers trying to bribe Tesla's employees to get internal data.

## **5.4 Financial Risk**

### **5.4.1 Debt Ratio Risk**

Tesla has relatively high debt accumulated from previous years because the firm cannot generate its own profits from its operations yet. As a result, the firm needs a long period to rebalance its debt ratio despite significantly increasing equity value recently.

### **5.4.2 Dividend Risk**

Tesla has very high accumulated deficit on retained earnings and does not have any policies to pay dividend yet. It causes risk for investors who are interested in investing in Tesla stock.

### **5.4.3 Taxation Risk**

Tesla currently operates with a special tax rate for EV vehicles this benefit will likely to be lifted once EV vehicles become the norm in the US. Moreover, Tesla has many factories in other countries, which also bear the risk of change to tax policy.

## **CHAPTER VI**

### **CONCLUSION**

#### **Valuation**

We reached the conclusion from the discounted cash flow valuation that Tesla's stock price is overvalued. Our forecast has predicted a strong increase in earnings and cash flow over the next few years, but the share value should be less than the price traded on the market. Tesla had outperformed many forecasts and expectations. There are several key factors that have resulted in Tesla's overvalued price.

#### **6.1 COVID Situation**

Tesla is one of the fastest firms to restart its operations once the temporary prohibition on operating the factories was lifted in China and the U.S. This allowed Tesla to speed up its production to catch up with its original plan. The COVID situation has caused the majority of firms to perform below their historical levels and caused their stock value to decrease. Investors who seek growth and positive trend stocks are looking at Tesla which started to have a positive trend earlier this year when the Shanghai factory officially opened. This created initial demand to trade on Tesla stock which was one of the few stocks that had a positive trend at that time. This trend can also be seen in most of the successful technology related firms. For example, AMD and NVIDIA have similar patterns of growth. However, Tesla also pushed this growth further due to its limited number of shares. Also, the influence of Tesla announcements causes the trading volume to snowball. The result is that people can be affected by unusual situations like COVID causing them to trade with more risky stock for growth.

## 6.2 Tesla Value

Tesla has had very impressive growth over several years. This growth was driven by expansion and development over several consecutive years. When we look at Tesla from a technological perspective, not only does the firm deliver impressive EV cars or energy solutions but, Elon Musk has also set up the beginnings of the future vehicle ecosystem. Tesla technologies can adapt and use technologies and innovations from other firms as well. This enables Elon Musk to own several leading firms in terms of technological advancements. Many investors look at Tesla as a gateway to invest in Musk's other firms due to Tesla's growth having a positive relationship with the achievement of Elon Musk's other firms. The result of this is that, if one of those firms achieves its goal, like SpaceX successfully launching a prototype, it can affect Tesla's stock price. We also know that Musk likes to push his goals to be impressive and beyond those of other firms. These achievements enhance the price of Tesla stock further and create trading that surpasses Tesla's own value.

## 6.3 Conclusion

The result of our DCF analysis shows that the current Tesla stock price of 571.4 USD is overvalued compared to our discounted value estimate. We recommend to sell the stock due to Tesla having built momentum which is now moving in different directions from the market during the economic recession. The achievements of Tesla and Elon Musk have increased the value of Tesla while creating enough momentum to push Tesla's stock value become higher than the firm's expected future value. The reason is that Tesla is one of the few corporate firms which performed well even during the COVID situation in 2020. The recommendation is based on the momentum that has built Tesla's stock to its level today. Many individuals and small investors will still seek to trade stocks like Tesla's which performs in a negative correlation with a majority of the firms on the stock market that have negative trends. This is caused by the trading behaviors and perspectives of these investors who can be influenced by misconceptions or biases. This combination of global events and investors seeking a good performing security will make Tesla's price higher than the discounted value of the firm until the

economy starts to recover. These external factors create an effect that goes beyond valuation limitations which explains the reason why Tesla stock is currently trading at an overvalued price.



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