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Fundamental Valuation of The General Motors Company

Assessing the value in the midst of a pandemic

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Master thesis, MSc Economics and Business Administration, Finance

NORWEGIAN SCHOOL OF ECONOMICS

Contents

1. Executive Summary

The purpose of this thesis is to conduct an in depth fundamental valuation of The General Motors Company in order to provide an equity value and share price as of March 31st 2020.

We hope to highlight the potential value to be had in an investment of GM, yet also showcase how the Covid-19 pandemic has caused havoc not only within the company, but on the industry at large.

General Motors has recently unveiled its Ultium scalable battery propulsion platform to the public. This platform leverages the most advanced battery technology on the market with a scalable frame that will allow GM to use it across multiple car and truck applications with varying degrees of luxury and battery sizes. Using valuation techniques, we can explore comparable companies in the industry who have similar technology to look into how their battery platforms have drove company valuations. This will allow us to put a value on this platform even though it has yet to be put into production.

Using the APV method, Dividend Discount Model, and Comparable Multiples Approach, we estimate three different values of $78.40 per share, $26.01 per share, and 86.62 per share respectively. While the Dividend discount model per share valuation differs strongly from the other two, we support this result by explaining that the DDM often understates value and is instead used as a lower boundary for our valuation. That being said, it still represents a 25% premium over the current share price as of March 31st 2020.

While we will not say with certainty that GM stock is going to be at $80 in 5 years, all three of our models highlight how undervalued GM is to varying degrees. Based on these results, we conclude with a strong buy recommendation for General Motors as the company has ample growth and profit opportunities that are not properly reflected in the firms current share price.

2. Introduction

I will briefly share my motivation on the selection of the topic and the industry before then presenting the research objective, and the following structure of this thesis.

2.1 Motivation and Selection

The motivation behind choosing the automotive industry as our topic of research stems from both a personal interest and current economic relevance. Growing up in Ontario, Canada meant living in the heart of automotive manufacturing within North America. Local economies were built upon automotive manufacturing and relied on the industry to sustain life. It was not out of the ordinary to know hundreds of people who worked in the automotive manufacturing and distribution value chain, so the industry has always been very important to us for better or for worse.

Due to the recent Covid-19 pandemic, the automotive industry has been severely shocked and stock valuations have plummeted. General Motors (GM), has been preparing for an economic downturn, but nothing like this; seeing their stock price and valuation decline over 50% (Yahoo Finance, 2020). That being said, I believe the company stands in a good position to weather these storms and come out on the other side. They possess a promising array of advanced technologies that include electric and hydrogen cell propulsion systems while at the same time manufacturing many large profitable internal combustion engine (ICE) vehicles to help fund the new propulsion technologies.

2.2 Research Objective

The objective of our master's thesis is to estimate the value of General Motors' (GM) equity value per share as of March 31st, 2020, as this date represents the end of Q1 2020 earnings. Using Q1 2020 earnings in conjunction with the annual 2019 earnings report will allow us to more accurately reflect changes in the stock price due to the Covid-19 pandemic, and apply these changes to any cash flow forecasts. Using these earnings reports, we hope to take on the role of valuation analysts in order to conclude an equity valuation that properly reflects GMs future outlook. From this valuation, we can then compare to the current stock price, as well as other valuation analysis' to deliver an investment recommendation.

The research question of this thesis is as follows:

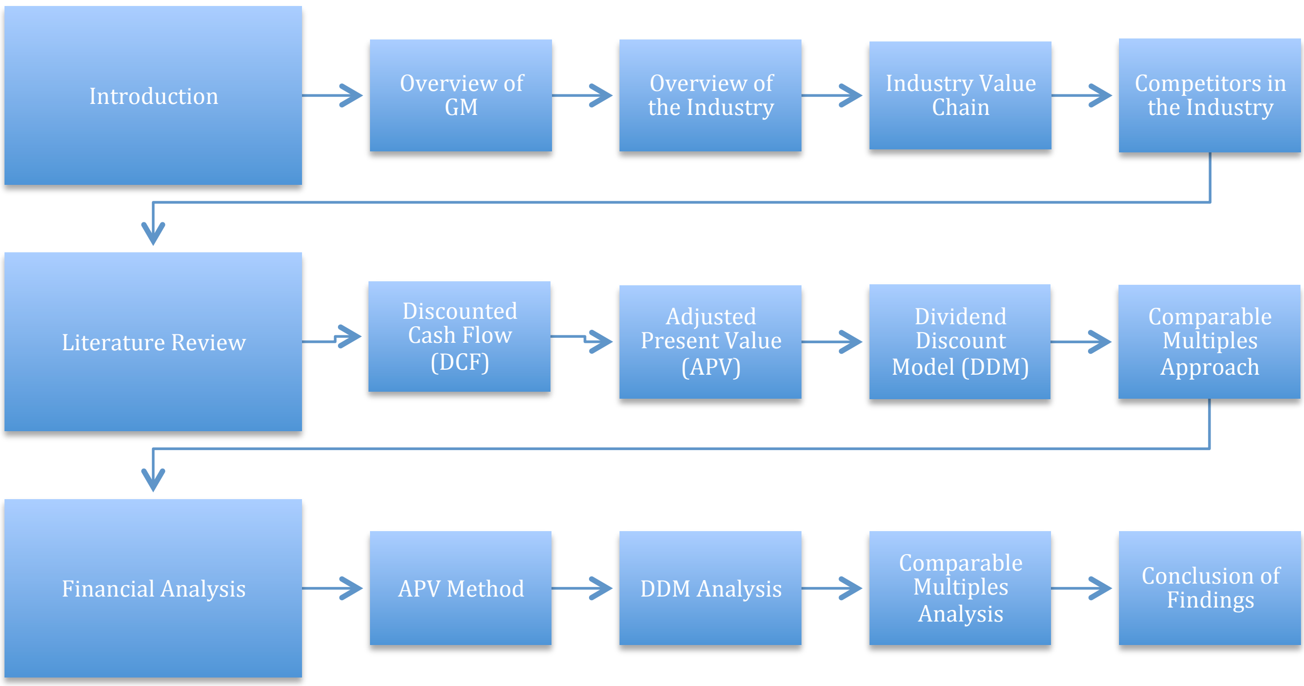
"What is General Motors' value of equity per share as of May 6th 2020?"

2.3 Theory and Limitations

This thesis will be based on the literature and theory discussed in the master's course FIE437 Valuation taught in the fall of 2019 by associate professor Kyeong Hun Lee at The Norwegian School of Economics. We will also extensively reference literature written by Aswath Damodaran, as he is an expert in the field of valuation techniques. Due to the nature of this thesis and the forecasting that is involved in arriving at an equity valuation, many assumptions may need to be made in the process. These assumptions are a limitation in this field of research with the information that we are working with. However, we strive to have the utmost accuracy of these assumptions to the best of our ability, and will clearly communicate when an assumption is being made.

2.4 Structure of Thesis

Below is the following structure that our master's thesis paper will follow:



In our introduction, we will discuss our motivation behind the research and why we chose this topic. Next, we will give an overview of both General Motors and the automotive manufacturing industry. This will include the market, sales statistics, challenges faced, as well as listing off close competitors of GM.

In the second section, we will begin our literature review. Using research discussed in our Valuations class and works written by Aswath Damodaran, we will explore the theory behind certain valuation models and what they comprise of. This section will play an important role in our valuation analysis, as we will only use a small subset of these models in the following analysis based on relevance and accuracy.

In the last section, we will conduct our analysis and share our findings using the chosen models from the literature review. Then we will provide our conclusion based on our work done throughout this thesis.

3. General Motors and the Automotive Industry

We will introduce General Motors and the industry that they operate in. This will provide a better understanding of the company, the industry, and its competitors, which will create a strong base for any analysis that is to be conducted later on in this thesis.

3.1 General Motors Company (GM)

GM is a publically traded company listed on the New York Stock Exchange under the ticker symbol GM, with a current market capitalization of $29.69B as of March 31st 2020 (GM, 2020a). The company traces its roots back to 1908 and was founded by William C. Durant in Michigan. However, the current GM Company was only incorporated in 2009 due to being reorganized after bankruptcy proceedings and a government bailout. Prior to this reorganization and bankruptcy, GM held the distinction of the world's largest automobile manufacturer for decades. It is currently the second largest American automaker by market capitalization after Tesla, and still one of the largest in the world (GM, 2020a).

GM has automotive assembly plants in 15 countries across the world including both wholly owned subsidiaries as well as joint ventures (GM, 2020c). GM produces automobiles under 4 core brands globally: Chevrolet, Buick, GMC, and Cadillac. They also manufacture cars under the Wuling and Baojun brands for local markets in Asia. In recent years, GM has undergone a restructuring in an attempt to become more efficient and reduce costs. This has resulted in the sale of the Opel and Vauxhall brands to Frances PSA Automotive group, effectively ending GMs production in Europe. This sale coincided with the exit of most brands from the European market as GM turned its focus to its more profitable core markets: The Americas and Asia (GM, 2019a).

GM defines its global manufacturing and sales under one of five distinct regions globally. You have GM North America, which includes Canada, USA, and Mexico and is the largest market that they operate in. GM China is the second largest market and has grown considerably in recent years. However, the majority of GMs manufacturing and sales in China are done through joint ventures with local Chinese companies due to the laws regarding foreign ownership in China (GM, 2019a). GM South America, GM International, and GM Europe are the remaining three regions, although sales in GM Europe only include niche products due to their recent market exit.

Figure 2: Map of General Motors' plants and facilities

3.1.1 Market Positioning of the GM brands

GM has 4 core brands globally that allow the company to position itself in multiple segments of the market. Like many other traditional automakers, this strategy allows them to target multiple segments and price points in the market and reach a wider customer base. It also allows them to share components between different models and brands in order to achieve economies of scale and cost reductions. Below we list the four global GM brands and their specific market positioning:

Chevrolet

Chevrolet is by far GMs largest brand by sales volume, with over 815,407 vehicles sold in the first quarter of 2020 (GM, 2020b). Chevrolet is positioned as GMs most cost conscious brand and also produces the widest array of vehicles, ranging from compact cars to large SUVs and trucks. Chevrolet's market is to deliver reliable and stylish vehicles at affordable prices that working class people can afford, while also providing some niche products such as the Chevrolet Corvette and high performance Camaro. Chevrolet's main competitors are fellow American automobile manufacturer Ford Motors, and traditional Japanese and Korean automakers such as Toyota, Honda, and Hyundai (GM, 2019).

GMC

GMC is GM's truck and large SUV brand. GMC and Chevrolet vehicles share the same platform and drivetrain components, while GMC vehicles deliver a slightly more rugged appearance at a slightly higher price point. GMC is the third largest brand by sales volume of 141,907 in Q1 of 2020 (GM, 2020b). GMC has little presence in international markets outside of North America, except for a select few markets in the Middle East and Russia (GM, 2019a).

Buick

Buick positions itself slightly more upmarket compared to Chevrolet. Historically, this has resulted in Buick acquiring an image of being a car your grandparents would drive due to its mid-market price point and out-dated styling. In recent years, this has resulted in Buick moving slightly down stream towards Chevrolet while making their vehicles sportier in order to attract younger buyers. In the Chinese market, Buick is GMs best selling core brand due to the Chinese perception of the brand as both sporty and luxurious. Due to this success in China, the Buick brand has moved a large portion of global manufacturing to Asian markets and has made many recent decisions with a China first mentality. Buick's Q1 2020 sales were the largest impacted by Covid-19; down 44% to 167,048 due to the importance of the Chinese market for the brand (GM, 2020b).

Cadillac

Cadillac is GM's luxury brand that looks to compete with Mercedes and BMW, but in reality is more of a direct competitor with Lexus or Acura due to its slightly lower price point than the German automakers (GM, 2019). Cadillac sold 60,875 vehicles globally in the first quarter of 2020 for a decrease of 29% since the same quarter last year.

3.1.2 Value Chain & Dealership model

GM is vertically integrated along the majority of the value chain with the exception of small component manufacturing that occurs early in the process. Large third party companies such as Magna International have developed a strong business of manufacturing and supplying many of the components that go into automotive manufacturing. Since these third parties are not directly associated with any one auto manufacturer, they are able to manufacture parts for any and all companies; allowing them to achieve economies of scale and keep costs lower than a traditional automaker only supplying themselves. This results in many independent companies operating at the beginning of the value chain (GM, 2019). GM's business operations consists of R&D, some component manufacturing, metal and body panel stamping, and overall car assembly. GM Financial, the financing arm of GM is also responsible for auto loans to customers who are looking to purchase vehicles (GM, 2020a).

Once the car is completely assembled, GM is also responsible for distribution of the vehicles to their global dealership network. While the global dealership network does operate under the GM name and its core brands, the majority are not actually apart of the GM Company. Instead, this dealer network consists of many independent businesses that are licensed to sell and repair GM vehicles (GM, 2019). GM sells the automobiles it manufacturers to this dealership network, who in turn then sells these vehicles to the final customer. In recent years, GM has continued to increase vertical integration by acquiring dealerships, especially in new markets. However, the majority of this dealer network is still independent (GM, 2019a).

3.1.3 Share Price Trends

After GM's bankruptcy and subsequent government bailout in 2009, the company went through a period of government ownership before being offered back on the market. GM filed for an initial public offering (IPO) on November 1st 2010 under the ticket symbol GM; listed on the New York Stock Exchange (NYSE) at \$34.20. Since then, the stock has held fairly constant up until the coronavirus pandemic caused a massive stock selloff. As of March 31st 2020, GM stock was trading at \$20.78, which results in a compounded annual growth rate of -4.6% and a market value of \$29.69B (Yahoo Finance, 2020). GM has historically paid dividends quite consistently. In 2014 they paid a quarterly dividend of \$0.30

per share, while increasing it to $0.36 for 2015. Since 2016, GM has paid a quarterly dividend of $0.38 up until it was announced on April 27th 2020 that they would be suspending quarterly dividend payments in order to conserve cash (Nasdaq, 2020).

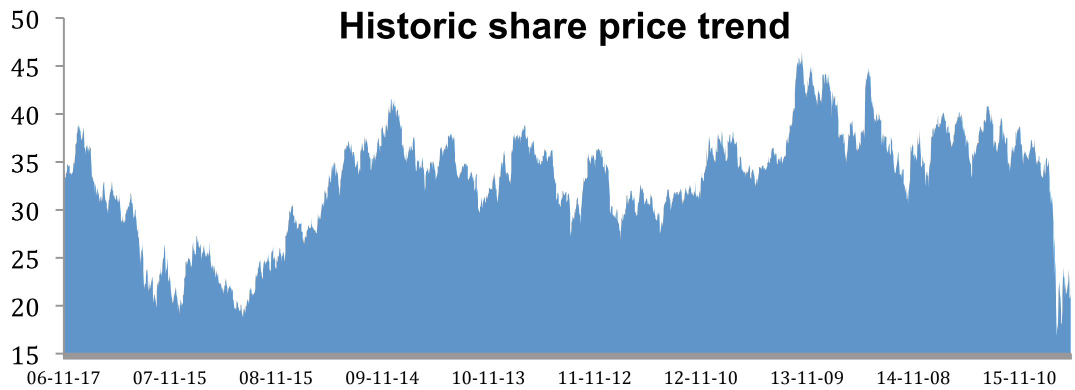


Figure 3: General Motors stock price trends 2010-2020 (Yahoo Finance, 2020)

3.1.4 Technology & Innovation

Electric Vehicles (EVs)

GM has made a considerable investment into advanced propulsion methods, as well as artificial intelligence in recent years. GM was the first to bring a successful Plug In Hybrid Electric Vehicle to market in 2011, and since then has continued to fund electric car research. While the Chevrolet Bolt has not been a major commercial success, the technology involved in that vehicle has only been rivalled by the likes of Tesla, at a much higher price point (GM, 2019).

GM continues to innovate and has recently released its modular and scalable electric propulsion vehicle platform Ultium. This platform will be able to underpin any and all GM electric vehicles for the foreseeable future while having the ability not only to scale to any vehicle size, but also to upgrade and improve battery technology and capacity as it becomes available. This follows GM's mantra of creating platforms that can underpin a wide array of vehicles in order to bring down the costs associated with vehicle manufacturing (GM, 2020a). In a bid of confidence, Honda Motors and GM have signed an agreement to produce two new Honda electric vehicles (EV) on GM's Ultium platform (GM, 2020a). This new platform will allow GM to compete against Tesla for market leadership in the EV industry.

Cruise Autonomous Vehicles (AVs)

Founded in 2013 and acquired by GM in 2016, Cruise is an autonomous vehicle development and testing company. Since its acquisition, cruise has successfully modified the Chevrolet Bolt vehicle with AV technology to operate autonomously on city roads. Testing on public roads began in 2017 and has ramped up in recent years, although industry wide adoption is still a few years away (GM, 2019). Cruise has also received investments by Softbank's Vision Fund, and Honda Motors. Currently, GM Cruise is locked in a head to head battle with Google's Waymo over who will be able to bring fully autonomous vehicles to market first. A spinoff of the technology acquired in the 2016 acquisition of Cruise is GM's Super Cruise feature. This technology is a completely hands free system that uses an array of sensors on the vehicle to operate and switch lanes on mapped highway systems throughout North America. This system is less well known compared to Tesla's Autopilot feature due to its exclusivity on only Cadillac Models, but essentially offers the same features (GM, 2019).

3.2 The Automotive Manufacturing Industry

3.2.1 Global Automotive Markets

Automotive manufacturing began in the late 1800s with the horseless carriage design. For the next century, the United States led global automobile production until being overtaken by Japan. Although the US lost its crown of being the largest automobile producer in the late 20th century, a large portion of vehicles produced overseas in countries such as japan ended up being exported to the US, as it was by far the largest market for automobiles at the time. However, China's recent economic emergence has catapulted it to become the largest market for the sale of automobiles in recent years (OICA, 2019a). While the US is still the second largest, the fact that China has seen such a rapid growth in automobile production and sales has warranted many global automotive companies to take a second look at where cars are being produced, and the costs associated with these locations.

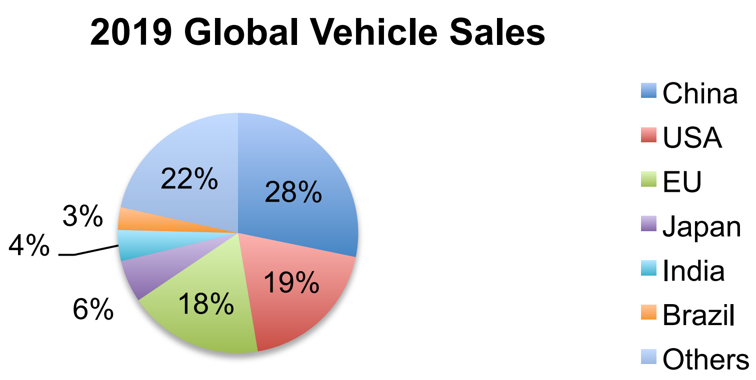


Figure 4: 2019 Global auto sales by market (OICA, 2019a)

If we look at total global sales of automobiles in the last 15 years, there has actually been a decline in sales in the European market while the North American market has held constant. A slight increase in vehicles sold can be seen in the South American market, however the majority of global automotive sales growth has been in Asia, specifically China (OICA, 2019a). Automotive companies recognize the immense growth this market has seen, and the potential it continues to have; yet only some have experience the sales growth and brand recognition in the country. GM is one of the foreign automakers that have been quite successful in the Chinese market as the Buick and Cadillac brands continue to see large sales growth.

3.2.2 Global Automotive Production

When comparing vehicle sales in a market to vehicles produced, you notice a common trend among developed markets such North America, and Europe. Large multinational companies are shifting auto production from these developed countries to other countries in the region that are less developed and thus have lower input costs. This has occurred most notably in Mexico for the US and Canadian market, and Eastern Europe for the more developed western European market.

As automakers become more globalized, they are more easily able to relocate production of vehicles to certain markets where the costs are lower, thus allowing them to increase profits and reduce pricing on their products. Rather than produce a car in each market that the vehicle is sold in, you can move global production to one site in a low cost country, and manufacture that car for the entire global market. This allows the manufacturers not only to reduce labour costs, but also to achieve economies of scale as global production is being completed in a single plant. This is why we see large vehicle production in countries such as Mexico, South Korea, and Japan compared to their relative market sizes (OICA, 2019b).

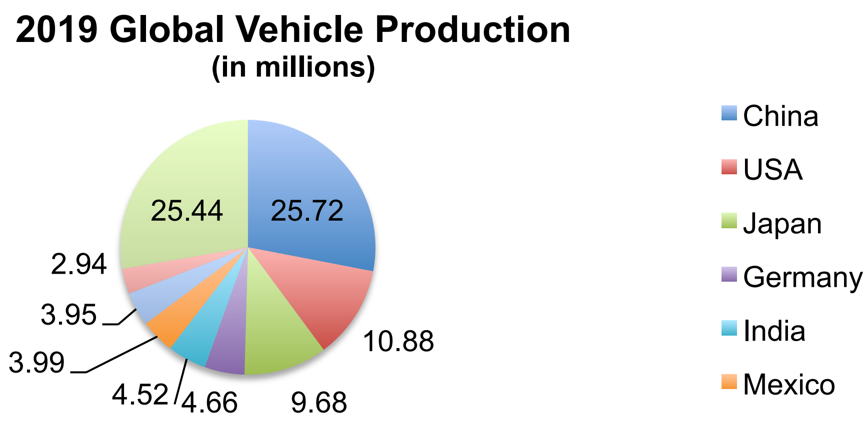


Figure 5: 2019 Global auto production by market (OICA, 2019b)

When looking at the import and export numbers, you would expect that China exports a large amount of vehicles globally, as it does for many other forms of goods. However, when comparing the numbers, the market actually consumes more vehicles than domestic production supplies (OICA, 2019). This is due to China's limitation on foreign automakers in the country. While this does result in most domestic production being 50% controlled by Chinese firms in joint venture agreements with international automakers, it also results in these international automakers not producing vehicles in China other than what is meant specifically for that market. Instead, opting to manufacture vehicles in South Korea, Japan, or Thailand for other international markets. China has since begun easing foreign ownership restrictions, but the implications of the original system still linger.

The US, like a large portion of its manufacturing industry, has been offshored to cheaper countries in central and South America along with Asia. In the auto industry's case, it creates a common argument about whether it is better to have domestic companies produce cars in foreign countries, or foreign companies product cars domestically. Mexico has especially benefited from rising US labour and production costs. GM and other American automakers can move manufacturing to Mexico in order to reduce costs dramatically while incurring only marginally more expensive transportation costs due to its geographic proximity to market (GM, 2019).

3.2.3 Covid-19 Implications & Market Volatility

The global automotive industry is characterized by a strong correlation with underlying economic conditions. In good economic times, car companies are able to sell many vehicles with healthy margins. However, in an economic recession, manufacturers are severely hit, as consumers are not looking to spend thousands of dollars on a vehicle if they are worrying about losing their job or savings. In the last global recession of 2008, we saw numerous automotive companies go bankrupt, receive government bailouts, or consolidate. Since the 2008 global financial crisis, automotive sales had been increasing at an average of 4.8% annually up until 2018. Since then, global automotive sales have decreased 4% due in large part to challenges faced in Asian markets (OICA, 2019a).

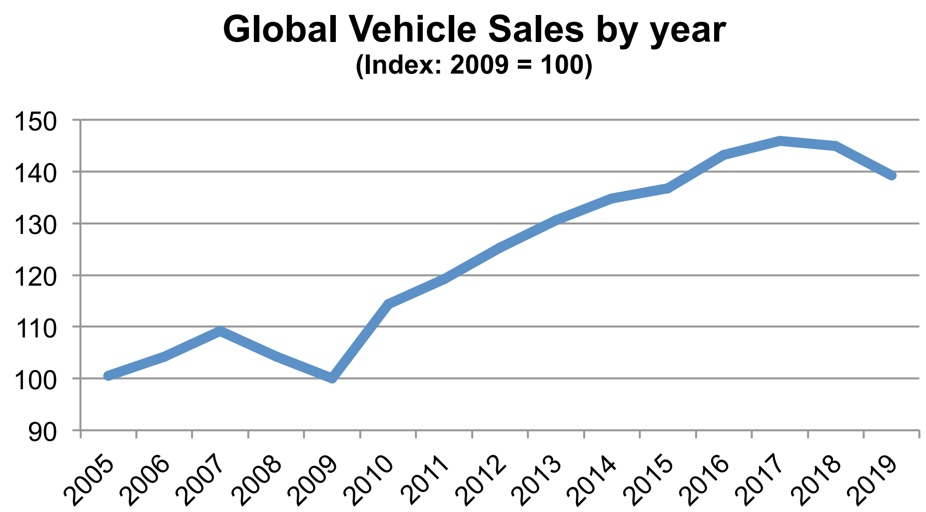


Figure 6: 2019 indexed global auto sales by year (OICA, 2019a)

Automakers have been preparing for an overall economic recession and the repercussions that this would have on the industry. Over ten years of economic growth is one of the largest bull markets in history, so many of these auto manufacturers such as GM and Ford had begun to spend billions on restructuring plans that would make them more lean and efficient should they need to weather a recession (GM, 2019). However, the impact of Covid-19 and the complete shutdown of almost all global auto manufacturing and sales was something that no company could have predicted. Asian automotive sales took the largest plummet in Q1 of 2020 due to the coronavirus originating in China; however expect North American and European markets to be severely impacted for Q2 and beyond as the virus spreads globally.

3.2.4 Cost Structure

Figure 7 illustrates the costs associated with vehicle manufacturing by segment. Materials and Labour stand out as the two major costs associated with vehicle manufacturing. Accounting for 47% of the total cost involved in vehicle production, major materials used in the manufacturing process include steel, iron, plastic, aluminum, and glass. Other rare earth metals such as platinum and palladium are used in applications such as the catalytic converters. Even though the amounts used compared to aluminum or steel is minimal, it adds to the vehicles overall cost due to their rarity and high costs.

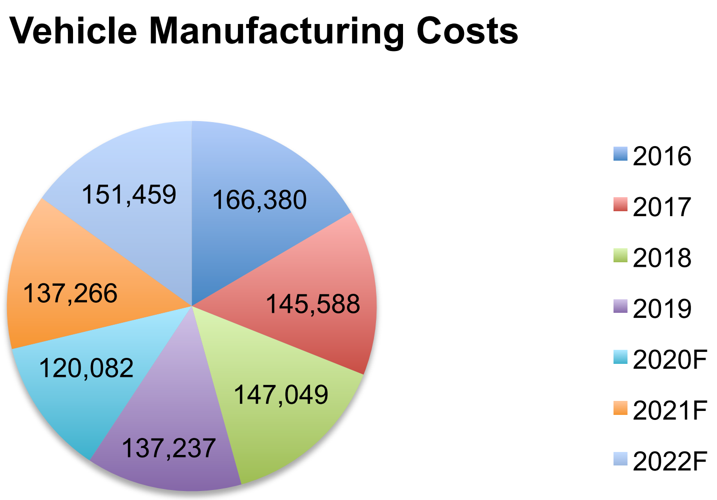


Figure 7: Car production cost breakdown by segment (Statista, 2020)

The second largest cost associated with vehicle manufacturing is labour at 21% of overall production costs. Even with efficient assembly processes and the prevalence of automation or robotics, the manufacturing process is still extremely labour intensive, which is why we have seen production shift to regions with lower labour costs in recent years. Although this shift to lower cost regions has occurred, the overall vehicle production costs have risen significantly in the last 15 years as input materials such as rare earth metals increase in cost. Automakers are also building vehicles at a quality never seen before and include more advanced technologies. This has led to an overall increase in the average sale price in order to cover increasing production costs, but also has allowed the average lifespan of a car to increase in tandem (GM, 2019).

3.3 Competition In the Industry

In this section we will briefly present a few of GM's major competitors. The purpose behind listing off these companies is to then use them as a comparison when we get to the financial analysis of GM in later sections. This will allow us to dig beyond the scope of just GM's financial statements into more industry wide trends and performance; making our analysis that much more thorough. The 4 major competitors that we will discuss are Toyota Motor Corporation, Ford Motor Company, and Tesla Inc. The reason that we chose these 3 companies is that they all share many similarities with GM in one way or another. They are all listed on U.S. stock exchanges as well which makes obtaining data easier and ensure that they are all using the same standards. These companies also consist of GM's main competitors and operate in similar if not the same segments, making them a great choice for direct comparison.

3.3.1 Toyota Motor Corporation

Toyota is the world's largest automaker and is headquartered in Toyota Japan. It is the largest automaker by both market capitalization and cars sold, selling 10.74 million cars in 2019 with a market value of $168.15 billion as of May 6th 2020 (Toyota, 2019). The company has manufacturing facilities on every continent except Antarctica, and exports vehicles all around the world. The company is listed on the New York Stock Exchange (NYSE), the London Stock Exchange (LSE), and the Tokyo Stock Exchange. Toyota competes directly with Chevrolet, while its luxury division Lexus competes directly with GMs Cadillac brand. Toyota is currently the industry leader in internal combustion engine and hybrid technology, however they have yet to invest in electric or hydrogen powered propulsion systems, which gives GM an advantage in that market (Toyota, 2019).

3.3.2 Ford Motor Company

Ford is the third largest auto manufacturer based in the US and is GM's direct domestic competitor (Ford, 2019). The company is headquartered less than 50km from GM in Dearborn, Michigan and is listed on the NYSE. Responsible for the advent of the assembly line and many advances in automotive manufacturing, Ford has faced tough times recently and has implemented a company wide restructuring that has resulted in it halting production of all compact cars and sedans. Ford continues to produce the best selling vehicle in North America; the F150 truck, which competes head to head with GM's Chevrolet Silverado and GMC Sierra (Ford, 2019). These trucks are responsible for the majority of their respective companies profits due to high volume and profit margins. Ford competes directly with the Chevrolet Brand, while its luxury offering Lincoln competes with GM's Cadillac brand.

3.3.3 Tesla Inc.

Tesla is the second largest automaker by market capitalization in the world, but sells considerably fewer vehicles than traditional automakers such as Toyota, Ford, or GM (Tesla, 2019). Listed on the NASDAQ, Tesla has seen a surge in its stock price recently as the company surpassed GM to become the largest US automaker by value, and the second largest automaker globally behind Toyota. Tesla is an all-electric car manufacturer that currently possesses the most advanced scalable battery technology in production. That being said, GM has recently unveiled its Ultium scalable battery platform that aims to take Tesla head on in the fast growing electric car market (GM, 2019). Tesla's current valuation and is more closely comparable to that of a tech company rather than a traditional auto manufacturer. Although that makes it less comparable to GM, the fact that the two automakers are the global leaders in battery technology allows Tesla to be used as a strong representation of what GM could look like once its electric vehicle portfolio hits the market.

4. Literature Review

When exploring the value of an asset, one must understand that this value may be different for everyone. The seller may place a different value than the first buyer, who may place a different value on an asset than another buyer. This true value of an asset is known as its intrinsic value, and is based off an assets underlying fundamentals. Aswath Damodaran, known coloquially as the 'Dean of Valuation' states that understanding what determines the value of a firm and how to estimate that value seems to be the prerequisite for making sensible descisions (Damodoran, 2006).

The problem with finding the intrinsic value of an asset is that no investor has perfect information about the company in both the past and present in order to make a valuation assesment. In real applications, the best valuation target that we can make is the one that comes the closest to an assets intrinsic value (Damodoran, 2006). There exists many different techniques that attempy to value a company, and new ones are created all the time. In the end, each of the strategies offers a slightly different perspective using different information and data to come to a conclusion, but each of these valuation approaches are simply different ways of expressing the same underlying model (Young, Sullivan, Nokhasteh, & Holt, 1999). Because of this, it is often useful to use multiple valuation techniques in conjunction with one another in order to assess what may be the most appropriate for your specific company.

The three main valuation approaches are:

1. Cash Flow Approach (Dividend Discount Model or Discounted Cash Flow)

2. Excess Returns Approach (Return on Equity)

3. Multiples Approach (P/E, P/BV, EV/EBITDA)

4.1 Cash Flow Approach

The Cash Flow approach is the most frequently used valuation method based on my research and review of existing literature. This approach consists of major models such as the Dividend Discount Model (DDM), and the Discounted Cash Flow model (DCF). DCF valuation finds the value of an asset by taking the present value of all expected future cash flows of that asset, while the DDM finds an assets value by taking the present value of all dividends (Damodaran, 2006). These models are based on the idea that an assets value is its sum of all future cash flows discounted at a specific rate that reflects the volatility or riskiness of the asset. This supports that notion that an assets valuation is based on what it can generate rather than what a persons perception of the assets worth to be.

4.1.1 Discounted Cash Flow Model (DCF)

The DCF model is often considered the most accurate and flexible for predicting a firm's value (Damodaran, 2006). As mentioned above, the DCF model finds the present value of all future cash flows using a discount rate that reflects the volatility and riskiness of an asset and its business. The main inputs that are used in the DCF model for finding the present value of future cash flows are:

- Earnings
- The Growth Rate (g)
- The Discount Rate (k)
- Stabilization state (Terminal Value)

Using some of these inputs, we can use the following formula to find present value:

$$Present\ Value = \sum_{t=0}^{n} \frac{E(CF)t}{(1+k)^t}$$

The cash flows used in this formula can either be free cash flows to the firm (FCFF), or Free Cash Flows to Equity (FCFE). FCFF is defined as all cash flows that are attributable to the business, while the FCFE is similar to the DDM analysis in that it looks at cash flows that come from equity such as dividends (Damodaran, 2006). The formula that is used to calculate FCFF is as follows:

$$FCFF = NOPAT + Depreciation - CAPEX - \Delta NWC$$

In the above equation, NOPAT stands for Net Operating Profit After Tax and is calculated by removing the tax from EBIT: $NOPAT = EBIT \times (1 - T)$.

As is the case with large global companies, you often find yourself dealing with many different tax rates depending on what country you are looking at. To avoid this problem, we will use the corporate tax rate in the US as a baseline since it is the country of origin for GM (Damodaran, 2002).

Using the FCFF formula listed above, we are also able to find the Free Cash Flow to Equity value. This differs from the FCFF in that FCFE is the cash available to a shareholder of the company after all deductions rather than the cash available to the firm.

$$FCFE = FCFF - [interest\ payments \times (1 - T)] - principal\ payments + new\ debt$$

Using FCFF rather than FCFE or the dividend discount model allows us to value the firm rather than firm's equity. Because the value of equity can be extracted from the value of the firm, these models are just variations of the same thing (Damodaran, 2006). The advantage of using FCFF is that these cash flows are pre debt cash flows, so any cash flows that are related to debt do not have to be considered explicitly while they do when using FCFE. This saves significant time and results in having to make less estimation specifically in cases where there is changing leverage at play (Damodaran, 2006). If we were to use FCFE in our DCF calculation, we would have to use the cost of equity (Ke). If we use FCFF then we would use the weighted average cost of capital (WACC) to reflect the riskiness of the firm. We will discuss more on this and the WACC approach in a later section.

4.1.2 Terminal Value

In a DCF calculation, you can break down free cash flow forecasting into two periods. In the first period, you forecast FCF at each period due to abnormal profits or growth in the company. However, this would be unpractical to assume forever as no firm can grow at a rate higher than the growth rate of that country in perpetuity (Damodaran, 2002). Once a firm reaches its maturity stage, it is expected to reach equilibrium of sorts where its growth rate tends to equalize around that of the countries economic growth. This period is characterized by a more constant growth rate and stable profits, so we call this second period the steady state (Damodaran, 2002).

The existence of this steady state allows us to calculate a terminal value. This terminal value represents the entire value of the firm once it reaches this steady state, allowing us to avoid having to calculate free cash flows for eternity. Instead, we can use this terminal value to represent the overall firm's value from that point forward and only calculate the free cash flows for earlier periods where growth or profits in the company are abnormal.

There are three main ways to calculate the terminal value: the Stable Growth Model, Liquidation Value, and the Multiples Approach. The stable growth model is the most frequently used in valuation analysis (Damodaran, 2002). The growth model is very applicable to mature companies whose revenue and profits have stabilized over time and grow at a steady rate. This description fits GM quite well and for that reason combined with its popularity, we will be using the growth model in our terminal value calculations.

The Stable Growth Model formula is:

$$TV_t = \frac{FCFF_{t+1}}{k-g}$$

Applying the Terminal Value formula into our present value formula we get:

$$Present\ Value = \sum_{t=0}^{n} \frac{FCFF_t}{(1+k)^t} + \frac{TV_t}{(1+k)^t}$$

4.1.3 Discount Rate

The discount rate is the rate that an investor would require in order to invest in a specific asset given its risk. It is a reflection of the opportunity cost and is largely influenced by an assets risk profile. The most common method for estimating the discount rate is by using the Weighted Average Cost of Capital (WACC) method. The WACC, like its name implies is a weighted average of both the cost of debt (Kd), and the required return on equity (Ke).

The formula for WACC is as follows:

$$WACC = \frac{D}{D+E}Kd * (1-T) + \frac{E}{D+E}Ke$$

In order to find the discount rate of the firm by using the WACC, we first need to identify the cost of equity (Ke), and the cost of debt (Kd).

<u>The Cost of Equity</u>

The cost of equity is determined by the riskiness of the firm, which is calculated by different methods depending on the model being used. The CAPM model uses the market beta, while other models such as the multifactor model use factor betas. Although many academics have presented limitations of the model, it still remains the most commonly used model due to the vast amount of existing literature on the topic and it’s easy of use. In this valuation analysis, we will be using the CAPM model due to its popularity and prevalence in the teachings given in FIE437.

The CAPM model is as follows:

$$ER_i = R_f + \beta_i(ER_m - R_f)$$

ER_i = expected return of investment, R_f = risk free rate, β_i = beta of investment, and $(ER_m - R_f)$ = market risk premium (Sharpe, 1964).

The CAPM model is an effective method of estimating cost of equity as it takes into account both the time value of money, which is reflected through the risk free rate, and the individual risk of a specific asset, which is reflected through the market risk premium (Sharpe, 1964).

Risk Free Rate

We will be using the 10 year treasury bond yield as of March 31st 2020 as the risk free rate since GM is an American based company and a major portion of its revenues come from the American market.

Market Risk Premium

The market risk premium is the rate investors require in order investing in the market over a risk free asset (Damodaran, 2002). There are three main approaches used to estimate the market risk premium, but we will only be using the historical average realized returns as this is widely considered the best estimator of the market risk premium (Damodaran, 2002). Like the name suggests, historical returns earned on stocks are compared to the returns earned on a risk free asset over the same period of time. Because you are taking an average, it is important to understand whether you are taking the arithmetic or geometric mean. Due to the influence of compounding taken into account in the Geometric mean, we will use that moving forward.

Evidence shows that historical risk premiums are time dependent, and thus the period that is under consideration is highly important (Damodaran, 2002). Due to current ultra low interest rates, we want to select a time period that goes far enough back in order to reduce major current market influences. Therefor we will use 2009-2019 as our time period in this valuation.

Beta

Beta is defined as the amount of exposure to market risk a company has, but can be slightly different depending on the methods used in its estimation (Damodaran, 2002).

Cost of Debt

For any large blue chip companies, the yield to maturity of a company's investment grade issued long term bonds are relatively good estimates of a company's cost of debt. This is so long as the debt is liquid and free of any options that could influence its short-term value (Damodaran, 2002).

4.1.4 Weighted Average Cost of Capital

As mentioned briefly above, The WACC can be calculated with the cost of equity and debt in order to discount FCFF. When we look deeper into the WACC we can see that there are tax benefits associated with debt financing since you only take into account the after tax cost of debt. This is known as the tax shield. However, as more debt is taken on, the risk of a firm increases eventually outweighing the benefits associated with the tax shield. Finding the right balance between these two is what capital structuring is all about (Damodaran, 2002).

Although WACC was the industry standard for a long time and is still frequently used today, the reason for its continued use is more due to simplicity rather than accuracy (Leuhrman, 1997). The WACC method is only suitable for simple static capital structures in order to not require constant adjustments based on different projects or periods within a company (Leuhrman, 1997). As a result of the many flaws that have been shown with the WACC model, the best alternative is to use the adjusted present value (APV) method (Leuhrman, 1997).

4.1.5 Adjusted Present Value

All Discounted Cash Flow methodologies involve taking future cash flows and discounting them at a specific rate that's reflects their risk in order to get their present value (Leuhrman, 1997). However, the methodologies used in doing so differ by how the account for the value created or destroyed by specific capital structures compared to business operations. The APV can be broken down into two parts in order to look at both the value gained or lost from business operations as well as the value gained or lost from its specific capital structure. The first is the more traditional cash flows that are tangibly linked to business operations such as revenue, operating costs, and net capital expenditures. This category is not so different from the WACC method. However, the second category of cash flows that the APV method considers is something known as financial side effects (Leuhrman, 1997). These include the interest tax shields, financial distress costs, and alternative forms of financing that are directly linked with a companies capital structure and financing methods.

The APV formula is as follows:

$$APV = Value\ of\ Unlevered\ Firm + Value\ of\ Tax\ Benifits \\ - Expected\ Costs\ of\ Financial\ Distress$$

In the first step of the APV method, we calculate the value of the firm as if it was financed solely with equity. This is known as the firm’s unlevered value. We can do this by discounting FCFF using the firm’s unlevered cost of equity (Damodaran, 2002).

As we mentioned above, the APV can be broken down into two categories of cash flows. This first step addresses the business operating, while the second and third steps will explore the side effects of the company’s capital structure and financing decisions.

Present Value of the Tax Shield

In the US, the corporate tax system is set up in a way that interest payments are considered a tax-deductible expense. This allows companies to claim interest expenses as tax deductions, ultimately reducing the real cost of the interest payments. This is known as the Tax Shield. As show in the WACC formula above, this results in the real cost of debt being multiplied by one minus the tax rate.

There is no clear answer to which method is the correct way to value the tax shield. (Modigliani and Miller, 1963) suggest using the risk free rate, but (Leuhrman, 1997) says that this is impractical because of leverage costs and proposes that the cost of debt be used as the discount rate to value the tax shield. This is also supported by (Myers, 1974). Another option that could be relevant in some situations is using the cost of debt in the first year, and unlevered cost of equity in subsequent years (Miles & Ezzel, 1980). However, because GM does not hold a constant D/E ratio, this would not make sense for our specific case (GM, 2019a).

During our valuation, we will use Leuhrman's method due to its consistency and accuracy when working with fluctuating D/E ratios (Luehrman, 1997).

Financial Distress Costs

One of the reasons given by Luehrman to avoid using the Modigliani and Miller method of valuing the tax shield was that it does not take into account leverage costs. While there can be many costs associated with higher leverage, one of the more challenging ones to measure is bankruptcy costs. While debt can be cheaper due to the tax shield, companies need to find the perfect capital structure that minimizes cost while also reducing exposure to bankruptcy. Taking on too much leverage can raise a companies risk profile and make investors wearier in investing.

The final portion of the APV formula is estimating the financial distress costs associate with a company. Because every company has a different optimal capital structure, all companies will have different financial distress costs as well. Financial distress costs are imposed when there is trouble-honouring agreements with creditors, or these agreements are completely broken. The chance of this occurring, and the depth at which it occurs also factor into financial distress costs. To do this, one must estimate the probability of default when undergoing additional debt in order to calculate the direct and indirect costs associated with insolvency (Damodaran, 2006).

Direct costs comprise of things such as lawyer and admins fees as a firm goes through the administrative process. These are straightforward calculations that cost between 3% and 5% of the total firm value at the time of insolvency (Sachs & Warner, 1997). However, In direct costs such as the loss of customers, employees, or business representation are much harder to estimate, but also more costly to a firm; ranging from 10% to upwards of 20% of the firm value (Kaplan, 1999).

We can use the following formula to calculate the present value of financial distress costs:

$$PV\ of\ Expected\ Costs = (Probability\ of\ Bankruptcy * PV\ of\ Bankruptcy\ Costs)$$

There are two commonly used methods to estimate the probability of bankruptcy, the first is by comparing default probabilities of other companies with similarly rated corporate bonds, while the second is to use a statistical approach based upon the firms financial data (Damodaran, 2006).

Summarizing the DCF model and it's the literature review conducted on its merits; we can conclude that there is not only one right way to conduct a DCF analysis. Both WACC and APV methods have their strengths and weaknesses. However, because GM has not held a constant D/E ratio we will use the APV method for our analysis.

4.1.6 Dividend Discount Model (DDM)

The dividend discount model is a commonly used model to value equity due to its simplicity and straightforward concept. The model states that the value of a firm's equity is just present value of the sum of its dividend payments (Damodaran, 2006).

$$Value\ per\ share\ of\ stock = \sum_{t=1}^{t=\infty} \frac{E(DPS_t)}{(1+K_e)^t}$$

In this equitation, DPS represents the dividend per share of the firms stock during period t, while K_e is the companies required return on equity.

Like in the DCF model, it is not practical to forecast dividends period by period perpetually. Instead, we use our knowledge of the dividend payout and growth ratios in order to value the firm's equity by using the simple Gordon Growth Model. The formula for this model is as follows:

$$Value\ per\ share\ of\ stock = \frac{DPS_1}{K_e - g}$$

In this formula, DPS1 represents the expected dividend 1 year from now. In many cases that information is not available directly, so we would take the current dividend and multiply it by the growth rate.

It is important to understand that this is a simple model when it comes to equity valuation, as it assumes constant dividend growth forever. In reality, this would mean that if the payout ratio stays the same, that returns would also increase at a constant ratio, which is similar to that of terminal value in the DCF analysis. We can see that the DDM becomes very sensitive to its inputs of the growth rate and firm returns, making it impractical in thorough equity analysis. Instead, we can use this model to establish a lower boundary on which the rest of our analysis can rely on.

4.2 Excess Returns Model

The concept of the excess returns model is that regular earnings do not create the majority of value in a firm as these earnings are expected. What drive value in a firm is the excess earnings above and beyond the required return of a firm or investment. In the excess returns model, we divide cash flows into two categories, normal returns, and excess returns. Then we can take the present value of these excess returns both in the present and for any future projects in order to find the value of a firm (Damodaran, 2002).

Like many of the other models discussed in the literature, there are many variations of the excess returns model that have been presented over the years. In this thesis, we will use the economic value added (EVA) model as it has a simple definition and is widely used in valuation analysis. The EVA model measures the incremental dollar surplus value crated by a firm on its existing investments (Damodaran, 2002).

The formula for the EVA model is as follows:

$$EVA = (Return\ on\ capital - Cost\ of\ capital) \times Capital\ invested$$

$$= NOPAT - Cost\ of\ capital \times Capital\ invested$$

See section 3.1.1 for explanation and formula of $NOPAT$.

Use market value not book value in your cost of capital calculations for the firm, but use book value to calculate capital invested since MV also includes investments in future growth (Damodaran, 2002).

After briefly summarizing some of the components of the excess returns model, we can now suggest the following formula to find firm value:

$$Value\ of\ firm = \sum_{t=1}^{t=\infty} \frac{EVA_{t,aip}}{(1+K_e)^t} + \sum_{t=1}^{t=\infty} \frac{EVA_{t,future\ projects}}{(1+K_e)^t} +$$

While it is important to understand some of the other models that exist in finding the value of a firm, they are not necessarily all created equal. Issues arise with the EVA model and using excess returns in identifying a company's value as this analysis is easily manipulated to achieve a higher firm value. For instance, a firm could chose investments that have high EVA but increase the firms leverage or risk profile, in turn increasing the firms cost of capital (Damodaran, 2002). This would ultimately lower the value of the firm if they underwent this project, even though their EVA may increase. For this reason, we will not be including an excess returns model in our valuation analysis of General Motors (GM).

4.3 Multiples Approach

In the DCF section above, we highlighted that the underlying theory behind it revolves around intrinsic value and how an asset is worth the cash flows that it generates and its riskiness. The multiples approach on the other hand is all about relative valuation. Looking at firms assets and comparing them to similar assets that are currently priced in the market.

In a multiples valuation, there are two major questions that an analyst must answer when attempting to value a firm. The first is what assets in the market do we value ours next to. This is known as peer group selection and is important because any errors made in this step will translate directly through to the second step. This second question once you have chosen your peer group is what multiples will you use to compare these assets.

There are two main groups that these multiples fall into. The first being equity multiples, and the second being enterprise multiples (Suozzo, Cooper, Sutherland, & Deng, 2001). Enterprise multiples are more commonly used in valuation analysis as they are less affected by capital structure and can exclude non-core assets when conducting a comparison (Suozzo, Cooper, Sutherland, & Deng, 2001). The most common enterprise multiple is EV/EBITDA, which is often used because it is less easily manipulated compared to equity multiples.

These multiples can be further broken down into three sub categories, current, trailing, and forward looking. The problem with trailing is that it looks at the last 4 quarters while current multiples only look at profits from the previous financial year. That is why it is recommended to use forward multiples as they are based on forecasted figures that better reflect future profits (Koller, Goedhart, & Wessels, 2005). Based on this recommendation, we will be using the forward-looking enterprise multiple in our analysis of GM.

4.4 Literature Conclusion

Based on this research presented in the literature review section of our thesis, we believe that it is clear what methods should be used in our analysis going forward. Although the WACC DCF is the traditional method used in valuation analysis, we will be using the APV method in our thesis. In light of the recent Covid-19 situation, many companies may be forced to take on larger than average amounts of debt in order to weather the storm. General Motors is no different and so because of the fluctuating debt to equity ratio caused by Covid-19 and GMs general operational challenges, we felt the APV method was better suited in our analysis. The dividend growth model will be used not as a tool to find the exact value of the firm, but rather in a sensitivity analysis form in order to define the upper and lower bounds of our results and give a conservative estimate. Lastly, we will conduct a multiples approach valuation to support or refute the results found in our APV analysis.

5. Forecasting

In this section, we will be presenting the valuation models and our results used to assess the equity value of General Motors. The APV method will form the basis of our analysis, but we will also include both a dividend discount model sensitivity analysis to define boundaries while using the multiples approach to concur previous findings.

Before we can run our models, we must first perform an analysis of GMs historic financial statements in order to find inputs needed for our models. After discovering the historical inputs, we can also use these values to forecast future items while clarifying any of the assumptions we make.

5.1 Revenue

The Auto industry revenue is highly correlated to economic performance based on an assessment of market and industry performance over the last 20 years. Looking at GMs annual report from 2019, we can see that the company posted net revenue of $137.2B, which was down 6.7% compared to 2018. GM originally predicted flat revenue growth prior to the Covid-19 pandemic. However, with the release of GMs Q1 2020 financial statements, we saw the revenue over the quarter was down to $32.7B, a decrease of 6.2% compared to Q1 2019 (GM, 2020a). ALG, the industry benchmark in American automotive forecasts predicts that vehicle sales will fall 14.2% from 2020 sales forecasts and 14.9% compared to 2019 sales due to a long term Covid-19 downturn. Although these forecasts are only for the American market, the majority of GM's revenue comes from that market, so we will be weighing these predictions heavily in our revenue assessment. Due to these predictions, we will assume a 12.5% decrease in revenue for the 2020-year as 77% of GM's revenue is generated from the North American market. For 2021, we predict a 14.31% growth rate as a U shaped recovery is established for GM's Covid-19 response plan. 14.31% is the industry growth rate average during economic recovery, and while GM in general has not been able to capitalize like other automakers have been historically, we predict this will not be the case due to the fear factor involved in Covid-19 demand shocks.

Although the industry has experienced a 14.31% growth rate on average in economic recovery times, GM has not always been able to capture this growth like other automakers have. Damodaran predicts that the auto industry will experience 199% revenue growth over the next 2 years (Damodaran, 2020). However, this was predicted prior to Covid-19 and the industry Q1 reports. Another challenge that presents itself for GM is that the majority of this growth is going to be in emerging economies where GMs market share is lower than the North American Market. That being said, GM does have advanced propulsion technologies and high profit margin vehicles that will drive up revenues in the future for the American and Chinese markets (GM, 2019a). We will take a conservative approach and say that GM's revenue growth will converge from its economic recovery numbers of 14.31% to its historic long-term revenue growth of 2.4% over a five-year period, which is the average business cycle length in the American auto industry (GM, 2019a).

(in millions)	**2016**	**2017**	**2018**	**2019**	**2020F**	**2021F**	**2022F**	**2023F**	**2024F**
Revenue	166,380	145,588	147,049	137,237	120,082	137,266	151,459	161,107	164,974
Growth Rate		-12.50%	1.00%	-6.67%	-12.50%	14.31%	10.34%	6.37%	2.40%

Table 1: Revenue forecasts (Damodaran, 2020)

5.2 Cost of Sales

General Motors has recently undergone a corporate restructuring to reduces costs and better prepare itself for an economic downturn. In 2016 and prior when GM revenues were at an all time high, GMs margins were over 20%. However, when sales and revenue decreased in 2017, the margins dropped reducing GMs overall profitability. We forecast GM revenues to increase back to above the 160 million mark before reaching steady growth, so we can assume that margins will also level off at above 20%.

As GM continues to invest in and produce more advanced propulsion technologies, its costs will increase, reducing its margins. However, at the same time, GM has implemented a strong cost cutting strategy that looks to save \$6 billion annually which will be realized starting in 2020 (GM, 2019). \$4.5B of which will be costs cuts, while the other \$1.5B will be reduced expenditures. We believe that this will essentially offset GMs increased costs due to advanced propulsions, thus resulting in a margin-moving forward of 21%. As GM revenues increase towards 160 million, margins will also increase towards the 21% rate.

	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
Cost of Sales	136,333	116,229	120,656	110,651	96,331	109,557	120,269	127,493	130,329
Margin	18.06%	20.17%	17.95%	19.37%	19.78%	20.19%	20.59%	20.86%	21.00%

Table 2: Margin forecasts (GM, 2019)

5.3 Other Operating Costs

Operating costs represent the costs associated with normal business operations. These include things such as Research & Development (R&D), selling, general and administrative expenses (SG&A), along with the Cost of Sales mentioned earlier represent the operating costs of a company. SG&A refers to expenses such as marketing, and any administrative costs. We could take a 5-year average of historic SG&A expenses to get a target percentage of 6.38% of revenue in order to forecast future values. However, we mentioned previously that GM has recently undergone a large cost cutting campaign that aims to reduce expenditures by $1.5B. This can already be reflected in reduced SG&A values in 2019. The full effect of this cost cutting campaign is expected to be realized in 2020, so for this reason we believe that the future percentage will be lower than that of the five-year average. For this reason, we will use a fixed percentage of 6.1/% of revenue to forecast future SG&A expenditures. Another major operating cost for GM is GM financials interest and operating costs. These two costs along with COGS make up total expenses on GMs Income Statement. We will use a 5-year average of 6.79% of revenue to forecast future GM financial operating costs. In the short run, it is expected that GM will experience slightly higher financial operating costs due to payment deferrals and defaults resulting from the economic fallout. However, in the long run, this will even out as the operating costs from GM financial as a percentage of revenue during boom years are around 3.5%, giving further credibility to the reason we use 5 year averages rather than recent annual trends.

Operating Expenses (In Millions)	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
Auto SG&A	11710.00	9570.00	9650.00	8491.00	7325.02	8373.24	9239.03	9827.55	10063.42
% of revenue	7.04%	6.57%	6.56%	6.19%	6.10%	6.10%	6.10%	6.10%	6.10%
GM Financial Operating & Other Expenses	8792	11128	12298	12614	8153.59	9320.37	10284.10	10939.20	11201.74
% of revenue	5.28%	7.64%	8.36%	9.19%	6.79%	6.79%	6.79%	6.79%	6.79%
Total Operating Expenses	20502.00	20698.00	21948.00	21105.00	15478.62	17693.61	19523.13	20766.75	21265.15

Table 3: SG&A forecasts (GM, 2019)

5.4 Borrowing Expenses & Debt

The Majority of General Motors debt comes from its GM financial Division rather than GM Automotive. Debt in this division is taken on in order to help customers finance cars and encourage sales. Interest rates on GMs outstanding short-term debt were 4.9% in 2019, and 6.6% in 2018. GM Automotive long-term debt had interest rates of 5.4% in 2019, and 5.2% in 2018. GM automotive takes on debt to finance plant, property, and equipment expenses as well as to cover any operating cash flow shortages. GM automotive debt is linked inversely to operating profits. Due to Covid-19 it is expected that there will be significant increases in GM Automotive debt due to lower revenue and profits. GM Financial debt is taken on in order to help customers finance GM vehicles and encourage sales. As sales drop due to Covid-19, GM financial debt should also decrease, as fewer customers will be financing. If we take a 5-year average of GMs interest payments in relation to their total debt from automotive manufacturing, we find an interest rate of 4.95%. We will use this rate moving forward to forecast interest expenses even though rates have reached all time lows.

Due to Covid-19s economic impact, we expect GM to take on large amount of debt in order to finance its operations and other activities. In the last economic crisis, GMs automotive debt increased by 27.9% in the year of the economic shock, and subsequently increased at 3.2% for the following few years. We will use these historical changes to forecast a 27.9% increase in GM's total debt for the 2020 fiscal year, before stabilizing at 3.2% until 2020. Using these assumptions, we can forecast the interest expense:

Interest Expense (In Millions)	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
Automotive Interest Expense	572	575	655	782	911	940	970	1,001	1,033
Automotive Debt	10,560	13,502	13,963	14,386	18,394	18,983	19,590	20,217	20,864
Interest Rate	5.42%	4.26%	4.69%	5.44%	4.95%	4.95%	4.95%	4.95%	4.95%
Debt Growth Rate		27.86%	3.41%	3.03%	27.86%	3.20%	3.20%	3.20%	3.20%

Table 4: Interest Expense Forecasts (GM, 2019)

5.5 Equity Income

General Motor's equity income consists of its earnings from holdings in Joint Ventures. Instead of reporting costs and revenue of these joint ventures in its financial statements, it simply lists the earnings from these holdings under equity income. The majority of GMs joint ventures are located in China, where the auto industry is experiences large-scale growth. The global auto industry is expected to grow 14.31% in the next 2 years globally. Although the Chinese industry will most likely experience faster growth, we will use this number as our growth rate of GM's Equity Income from joint venture ownership.

Equity Income (In Millions)	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
Equity Income	2,282	2,132	2,163	1,268	1,449	1,657	1,894	2,165	2,475
% Growth	4.01%	-6.57%	1.45%	-41.38%	14.31%	14.31%	14.31%	14.31%	14.31%

Table 5: Equity Income Forecasts (GM, 2019)

5.6 Corporate Tax Rate

We calculated the historical 5-year and 8 year average tax rate that General Motors has paid, which resulted in a tax rate of 35.6% and 34.7% respectively. Going forward, we will use a tax rate of 35% in our forecasting which also happens to be the corporate tax rate in the USA under previous presidential administrations.

5.7 NOPLAT

As mentioned earlier, Net Operating Profit Less Adjusted Taxes is used to calculate FCFF projects. Using the values forecasted in previous sections we can now compute the NOPLAT. For Change in adjusted taxes, we assigned that input a value of zero moving forward as tax deferrals are reflected in net income through higher income tax expenses.

NOPLAT (In Millions)	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
Net Income	8,945	330	8,075	6,667	6,451	7,802	9,096	10,077	10,627
Add: Interest Expense	572	575	655	782	911	940	970	1,001	1,033
After Tax Operating Profit (NOPAT)	9,517	905	8,730	7,449	7,361	8,742	10,066	11,078	11,660
Add: Change in Adjusted Taxes	-1886	10880	-112	-133	0	0	0	0	0
NOPLAT	7,631	11,785	8,618	7,316	7,361	8,742	10,066	11,078	11,660

Table 6: NOPLAT Forecasts (GM, 2019)

5.8 Net Working Capital

We calculated the historical 5-year NWC average as a percentage of revenue. However, due to the Covid-19 pandemic, we believe that GM's NWC will continue to decrease in the short term, before levelling out around its 5 year moving average.

NWC (in millions)	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
Revenue	166,380	145,588	147,049	137,237	120,082	137,266	151,459	161,107	164,974
NWC	-8,978	-8,146	-6,944	-9,913	-11,408	-10,433	-8,634	-7,144	-6,271
NWC as % of Sales	-5.40%	-5.60%	-4.72%	-7.22%	-9.50%	-7.60%	-5.70%	-4.43%	-3.80%

Table 7: Net Working Capital Forecasts (GM, 2019)

5.9 Depreciation, CAPEX, and PPE

In order to forecast the depreciation and amortization value, we first must find what future capital expenditures will be. GM has not disclosed any specific statements or forecasts with respect to capital expenditures, so we will use an average of historic Capital Expenditures as a % of sales to forecast. We find the historical CAPEX percentage of sales values using a 3-year average. These capital expenditures have held fairly constant and are less tied to economic fluctuations as projects are planned further in advance. The 3-year average CapEx is 9.54% of revenue.

In the second section, we find depreciation as a percentage of PPE and take a 3-year average of those historical values to find a forecast for that. However, we then conduct the same process but instead use depreciation as a percentage of sales rather than PPE. This gives us a more consistent rate, which we will use as our Depreciation and Amortization forecast for further analysis.

(Millions)	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
Revenue	166,380	145,588	147,049	137,237	120,082	137,266	151,459	161,107	164,974
CAPEX	13,469	14,766	13,661	12,593	11,451	13,090	14,443	15,363	15,732
CAPEX as % of sales	8%	10%	9%	9%	10%	10%	10%	10%	10%
Depreciation/Amortization	9,819	12,261	13,669	14,118	12,976	14,615	15,969	16,889	17,257
Depreciation as a % of PPE	30.12%	33.82%	35.27%	36.43%	35.17%	35.17%	35.17%	35.17%	35.17%
PPE Opening	32,603	36,253	38,758	38,750	37,225	35,699	34,174	32,649	31,124
PPE Closing	36,253	38,758	38,750	37,225	35,699	34,174	32,649	31,124	29,598
Depreciation/Amortization	9,819	12,261	13,669	14,118	11,210	12,814	14,139	15,039	15,400
Depreciation as a % of sales	5.90%	8.42%	9.30%	10.29%	9.33%	9.33%	9.33%	9.33%	9.33%
PPE Opening	32,603	36,253	38,758	38,750	37,225	37,466	37,743	38,048	38,372
PPE Closing	36,253	38,758	38,750	37,225	37,466	37,743	38,048	38,372	38,704

Table 8: Depreciation forecasts (GM, 2019)

5.10 Free Cash Flows to the Firm (FCFF)

Next, we will calculate Free Cash Flows to the Firm:

(In Millions)	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
Revenue	166,380	145,588	147,049	137,237	120,082	137,266	151,459	161,107	164,974
Cost of Sales	136,333	116,229	120,656	110,651	96,331	109,557	120,269	127,493	130,329
Auto SG&A	11,710	9,570	9,650	8,491	7,325	8,373	9,239	9,828	10,063
GM Financial Operating Costs	8,792	11,128	12,298	12,614	8,154	9,320	10,284	10,939	11,202
Total Operating Costs	156,835	136,927	142,604	131,756	111,810	127,251	139,792	148,260	151,595
Operating Earnings	9,545	8,661	4,445	5,481	8,273	10,015	11,667	12,847	13,379
Automotive Interest Expense	572	575	655	782	911	940	970	1,001	1,033
Interest Income	429	1,645	2,596	1,469	1,112	1,271	1,403	1,492	1,528
Equity Income	2,282	2,132	2,163	1,268	1,449	1,657	1,894	2,165	2,475
Earnings Before Income Tax	11,684	11,863	8,549	7,436	9,924	12,004	13,994	15,504	16,349
Income Tax Expense	2,739	11,533	474	769	3,473	4,201	4,898	5,426	5,722
Net Income	8,945	330	8,075	6,667	6,451	7,802	9,096	10,077	10,627
Add: Interest Expense	572	575	655	782	911	940	970	1,001	1,033
After Tax Operating Profit (NOPAT)	9,517	905	8,730	7,449	7,361	8,742	10,066	11,078	11,660
Add: Change in Adjusted Taxes	-1886	10880	-112	-133	0	0	0	0	0
NOPLAT	7,631	11,785	8,618	7,316	7,361	8,742	10,066	11,078	11,660
Depreciation & Amortization	9,819	12,261	13,669	14,118	11,210	12,814	14,139	15,039	15,400
Capital Expenditures	13,469	14,766	13,661	12,593	11,451	12,812	14,159	15,154	15,447
Investment in NWC	-7,169	832	1,202	-2,969	-1,495	975	1,798	1,490	873
Free Cash Flows to Firm	11,150	8,448	7,424	11,810	8,614	7,768	8,247	9,473	10,740

Table 9: Free Cash Flows to Firm (GM, 2019)

We assume that GM will enter its steady state during 2024. This is because it has reached its long-term growth rate, and D&A/CapEx has stabilized at a value close to 100%.

5.11 Long Term Growth Rate

General Motors is a large mature company that experiences growth correlated with general economic prosperity in the markets that it operates in. While other automakers and the industry in general have seen tremendous historical growth, GM has been unable to capture the same growth. For this reason, we estimate the long-term growth rate to be 1.57%, which is the US inflation rate over the last 5 years (Bureau of Labor Statistics, 2020). We believe that GM will continue to grow, but at a slower pace than that of the general economy, and that rising costs will hamper FCFF growth when compared to revenue growth.

5.12 Cost of Debt, Levered Equity & Unlevered Cost of Capital

The yield to maturity of a company's investment grade issued long-term bonds are relatively good estimates of a company's cost of debt, so long as it is liquid and free of options (Damodaran, 2002). GMs corporate bonds that were issued in 2017 meet these criteria. The bond issue has a yield of 4.2%, which we will use as our cost of debt (*Kd*) for the company.

Using CAPIQ, we find that GM has an equity beta of 1.42 and an unlevered Beta of 0.53 (CAPIQ, 2020). As we mentioned earlier, we will be using the 10-year Treasury bond as the risk free rate, which is 0.7%. Next, we calculate the market returns based on 2009-2019 returns in order to find the expected market return moving forward. This gives us an expected market return of 12.05%. Subtracting the risk free rate of 0.7% we find the market risk premium of 11.35%.

We can use the CAPM formula and the estimated inputs listed above to find GM's cost of equity (*Ke*) and unlevered cost of capital (*Ku*), which are 16.82% and 6.72% respectively.

Risk free rate (Rf)	0.70%
Expected Market Returns (Rm)	12.05%
Market Risk Premium (Rp)	11.35%
Equity Beta	1.42
Cost of Equity (Ke)	16.82%
Unlevered Beta	0.53
Unlevered Cost of Capital (Ku)	6.72%

Table 10: GM input summary (Source: CapIQ & GM company report)

6. Valuation Models

6.1 APV Valuation

General Motors and the Auto Industry in General are very cyclical industries that rely heavily on economic prosperity in their markets in order to perform well. In poor economic times, GM will often have to take on larger debt in order to finance its operations and get back to profitability. Due to this fluctuating debt levels, we notice no trends or consistency in their Debt to Equity level. For this reason and others presented in the literature review, we have chosen to use the APV method as our main valuation technique for GM.

For a refresh of our literature, we will be using the following formula:

$$APV = Value\ of\ Unlevered\ Firm + Value\ of\ Tax\ Benifits - Expected\ Costs\ of\ Financial\ Distress$$

6.1.1 Unlevered Value of the Firm

Calculating the value of the unlevered firm is similar to the calculations used in a traditional DCF where one would discount cash flows by the Weighted Average Cost of Capital. In the APV method, we discount FCFF using the unlevered cost of capital of 6.72% found in section 4.12. Another important aspect of the unlevered value calculations is Terminal Value. We will use the perpetuity method to calculate GM's terminal value as this method is more heavily supported by research and theory.

See the following table for the summary of our results in calculating unlevered firm value:

Long Term Growth Rate	1.57%
Terminal Value	211,929
PV of Terminal Value	174,375
PV of FCFF	39,766
Unlevered Value of the Firm	214,141

Table 11: Unlevered Value of Firm Output Summary (Source: Our Analysis) (In millions)

6.1.2 Value of the Tax Benefits

The next step in the APV method is calculating the value of the tax benefits, also known as the interest shield. We do this by discounting the tax shield using the cost of debt given in section 4.12. To calculate the value of the tax shield, we will use the perpetuity function to calculate this value over the entire lifetime of GM, assuming that the marginal tax rate stays constant over time. Since we forecasted the marginal tax rate using a 5-year average of historical data, we assume this to be the case. We use the following formula to calculate the PV of the tax shield:

$$PV\ of\ Tax\ Shield = \frac{T \times K_d \times Debt}{K_d}$$

Using this formula and the inputs found in previous sections, we obtained the following results:

(in millions)	
Cost of Debt	4.20%
Tax Rate	35%
Total Debt	182,080
PV of Tax Shield	63,728

Table 12: PV of Tax Shield Summary (Source: Our Analysis)

6.1.3 Financial Distress Costs

The last step in the APV analysis is to calculate the costs associate with bankruptcy or financial distress. To calculate this, we must first obtain a probability of default. To do this, we find the rating GM debt has been issued, and compare that with the probability of default for debt issuance at that rating. GM has both Baa2 rated bank debt, and Baa3 rated senior unsecured debt. Both of these ratings were also put under review for a downgrade at the end of March 2020 (Moodys, 2020). Using Bloomberg, we are able to see that Baa2 ratings have a probability of default of 5.49% and Baa3 debt has a probability of default of 7.2%. The majority of GMs debt is bank debt associated with GM Financial operations, so we will use 5.49% as our probability of default moving forward (GM, 2019).

We will need to make some assumptions when calculating the cost of financial distress. In the literature review, we stated that direct costs are between 3 and 5% of firm value, while indirect costs can be anywhere between 10% and 20%. Due to the size of GM and its complexity, we will chose 5% for the direct costs. For the indirect costs, GM has already gone through one bankruptcy and restructuring and as a result did not see any major impacts to brand equity, customer base, or market share after reorganization. For that reason, we will assign a value of 12% for indirect costs.

We will use the following formula to estimate the costs of financial distress:

$$PV\ of\ Expected\ Costs = (Probability\ of\ Bankruptcy * PV\ of\ Bankruptcy\ Costs)$$

Combining the direct and indirect costs of financial distress we get 17% of firm value. 17% of the firm value results in total financial distress costs of $47,238 million. Multiplying the costs by the probability of default, we get $2,593 million.

6.1.4 Firm Value

After going through all the inputs used in the APV analysis, we are now able to calculate a value for General Motors. By taking the unlevered firm value, adding the value of the tax shield, and subtracting financial distress costs, we can find the enterprise value of General Motors. The value we obtain for this is $275.28 Billion.

If this value seems high, that is because it is the enterprise value not the equity value. The difference is that to get to the equity value, we must first subtract net debt from the enterprise value. Net debt is short term and long-term debt minus cash and cash equivalents. Subtracting this from the enterprise value gives us an equity value of $112.27 Billion. This large difference is attributed mainly to GM’s high debt load.

We then obtained a per share value by dividing this equity value by the number of shares outstanding, resulting in a per-share forecasted value of $78.40.

(In millions $ except share values)	
Unlevered Value of Firm	214,141
PV of Tax Shield	63,728
Costs of Financial Distress	2,593
Enterprise Value	**275,276**
Debt Valuation	182,080
Excess Cash	19,069
Equity Valuation	**112,265**
Stock Valuation	$78.40

Table 12: PV of Tax Shield Summary (Source: Our Analysis)

As of March 31st 2020, GM stock was trading at $20.78, giving our valuation an almost 300% premium. Yet when compared to competitors such as Tesla who at the time had a market capitalization of $96.94B with only a fraction of the revenue and profits shows just how undervalued GM stock currently is. That being said, we will test out 2 more models to confirm or refute our findings from the APV analysis method.

6.2 Dividend Discount Model (DDM)

General Motor's dividend policy is difficult to forecast due to the relative infancy of the modern era company after bankruptcy proceedings in 2009. After reorganization, the company only started issuing a dividend in 2014 at $0.30 per share quarterly. Since then, GM has increased its dividend twice, the first in 2015 to $0.36 per share quarterly, and again in 2016 to $0.38 per share quarterly (GM, 2019). This has resulted in a fairly constant dividend yield in the high 3% low 4% range, although recent stock devaluations have caused dividend yields to rise upwards of 5% (GM, 2020a).

One approach to forecasting future dividend payments is by assuming future payout ratios and then finding the future dividend payments based on those ratios. However, in that method it becomes complex for firms that do not have fixed payout ratio dividend policy such as GM, whose payout ratios have been anything but constant due to its volatile stock price. Instead, we will use historical dividend data to find the average dividend growth rate between 2014 and 2019. Based on the growth projections, we will then use our projected growth rate, the Gordon growth model, and current dividend payments to find a stock valuation for GM. In our dividend per share calculations, we will also take into account any share buyback programs that GM has gone through as this is often considered another form of dividend policy and is used to raise the price of existing shares.

Using the Compound annual growth rate and historical data between 2014 and 2019, we found an annual dividend growth of 4.84%. The remaining results of the dividend discount model valuation method are as follows:

($ per share)	
D0	2.97
D1	3.12
Ke	16.82%
g	4.84%
P0	26.01

Table 13: DDM Results Summary (Source: Our Analysis)

Based on the dividend discount model, GM stock is valued at $26.01 per share as of March 31st 2020. This represents approximately a 25% premium over the current market price of $20.78, which is a far lower valuation than that of the APV method. That being said, the DDM usually results in a much lower than valuation than reality, which is why we mentioned that we would be using it as a lower boundary. It is still important to conduct this analysis as it shows that even at our lower boundary, GM stock is still undervalued by 25%.

6.3 Multiples Approach

All previous valuation methods that we have explored so far involve cash flows in one-way or another. The APV method involved discounted FCF while the DDM model involved discounting dividends back to present value in order to find firm value. Instead, we will use a relative valuation in this section to assign a value to GM and see how it compares to the APV method results. This valuation is performed by comparing GM with companies that match GM closely in industry, characteristics, size, and technology. By comparing GM against these competitors, we are able to assign a valuation for it based on other company's valuations.

In order to move forward, we must first identify which firms we will be comparing GM against. Ideally, you want to select companies that are close in risk, growth, and cash flow generating potential (Damodaran, 2006). For this reason, we select Tesla, Toyota, Hyundai, and Honda. We will also include Ford Motors for reference in our table but do not include it in the peer average calculations due to its highly differing characteristics and growth potential. While the majority of automakers listed are legacy automakers such as GM, we include Tesla on this list as GM has recently unveiled its Ultium battery platform that poses as a direct competitor to Tesla. See the following table for the remaining results of our multiples valuation:

Comp Firms	EV/EBITDA	EV/EBIT	EV/SALES	P/SALES	P/E
Ford	76.67	-224.43	4.53	0.61	-9.66
Tesla	34.21	136.86	3.92	3.73	-940.75
Toyota	8.03	13.01	1.12	0.60	8.67
Hyundai	9.44	18.68	0.70	0.09	6.91
Honda	6.02	11.19	0.61	0.28	9.41
Peer Group Averages	14.42	44.94	1.59	1.18	8.33

GM (in $millions)	EV/EBITDA	EV/EBIT	EV/SALES	P/SALES	P/E
GM Enterprise Value	287,046	296,173	214,716	-	-
Debt Valuation	182,080	182,080	182,080	-	-
Excess Cash	19,069	19,070	19,071	-	-
Equity Valuation	124,035	133,163	51,707	158,880	-
Per Share Value	86.62	92.99	36.11	110.95	27.15*

Table 14 & 15: Comparable and Multiples Valuation Summary (Source: Company Reports, Our Analysis)

**We did not include Tesla in the peer average calculations for P/E ratio due to its negative earnings. The exclusion of Tesla results in a share price value similar to that of the DDM. When we do include Tesla in our peer averages, the share price valuation is closer to that of the APV method.*

While there are many multiples listed in table 15, we will focus on EV/EBITDA, as it is the most used among valuation analysts due to the theory behind it and its accuracy. Our analysis results in a per share price estimate of $86.62 for GM. This represents an even larger premium over the current share price then we estimated in the APV analysis. A large portion of this high premium results in the inclusion of Tesla in our peer averages. The reason behind including them in the average is due to GMs advanced technologies and propulsion platforms. This represents large future growth opportunities that have not been captured in its stock price, yet is what Tesla valuation is entirely built upon. For that reason, we felt it best to include Tesla in our averages while at the same time including Legacy automakers to get a strong mix of comparable companies to GM.

7. Conclusion

In this thesis we have conducted 3 different methods of estimating the value of a firm. Using the APV method, we forecasted Free Cash Flows to the Firm, which allowed us to calculate the unlevered firm value. From there we added in the benefit of the tax shield and subtracted the costs of financial distress to arrive at an overall firm value of $112.265 Billion and a per share value of $78.40. This represents almost a 300% premium over the existing share price of $20.70 as of March 31st 2020.

The next method we used was the Dividend Discount Model. In this model, we forecasted future dividend payments in perpetuity using the Gordon growth model, and discounted them back using the cost of equity. Using this model, we estimated a value of $26.01 per share. While this is much lower than the estimated value using the APV method, it still represents a premium over the current share price, and can be used as a strong lower boundary if an investor wants to be conservative in their portfolio acquisitions.

The last model we used was the comparable multiples approach, specifically the EV/EBITDA multiple. Using this multiple we concluded a valuation of $86.62 per share. This represents the largest premium over the current share price of our models. However, if you remove Tesla from the list of peer averages, the valuation estimate is much lower. Using the P/E multiple with Tesla excluded results in an estimated value of $21.15, much closer to the lower boundary that was given in the DDM.

We feel confident in GMs growth opportunities due to its new Ultium battery platform and investment in new technologies. While this will certainly raise its costs, it also gives it the possibility of substantial future growth even though this is not reflected in the current share price. For that reason we believe Tesla is a strong comparable to use in GMs peer averages. This is why a valuation of $78.40 given in the APV method, or $86.62 given from the Multiples approach are not unrealistic even though they represent 300% premiums from the current share price.

That being said, it is important to remember that with any valuation analysis there are many assumptions that need to be made due to the limited information available to the public. We did our best to use a mix of historical data, public information, and industry trends in order to provide accurate assumptions in our analysis. While we may not be able to conclude with utmost certainty that GM stock will rise to $80, all three of our models concluded that GM stock is currently undervalued. For that reason, we feel that at its current price of $20.78, General Motors is a strong buy regardless of which model's results you want to base your investment on.

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