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Equity Valuation of Ford Motor Company

João Afonso Câmara Figueira

Master´s in Finance

Supervisor:
PhD Pedro Manuel de Sousa Leite Inácio, Assistant Professor,
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BUSINESS
SCHOOL

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Resumo

O principal objetivo deste projeto é avaliar a Ford Motor Company, a fim de produzir uma recomendação de investimento com base no cálculo do valor justo das ações da empresa.

Inicialmente, é feita uma introdução e explicação do Modelo de Avaliação do Fluxo de Caixa Descontado (DCF) e do modelo de Avaliação Relativa (Múltipla) utilizados para o cálculo do valor justo da empresa. Ambas as metodologias, apoiadas por uma revisão da literatura, fornecem a base fundamental para a avaliação da empresa e oferecem diferentes perspectivas e pressupostos da Ford Motor Company.

Em segundo lugar, depois de eleitos os métodos de avaliação, é feita uma análise da Ford Motor Company e do seu modelo de negócio nos diferentes segmentos. Além disso, apresenta-se o setor em que a Ford atua para analisar o mercado e suas principais tendências.

No final da avaliação, com base nos preços finais das ações obtidos por ambas as metodologias, a nossa recomendação para os investidores da Ford é comprar ou manter ações, pois de acordo com o Modelo de Avaliação DCF, o valor está acima do preço de referência de $20,77 (Mercado Valor em 31 dez21). Além disso, a potencial subavaliação do preço das ações da Ford e as expectativas otimistas dos potenciais resultados operacionais futuros por parte dos investidores, dadas pelas estimativas dos múltiplos de Avaliação Relativa, contribuem para reforçar a nossa recomendação.

Palavras-chave: Ford Motor Company; Avaliação; Cash-Flows Descontados; Múltiplos

Abstract

The main objective of this project is to evaluate Ford Motor Company, in order to produce an investment recommendation based on the computation of the fair value of the company´s shares.

Initially, is provide an introduction and explanation of the Discounted Cash Flow (DCF) Valuation Model and Relative (Multiple) Valuation model used for the computation of the fair value of the company. Both methodologies, supported by a literature review, provide the fundamental basis for the company´s valuation and give different perspectives and assumptions of Ford Motor Company.

Secondly, after the valuation methods are elected, an analysis is made of Ford Motor Company and its business model in the different segments. Besides, the industry in which Ford operates is presented in order to analyse the market and its main trends.

At the end of the valuation, based on final share prices obtained using both methodologies, our recommendations for Ford´s investors are to buy or hold shares, since according to the DCF Valuation Model, the value is above the reference price of $20.77 (Market Value on 31dec21). Besides, the potential undervaluation of Ford´s share price and bullish expectations of future potential operational results by the investors, given by the Relative Valuation multiples estimations, contribute to reinforcing our recommendation.

Keywords: Valuation, Ford Motor Company, Discounted Cash Flow, Relative valuation

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Glossary

APV – Adjusted present value

CAPEX – Capital Expenditures

CAPM – Capital Asset Pricing Model

CEO - Chief Executive Officer

D&A – Depreciations and Amortizations

DCF – Discounted Cash Flow

EBIT - Earnings Before Interest and Taxes

EBITDA - Earnings Before Interest, Taxes, Depreciations and Amortizations

EVA - Economic Value Added

EV – Electric Vehicles

F – Ford Motor Company (NYSE)

FCF - Free Cash Flow

FCFE - Free Cash Flow to the Equity

FCFF – Free Cash Flow to Firm

GDP – Gross Domestic Product

GM – General Motors

ICE - Internal combustion engine vehicles

IEEP - Institute for European Environmental Policy

LFP - Lithium iron phosphate battery

MRP - Market Risk Premium

MV - Market Value

NPV - Net Present Value

NYSE – New York Stock Exchange

NADA – National Automobile Dealers Association

OEMs - Original Equipment Manufacturer

PER - Price Earnings Ratio

R&D – Research and Development

SIA – Semiconductors Industry Association

TGR - Terminal Growth Rate

USD – US Dollar

UK - United Kingdom

VW – Volkswagen

WC - Working Capital

WTO – World Trade Organization

WACC – Weighted Average Cost of Capital

1. Introduction

In the most recent years, corporate valuation has become popular in the Financial World. It has been fundamental in many financial areas, giving reliable and accurate recommendations for managers, investors, and stakeholders. With it, we can estimate the fair value of a company, understanding if we should buy, sell or hold the company´s shares. Hence, the main objective of this master's project is to analyse and evaluate Ford Motor Company in order to produce an investment recommendation to Ford´s potential investors based on the computation of the fair value of the company´s shares and compare it with the actual share close price.

In this sense, this project begins with a literature review, in which several valuation models are analysed, supported by studies from financial authors like Damodaran, Luerhman, and Fernández. Then, we will make an overview of the company, taking into account the company history, structure, business model, financial performance, and future projections. Besides, we will also present the automobile industry, focusing on the industry revolution, the future, and the new challenges that the automakers are facing today. Finally, considering the valuation models that will be selected, we are going to estimate Ford´s final share price and give our respective investment recommendation.

Ford Motor Company is an American multinational automobile manufacturer and one of the main players in the automobile industry. Represented in over 125 countries, the company produces trucks, utility vehicles, vans, cars, and Lincoln luxury vehicles. The company employs 182 789 people worldwide and is divided into three main segments: Automotive Segment, Ford Credit, and Ford Mobility. Today, it is the 11th largest automaker by market capitalization and reported revenue, EBITDA, and Net Income of $136.341 billion, $12.269 billion, and $7.353 billion, respectively, in 2021. Overall, the company is committed to helping to build a better world where each person is free to move and pursue their dreams in a new era of transportation defined by electric, connected, and autonomous vehicles.

2. Literature review

Valuation has been the most crucial financial analytical skill for managers and investors in making investment and management decisions. In past years, it has been playing an essential role in several areas of finance, being crucial for the computation of the fair value of a company. Damodaran (2006) highlighted the importance of valuation in the financial world, considering it the heart of finance and fundamental to making value-increasing decisions and sensible financial restructuring.

As financial investors and managers, we must understand that value and price of a company are two different financial concepts. Warren Edward Buffett (2008) mentioned that "price is what you pay. Value is what you get", in other words, according to Fernandez (2007), the price of a company is the amount agreed when selling a company between seller and buyer, and the value an extensive definition, which considers not only the shareholder's interest, but also the stakeholders (investors, customers, and suppliers) satisfaction.

By using different methodologies with different assumptions and implementations, we are able to estimate the fair value of the company's shares and comprehend which leads to that value. Of course, some models are closer to reality than others, but it does not mean they are worse or incorrect. What worries financial authors is that these valuations are subjective since they are sensitive to bias and subjectivity and made with assumptions about the economy and future of the company (Damodaran, 2002).

Damodaran (2002) presented four different approaches for the valuation of the companies: the Discounted Cash Flow Valuation Model, the Relative (Multiple) Valuation Model, the Contingent Claim valuation Model, and the Liquidation and Accounting Valuation Model. For our project, we selected the two most commonly used models to value the company, Discounted Cash Flow Valuation Model and Relative Valuation, which are presented on the following pages.

2.1 Discounted Cash Flow Valuation

The Discounted Cash Flow (DCF) Valuation Model determines the fair value of the company by estimating the "present value of the expected cash flows on the asset, discounted back at a rate that reflects the riskiness of these cash flows" (Damodaran, 2006). For the past 20 years, this methodology has been the most used valuation model by investors and managers since it is the most accurate and consistent methodology (Damodaran, 2006) and the only conceptually correct valuation in the Financial World (Fernández, 2002).

Despite being the most used valuation model, this approach is associated with accuracy problems since it is made by future projections, sensitive to bias and subjectivity. Damodaran (2006) highlighted this issue and mentioned that this problem leads us to results that are different from those observed in the market, but in the end, they tend to converge.

There are several models in the DCF Valuation Model, divided into two different perspectives: Firm/Enterprise Valuation and Equity Valuation. For the first perspective, which values the entire company, we use the Free Cash Flow to the Firm (FCFF), EVA (Excess Return Models), and APV valuation models; and for the second perspective, which values only the shareholders' value, we use the Free Cash Flow to Equity (FCFE) valuation model. The following pages present each of these models in detail in order to choose the most accurate methodology for the computation of the fair value of Ford Motor Company.

2.1.1 Free Cash Flow to The Firm (FCFF)

The FCFF model is the most used methodology in the Discounted Cash Flow (DCF) Valuation Model and one of the most known Valuation models to compare and analyse a company´s financial health. According to Damodaran (2006), this methodology is "the sum of the cash flows to all claim holders in the firm, including stockholders, bondholders, and preferred stockholders", in other words, the amount of cash-flow generated after accounting for taxes, depreciation & amortization costs (expenses), Net Working Capital, and investments in fixed assets (Capex).

The general formula is presented as follows:

$$FCFF = EBIT \times (1 - taxes) + Depreciation\ \&\ Amortization\ costs - \Delta NWC - Capex$$

Formula 1: Free Cash Flow to the Firm

Following the previous equation, this leads us to the concept of enterprise value, which represents the company´s total value. For its computation we must divide the equation by two sections: (i) the FCFF discounted at the discount rate (WACC); (ii) the Terminal Value in perpetuity (Damodaran, 2002), as observable in the following equation:

$$Enterprise\ Value = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1+WACC)^t} + \frac{Terminal\ Value_n}{(1+WACC)^n}$$

Formula 2: Enterprise Value

Where,

$FCFF_t = Free\ Cash\ Flow\ to\ the\ Firm\ considering\ t\ period$

$Terminal\ Value_n$
$= PV\ of\ the\ future\ remaining\ Free\ Cash\ Flows\ to\ the\ Firm\ discounted\ to\ period\ n$

$WACC = Weighted\ Average\ Cost\ of\ Capital$

Damodaran (2002) mentioned that we must be aware of the number of years when computing the enterprise value since the greater the number in which the Cash Flows will be estimated, the more complex and subjective our estimations will be. For this reason, for long-term estimations, we should use the Terminal Value.

The Terminal Value represents the future cash flows of the company until perpetuity at a constant growth rate. The following equation show us how to calculate the cash flows that the company will produce in the long-term:

$$Terminal\ Value_t = \frac{FCFF_{t+1}}{WACC - g}$$

Formula 3: Terminal Value

Where,

$FCFF_{t+1} = FCFF_t \times (1+g)$; if the g growth rate was also applied in year t

$g = Expected\ Growth\ rate\ of\ the\ company$

$WACC = Weighted\ Average\ Cost\ of\ Capital$

In the previous equation, the Discount rate (WACC) and the expected growth rate (g) of the company are calculated using the current available information.

Regarding to the growth rate associated with the future cash flows of the company, we must be aware that it is not realistic to a company to have a constant growth in perpetuity. Damodaran (2002) highlighted this issue saying that a company cannot grow forever with a rate higher than the one observable in the economy in which it operates. For this reason, we must be careful when establishing the growth rate of the company to accurately estimate the enterprise value.

After the computation of the enterprise value, in order to estimate the equity value, we must consider the non-operating assets and the debt. Therefore, by dividing the equity value by the total number of shares, we estimate the fair value of the company per share.

The following equation represents the general formula of equity value of the company:

$$Equity\ Value = Enterprise\ Value + Non\ Operating\ Assets - Net\ Debt + Cash$$

Formula 4: Equity Value

2.1.1.1 WACC – Weighted Average Cost of Capital

The Weighted Average Cost of Capital (WACC) is defined as a "tax-adjusted discount rate, intended to pick up the value of interest tax shields that come from using an operation´s debt capacity" (Luehrman, 1997), by other words, it is the calculation of the company´s cost of capital with the considerations of the equity and debt in the company´s capital structure. According to Luehrman (1997), this computation is normally used due to its simplicity and facility in the calculation of the yields. The following equation demonstrates how we calculate the WACC:

$$WACC = \frac{E}{E+D} \times R_e + \frac{D}{E+D} \times R_d \times (1-t)$$

Formula 5: Weighted Average Cost of Capital (WACC)

Where,

$E = Market\ Value\ of\ the\ Company´s\ Equity$

$D = Market\ Value\ of\ the\ Company´s\ Debt$

$R_e = Cost\ of\ Equity$

$R_d = Cost\ of\ Debt\ before\ taxes$

$t = Corporate\ tax\ rate$

As observable in the previous equation, the facility of the computation is one of the advantages for investors and managers when estimating the company's fair value; however, according to Peterson & Peterson (1996), this method is only suited for companies with static and stable capital structures. Furthermore, due to problems such as forecasting the cost of debt and equity in the future and estimating some variables in the cost of equity and debt, the WACC cannot be viable when estimating the value of the companies, being subjective and biased. Therefore, Koller et al. (2010) suggest using an alternative methodology such as APV in order to avoid this limitation associated with the model and the complex capital structures in the companies.

Despite having these disadvantages, Luehrman (1997) mentioned that the WACC still works, even though other recent methodologies work even better.

In order to compute the WACC, we need to estimate the cost of equity and cost of debt, which are explained in the following pages.

2.1.1.1.1 Cost of Equity

The main goal of the Shareholders when investing in the company's equity is to receive a future return from it. In the financial world, that expected return is called the cost of equity which includes a premium associated with the risk taken by the shareholders when investing in the company. Several models can be applied to calculate the cost of equity, being the Dividend Discount Model and the Capital Asset Pricing Model (CAPM), the most used models by investors and managers.

The Dividend Discount Model is one of the most used to compute the cost of equity. Investors and managers use this model because of its simplicity; however, it can only be applied to companies that pay dividends. For this reason, most of the analyses are made using the alternative model, the CAPM. Even though it is more complex than the Dividend Discount Model, this second approach is more accurate when valuing a company. For this reason, during the valuation of the Ford Motor Company, we will apply the CAPM to have an accurate valuation of the company.

According to this approach, the calculation of the CAPM, developed by William F. Sharpe, John Lintner and Jan Mossin, depends on the risk-free rate in the market, the market risk premium (difference between the expected return of the market and the risk-free rate), and the beta, which represents the stock´s sensitivity relative to the market return. The following equation shows how we calculate the CAPM:

$$CAPM = R_f + \beta \times (R_m - R_f)$$

Formula 6: CAPM

Where,

$R_f = Risk\ Free\ Rate$

$R_m = Expected\ Return\ of\ the\ Market$

$\beta = Stock's\ Sensitivity\ to\ the\ Market\ Return$

For the application of the CAPM, Damodaran (2002) made some assumptions, which are: there are no transaction costs, no asymmetry of information and the market is efficient.

2.1.1.1.1.1 Risk Free Rate

Damodaran (2002) defined a *risk-free rate* as an investment characterized for not having default risk and reinvestment risk, in other words, it is the guaranteed rate of return of for the investor. The most common asset is government bonds since they are identified in the financial market as free risk investments. For applying the risk-free rate, Damodaran (2002) says that investors and analysts should use a proxy with the maturity of the cash flows analysed to avoid reinvestment risks since "the present value effect of using year-specific risk-free rates tends to be small". Additionally, we must consider the consistency between the currency and the government bond. In our specific case, we should use the US 10-year treasury rate because the company is in the United States of America.

2.1.1.1.1.2 Market Risk Premium

The Market Risk Premium (MRP) is the demand for the average risk investment, calculated by the difference between the expected return of the market and the risk-free rate. There are several models to compute the MRP, being the historical model the most used. The main reason is that the market risk premium is the same for all investors, not being affected by investors´ risk tolerance and investing style.

2.1.1.1.1.3 Beta

The CAPM Beta is a single measure that tells financial investors and analysts the risk associated with the stock. The Beta is defined as the market risk of the company (systematic risk) as compared with the rest of the market and it is calculated by using the covariance between the asset and the market portfolio divided by the variance of the market portfolio (Damodaran, 2002), as observable in the following equation:

$$\beta = \frac{Cov(x,m)}{\theta_m^2}$$

Formula 7: Beta

Where,

$Cov(x,m) = Covariance\ between\ the\ Asset\ and\ The\ Market$

$\theta_m^2 = Variance\ of\ the\ market\ portfolio$

With the computation of the previous equation, investors get a beta result, which has different interpretations. When the beta is closer to 1, it means that the asset tends to follow more closely the market. We may also compute the correlation of the asset return and the market, which varies between -1 and + 1. When it is 1 there is a high correlation between the share and the market return; when the correlation coefficient is equal to 0, there is no correlation between them, i.e. they are uncorrelated or independent; when the correlation coefficient is closer to -1, it indicates that there is an inverse correlation between the share and the market return. 7

Damodaran (2002) highlighted that the financial structure influences the value of beta. As mentioned by the author there are two ways to finance a company, by using equity or by using debt. When the company is financed only by its equity, the value of the beta is equal to the value of the unlevered beta (βu). Otherwise, when the company is financed not only by equity but also by debt, its value is equal to the levered beta (BL), which is calculated using the following equation:

$$\beta_l = \beta_u + (\beta_u - \beta_D) * (1-t) * \frac{D}{E}$$

Formula 8: Beta Levered

Where,

$B_l = Levered\ Beta$

$\beta_u = Unlevered\ Beta$

$\beta_D = Debt\ Beta = \frac{Spread\ (due\ to\ the\ Company´s\ Credit\ Risk\ Rating)}{Equity\ Risk\ Premium\ of\ a\ Country}$

$\frac{D}{E} = debt\ to\ equity\ ratio$

$t = Corporate\ Taxes$

Please note that in this expression we are not assuming the Beta of Debt is zero and therefore in that case Rd should be equal to the average interest rate the company is paying on its debt.

2.1.1.1.2 Cost of Debt

For the computation of the WACC, we also need the cost of debt. The cost of debt is defined as the effective interest rate that a company pays on its debt, which not only reflects the default risk of the company but also the interest rate of the market (Damodaran, 2014). The cost of debt can be referred as Pre-tax cost of debt or after-tax cost of debt, which are differentiated by the fact that the after-tax cost of debt captures the tax benefits associated with the company's debt. For this reason, when computing the cost of debt of the company we usually use the After-tax cost of debt formula, as it demonstrates in the following equation:

$$After\ tax\ Cost\ of\ Debt = Pre\ tax\ Cost\ of\ Debt \times (1 - tax)$$

Formula 9: Cost of Debt

Regarding to the Pre-tax Cost of debt, it corresponds to the sum of the risk-free rate and the default spread, which is the difference between the yields of a corporate bond and a risk-free bond (government bond) with the same maturity. As financial investors and analysts we must be aware of the fact that the estimation of the default spread depends on the company being listed or not. If the company is listed, like Ford Motor company, the default risk is estimated by the rating or from a traded bond issued by the company or even a company CDS. If not, then it is estimated by the recent borrowing history or estimation of a synthetic rating (Damodaran, 2014).

2.1.2 Free Cash Flow to Equity (FCFE)

The Free Cash Flow to Equity (FCFE) model is one of the DCF approaches presented by Damodaran (2002) to calculate the fair price of the stock. The FCFE measures the available free cash flow to common equity shareholders of a company, including the impact of leverage as it subtracts interest payments and principal repayments to debt holders to arrive at the cash flow. According to Damodaran (2002), we can define the FCFE using the following equation:

$$FCFE = Net\ Income + Depreciation\ \&\ Amortization - \Delta NWC - Capex + \Delta Debt$$

Formula 10: Free Cash Flow to Equity

Where,

$\Delta NWC = Changes\ in\ Non\ Cash\ Working\ Capital\ Needs$

$\Delta Debt = New\ Debt\ Issued - Debt\ Repayments$

Fernández (2007) highlighted that the previous equation can be simplified using the FCFF by subtracting the after-tax interest expenses and adding new debt provided, as observable in the following equation:

$$FCFE = FCFF - [Interest\ Expenses \times (1 - tax)] + \Delta Debt$$

Formula 11: Free Cash Flow to Equity

After the computation of the FCFE with the previous formulas, to compute the total equity value we must follow the same steps as we made in the FCFF model for the enterprise value. The main difference between both formulas comes from the fact that we are going to use an appropriate discount rate of the market, which is the cost of equity, instead of the WACC. The following formula shows how we must compute the equity value of a company:

$$Value = \sum_{t=1}^{t=n} \frac{FCFE_t}{(1 + r_e)^t} + \frac{\frac{FCFE_n \times (1 + g)}{r_e - g}}{(1 + r_e)^n}$$

Formula 12: Equity Value

Where,

$FCFE_t = Free\ Cash\ Flow\ to\ Equity\ considering\ t\ period$, once more assuming g growth rate was already applied in year n

$r_e = Cost\ of\ Equity$

$g = Expected\ perpetuity\ Growth\ Rate\ of\ the\ Company$

2.1.3 Economic Value Added (EVA) Model

The Economic Value Added (EVA) model is an alternative approach to the traditional models in the DCF valuation model. This methodology "measures the dollar surplus value created by an investment or a portfolio of investments" (Damodaran, 2002) and it is one specific approach of the Excess Return Models. For its computation, investors and analysts need to be aware of

the net present value of the investment and the return on invested capital (ROIC), which must be positive and higher than the cost of capital (WACC), respectively, in order to increase the company´s value. The following equation demonstrates how we must calculate the EVA of the company:

$$EVA = NOPAT - (Invested\ Capital \times WACC)$$

Formula 13: Economic Added Value

Where,

$NOPAT = Net\ Operating\ Profit\ After\ Tax$

$Invested\ Capital = Interest\ bearing\ debt + equity$ (assuming there are no Non-Operating assets)

$WACC = Weighted\ Average\ Cost\ of\ Capital$

According to Damodaran (2002), the EVA is "a simple extension of the net present value" due to the positive net present value (NPV) (or MVA = Market Value Added) of the investment project increasing the company´s value. For this reason, "The net present value of the project is the present value of the economic value added by that project over its life" as observable in the following equation:

$$NPV\ (or\ MVA) = \sum_{t=1}^{t=n} \frac{EVA_t}{(1 + WACC)^t}$$

Equation 14: Net Present Value

Furthermore, Damodaran (2002) mentioned that the company value could be estimated by using the connection between the EVA and the NPV. By summing the capital invested in assets in place with the NPV of assets in place and future projects, we estimate the company value, as it shows in the next equation:

$$\text{Company Value} = \text{Capital Invested}_{\text{Assets in place}} + \sum \frac{\text{EVA}_{\text{t, Assets in Place}}}{(1+\text{WACC})^{\text{t}}} + \sum \frac{\text{EVA}_{\text{t, future projects}}}{(1+\text{WACC})^{\text{t}}}$$

Formula 15: Enterprise Value

For this reason, EVA is a very successful performance indicator in corporate finance since it shows how and where the company created profit. However, this indicator cannot be so accurate as the ones presented before from the fact that invested capital is computed by the

book value instead of the market value. Even though Damodaran (2002) mentioned that there is no problem of its use since the company needs to profit more than its market value, Fernández (2001) highlighted the non-usefulness of the EVA due to inaccurate computation of the creation of value by the company.

2.1.4 Adjusted Present Value (APV) Model

The Adjusted Present Value (APV) model is a viable, less complex, and flexible alternative to the standard DCF Valuation models presented before. Introduced by Stewart Myers, in 1974, this approach "separates the effects on the value of debt financing from the value of the assets of a business" (Damodaran, 2006), giving a better perception of the debt benefits and cost from the value of the operating assets (Luehrnam, 1997).

For the computation of the APV approach, we must consider two essential steps: (i) calculation of the unlevered company´s value and (ii) the present value of the benefits (interest tax shields) and the costs (issue costs and bankruptcy) of the company´s debt (Damodaran, 2006).

Starting with the first step, according to Damodaran (2006), by discounting the expected free cash flow to the firm (FCFF) at unlevered cost, we estimate the unlevered company´s value, as it shows in the following equation:

$$Unlevered\ Company´s\ value = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1+r_e)^t} + \frac{\frac{FCFF_n \times (1+g)}{r_e - g}}{(1+r_e)^n}$$

Formula 16: Unlevered Company´s Value

Where,

$FCFF_t = Free\ Cash\ Flow\ to\ the\ Firm\ considering\ t\ period$

$r_e = Cost\ of\ Equity$/ Unlevered cost of capital

$g = Expected\ Growth\ Rate\ of\ the\ Company$

After the computation of the unlevered value, we must compute the second step, where we estimate the present value of the benefits and costs of the company´s debt. Starting with the present value of the benefits of debt, also referred as PV of interest tax shield, we must discount the present value of the interest tax shield by the cost of debt (Damodaran, 2006), giving a better perception of the benefits of the tax shields from debt interest payments. The general formula for the present value of the interest tax shield comes as follows:

$$PV\ interest\ Tax\ Shield = \sum_{t=1}^{n} \frac{t_c \times D \times r_d}{(1 + r_d)^t}$$

Equation 17: Present Value Interest Tax Shield

Where,

$D = debt$ (assumed to be constant)

$t_c = Corporate\ tax\ rate$

$r_d = Cost\ of\ debt$

Regarding to the costs of the company´s debt, also referred as Expected bankruptcy costs, we are going to evaluate the expected default risk and bankruptcy cost. For this reason, the computation of it comes as the multiplication of default after the additional debt and the present value of the bankruptcy cost (Damodaran, 2006), as it shows in the next equation:

$$PV\ expected\ Bankruptcy\ cost = \pi_a \times BC$$

Formula 18: Present Value of the Expected Bankruptcy Cost

Where,

$\pi_a = Probability\ of\ Bankruptcy$

$BC = PV\ of\ Bankruptcy\ cost$

We must be aware that this last estimation is subjective and not straightforward, since, according to Damodaran (2006) this probability of bankruptcy and cost cannot be estimated directly. The author mentioned that there are two ways to estimate indirectly the cost and default of bankruptcy of a company, which are: estimate the bond rating, as made in the cost of capital, or use a statistical approach to estimate the probability of default.

After the computation of all steps, to estimate the APV of the company we must use the following equation:

Company´s Value =Value of Unlevered Firm + PV Int. tax shield - PV of exp. Bankruptcy costs

Formula 19: Enterprise Value

2.2 Relative Valuation (Multiples)

The Relative Valuation Model, also referred to as the Multiple Valuation Model or Pricing, is a different way of approaching the valuation of a company in the corporate finance world. This methodology, rather than valuing a company based on its fundamentals, as observed in the DCF Valuation Model, values the company by looking at how the market is pricing other similar companies or industries (Damodaran, 2006).

In the most recent years, the use of this approach has become more popular when valuing a company due to its simplicity and quickness computation when compared to the DCF Valuation Model (Damodaran, 2002); however, this practical approach can lead us to an incorrect estimation of the company´s value due to the abstraction of the risk, growth, and cash flows associated with the company.

For this reason, some financial authors like Fernández (2001) suggest that this methodology should be used as a complementary approach, to critically compare with the results obtained from the DCF Valuation Model.

According to Damodaran (2002), for the use of this methodology, we must follow four essential steps to make sure we do not get in trouble when computing the standardized multiples. These four steps are:

1. Define the multiple: understand how the multiples have been estimated and how to apply consistently among comparable firms;
2. Describe the multiple: understand the cross-sectional distribution of the multiple;
3. Analyse the multiple: understand the fundamentals behind the multiple, how it is impacted by possible changes, and the relationship between it and the variables;
4. Apply the multiple: paying attention to the companies used to compare.

Regarding the last point, we are going to assume that companies from the same industry have the same characteristic since Damodaran (2006) mentioned that the comparable companies should have the same risk, growth, and cash flows as the company to value. If that is not verified, we will use similar companies suggested by Damodaran (2006).

Several multiples can be used to compute the company's relative valuation, which varies across the company's structure and industry. According to Fernández (2002), the multiples can be

divided into three main groups: Equity Value Multiples, Growth-Reference Multiples, and Enterprise Value Multiples, as observable in the table below:

Equity Value Multiples	Growth-Reference Multiples	Enterprise Value Multiples
Price-to-Earnings (PER)	PEG	EV/EBITDA
Price-to-Cashflow	EV/EG	EV/Sales
Price to book value (P/BV)		EV/FCF
Price to Sales (P/S)		
Price to Customer		
Price to Output		
Price to Units		

Table 1: Relative Multiples
Source: Fernández (2001)

From the several multiples presented before, there are three of these multiples that according to Fernández (2001) are the most indicated when computing these relative valuations of the companies. These models are the Price-to-Earnings (PER) and Price-to-Sales (P/S) from the Equity Value Multiples, and the EV/EBITDA from the Enterprise Value Multiples.

The PER multiple is the most used multiple by investors and managers, and from it, we can estimate how the company is faring compared with its competitors and industry. To compute this ratio, we need to use this formula:

$$PER = \frac{Market\ Price\ per\ Share}{Earnings\ per\ Share}$$

Formula 20: Price-to-Earnings

Besides, it also gives the information of how the company is faring compared with its last performance, giving a better understanding of the company development through the years.

Regarding to the P/S, according to Fernández (2001), this multiple is the most used in the automobile industry, which Ford Motor Company integrates, however due to tax differentiation and sensitivity to bias and subjectivity, normally, we use the EV/EBITDA. This second

multiple is more accurate when valuing a company since it is not influenced by the company´s capital structure (Koller et all, 2010).

It is important to investors and analysts to bear in mind that due to different market views from the approaches, the company´s value can be different. This does not necessarily mean that the computations are incorrect, but from the fact that the DCF Valuation Model assumes markets may make mistakes that can be corrected in the future, while Relative Valuation rather assumes that markets are correct at least on average. Damodaran (2006) highlighted this situation mentioning that "a stock may be overvalued on a discounted cash flow basis but undervalued on a relative basis, if the firms used in the relative valuation are all overpriced by the market".

2.3 Conclusion: Valuation Models for Ford Motor Company

The valuation models presented in the literature review are some possible models from a wide range of existing ones that investors and analysts have for valuing a company. As mentioned before, these models have different assumptions and implementations, along with advantages and disadvantages, giving different perceptions of the company and the market. According to Damodaran (2002), when choosing a valuation model, we must be aware of several key factors, such as capital structure and industry, which can affect the valuation outcome.

Considering the possible models and the structure of the company, we have decided to apply for Ford Motor Company´s valuation the Free Cash Flow to the Firm (FCFF) Model from the DCF Valuation Model and the PER and EV/EBITDA from the Relative Valuation Model as a complementary valuation.

3. Company Overview

3.1 Background, Business Model and Business by Region

3.1.1 Background

Ford Motor Company (NYSE: F) was founded on June 16, 1903, by Henry Ford, an American industrialist and pioneer of the integrated moving assembly line. With twelve initial investors and initial issuance of 1000 shares, the Company began spending all its $28,000 cash investments in the production of its first vehicle, Ford Model A, which by October of the same year, turned a profit of $37,000, the first achievement of the Automobile Manufacturer. After the success of the Model A, the Company continued to expand its automobile portfolio from Model B to Model S, until it released, in 1908, the famous Model T. By being simple, affordable and durable, contrarily to other vehicles at that time, Ford Model T become one of the best-selling cars of all time, selling more than fifty million units between 1908 and 1927.

During the success of Ford's Model T, in 1913, Henry Ford introduced the integrated moving assembly line in his corporation. According to Bowden and Lamond (2015), "Ford's assembly line is one of the world's most influential production management concepts", which allowed the corporation to reduce the Model T's chassis assemblage from 12.5 hours to 93 minutes, producing over a million units a year and reducing its final price. However, it became complex and repetitive for workers, who were "quickly bored by the more mundane assembly process. Many simply quitted, and Ford found itself with a crippling labour turnover rate of 370 percent" (Anderson, 2014). In response, the Company implemented the "$ 5-day" policy, which doubled its workers' wages and increased Ford's demand for labour and sales.

In the subsequent years, Ford Motor Company continued to expand itself, producing new vehicles and exploring new production areas. In 1922, with Edsel Ford as president, the Company acquired Lincoln from Henry Leland, produced the Model TT (Ford's first truck), the new Model A and assisted the United States Military, during WWII.

Later in 1956, with Henry Ford II as president and later as CEO of the Company, Ford became publicly traded, with the largest initial public offering (IPO) of common stock shares, starting a new era for the automobile manufacturer.

Nowadays, Ford Motor Company continues as one of the major players in the automobile industry and the largest automobile company based in the United States, maintaining its global

presence (125 countries, including 10 700 dealerships and 182 789 employees worldwide) and heavily influencing the US socio-economic development.

In 2021, Ford was the 8th most valuable Brand ($22,676M) in the automotive industry and reported Revenue, EBITDA, and Net Income of $136.341 billion, $12.269 billion, and $7.353 billion, respectively. Overall, the company maintains its investors' confidence and continues to be committed to helping to build a better world where each person is free to move and pursue their dreams in a new era of transportation defined by electric, connected, and autonomous vehicles.

3.1.2 Business Model

Since its beginning, Ford Motor Company has been a full concept brand and one of the major players in the automobile industry. The key to this success comes from the segment business organization, which is divided into three main segments: Automotive Segment, Ford Credit, and Ford Mobility.

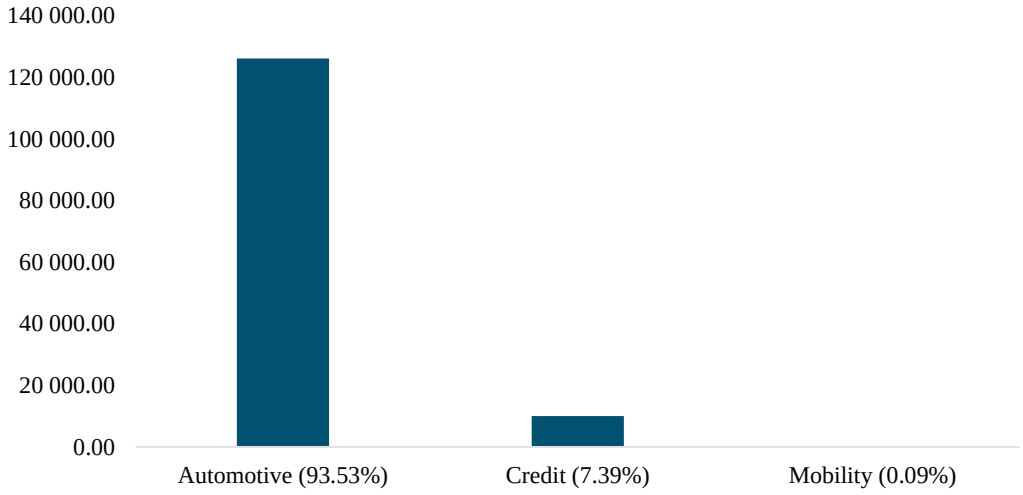
The Automotive Segment is the primary business model of the corporation, which generates a substantial portion of the company's annual revenue, and is divided into five subsegments: Cars, Crossovers and SUVs, Trucks, Hybrids and Electrified, and Commercial. Additionally, it also includes the more exclusive branch of the company, Lincoln Vehicles, besides the repairs, services, and others.

In the other hand, the Ford Credit segment is the company's financial services, which offers an extensive range of automotive financing products to dealers and customers, such as retail instalment sales, retail financing, and operating leasing contracts. This segment generates revenue from the interest rate supplements and other support payments from Ford and its affiliates; besides, it also receives payments made under dealer financing programs (Pratap, 2021).

The Ford Mobility segment is regarding to the new era of transportation. It includes development costs associated with autonomous vehicles and related business and equity ownership in Argo AI (autonomous driving systems). Furthermore, it includes other mobility businesses and investments, such as micro-mobility service providers.

The following Chart, presents the total revenues of the company by business´s segment in 2021.

Figure 1: Revenues by Business´s Segment, 2021



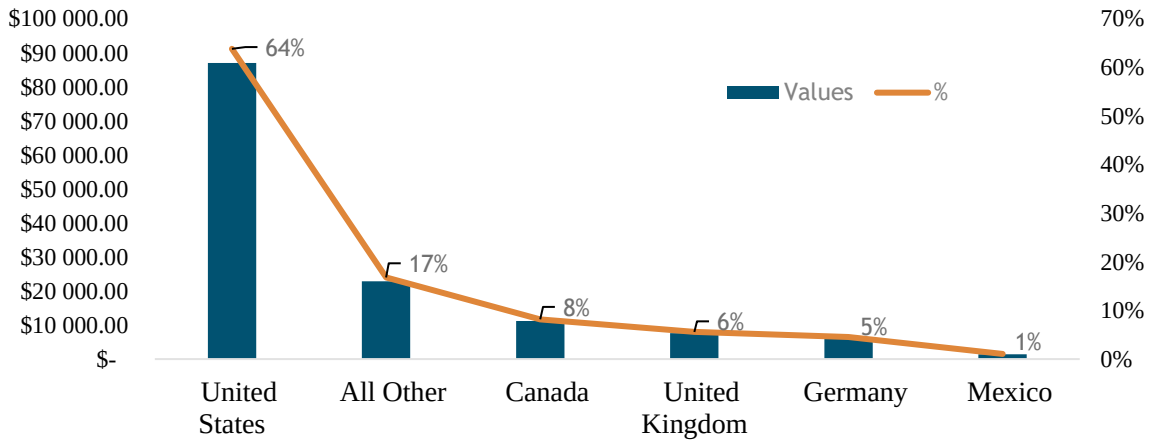
Source: Bloomberg, May 2022

3.1.3 Business by region

Ford Motor Company has established itself as one of the most influential automobile manufacturers globally and a well-recognized international brand. Since its first foreign presence in Walkerville, Canada, the company has expanded in over 125 countries, including 10 700 dealerships, and has 182 789 employees worldwide.

According to Bloomberg´s last financial report, despite its international presence, the US market continues to have a massive impact in the total revenues of the Company. In 2021, the US Market generated 64% of the total revenues, followed by Canada, the United Kingdom, and Germany, with a respectively 8%, 6%, and 5% of the total revenues.

Figure 2: Total Revenues by Region, 2021 (million $)



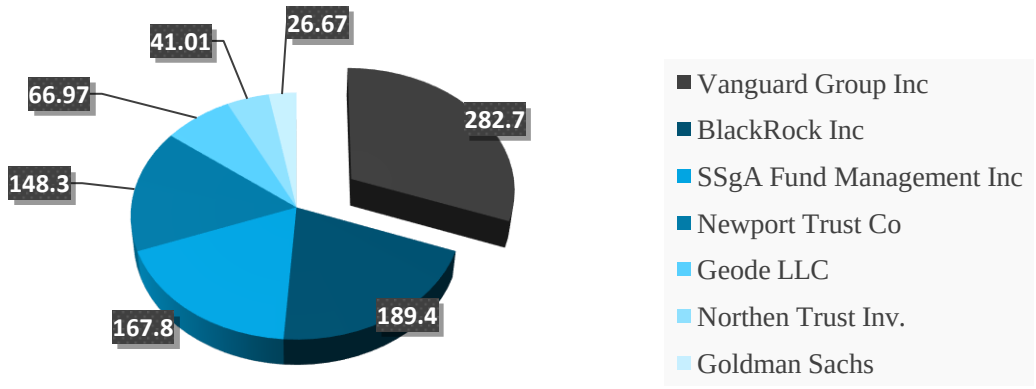
Source: Bloomberg, May 2022

3.2 Shareholder Structure

Ford Motor Company (NYSE: F) has 4 billion shares outstanding, divided into shares held by non-institutional holding companies and institutional investors. According to the latest financial report, Institutional Investors represent the majority ownership of F, with 54.64% of the outstanding shares. Vanguard Group, Inc. owns the biggest stake in Ford´s ownership among the institutional investors, having to its name 282.7 million shares, representing 7.20% of shares outstanding. BlackRock Inc. is the second biggest Ford shareholder with 4.83% of outstanding shares, followed by SSgA Fund Management, Inc. which owns 4.27% outstanding shares. Newport Trust Co. represents 3.78% of outstanding shares, and Goldman Sachs, responsible for making Ford public in 1956, represents only 0.68%.

The following chart presents the total number of shares (in millions) distributed by the top institutional investors of Ford Motor Company (NYSE: F).

Figure 3: Top institutional investors of Ford Motor Company (Millions of Shares Outstanding)



Source: CNN Business Website

Regarding the shares held by non-institutional holdings, which include people in senior management positions and members of the board of directors, as well as people or entities that own more than 10% of the company's stock, the principal individual shareholders are William

Clay Ford Jr. and James D. Farley, Jr., respectively, the Executive Chair and CEO of the company.

3.3 Share Price Performance

Ford Motor Company became publicly traded on January 17, 1956, with the largest IPO of common stock shares, at that time. Since the day it was first listed, the automaker's stock performance had through many ups and downs, going from a close share price of $0.66/share by the end of 1981, all way up to a close share price of $35.72/share, in 1999, representing a consistent positive trend during this period.

From 2001 until 2009, Ford's stock prices registered a negative trend and a significant decrease in its close share prices. The main reason comes from the different crisis faced during that period, especially the global financial crisis of 2008, where Ford registered its second-lowest close share price of $1.43/share.

From 2010 until 2019, Ford's Stock performance has fluctuated between close share prices at $18.85/share and $9.00/share, representing a recovery from the last decade’s financial performance. The main reasons come due to the recovery of the automobile industry after the industry slowdown during 2009 and 2010, and Ford's own strategy, a four-point business plan created by the former CEO Allan Mulally.

In 2020, affected by the current pandemic, Ford's stock prices registered a significant decrease, reaching a close share price of $4.33/share on March 15, 2020, and suspending its regular dividend payments.

Since the beginning of 2021, Ford's stock price has registered a positive trend, closing the year with a close share price of $20.77/share (December 31, 2021). Most of this turning point comes from the Company's turnaround plan, which pretends to expand its business areas to meet the need for electric passenger and commercial vehicles and pursues leadership positions in electrification, connected vehicle services, and mobility solutions, including self-driving technologies.

Figure 4:Ford´s stock performance from 1982 until 2022

Source: MSN Finanças, May 14, 2022

3.4 Expansions Plans

Ford Motor Company has always been optimistic when it comes to the ongoing automotive industry transformation, alongside with the rise trajectory of the EV business. Since the beginning of 2019, CEO Jim Farley, has reportedly confirmed the company´s intentions to heavy investing in new technologies to keep up the pace in autonomous vehicles, ride sharing and electric vehicles, and to accomplish its core goal of carbon neutrality by 2050.

Recently, Ford invested $700 million into the Rouge complex, adding 500 new jobs and employing advanced sustainable manufacturing technology to build F-150 Lightning and F-150 PowerBoost Hybrid (F-150 has been the US bestselling vehicle for 45 years). Furthermore, the Company introduced its first full-electric vehicles to the market: the Mustang Mach-E and the E-Transit, an all-electric version of America's best-selling van.

On September 27, 2021, Ford announced its $11.4 billion investment, together with SK Innovation, for the creation of a new Blueoval City Mega Campus in Tennessee and Twin Battery Plants in Kentucky, the largest ever US investment in electric vehicles made at one time by any automotive manufacturer.

Besides, CEO Jim Farley has reportedly confirmed Ford’s intention to spend more $30 billion through 2025 and its commitment to producing about 600 000 EV units in the next 24 months. This commitment has the objective to become the second EV seller in the US, behind its competitor Tesla, a Company admired by Jim Farley, for its contribution to the digital electric transformation of the automobile industry.

According to Investor´s Business Daily, Inc, this recent Ford´s investment in electrification helped to push shares to a 140% gain by the end 2021, surpassing General Motors in market cap for the first time in the past five years.

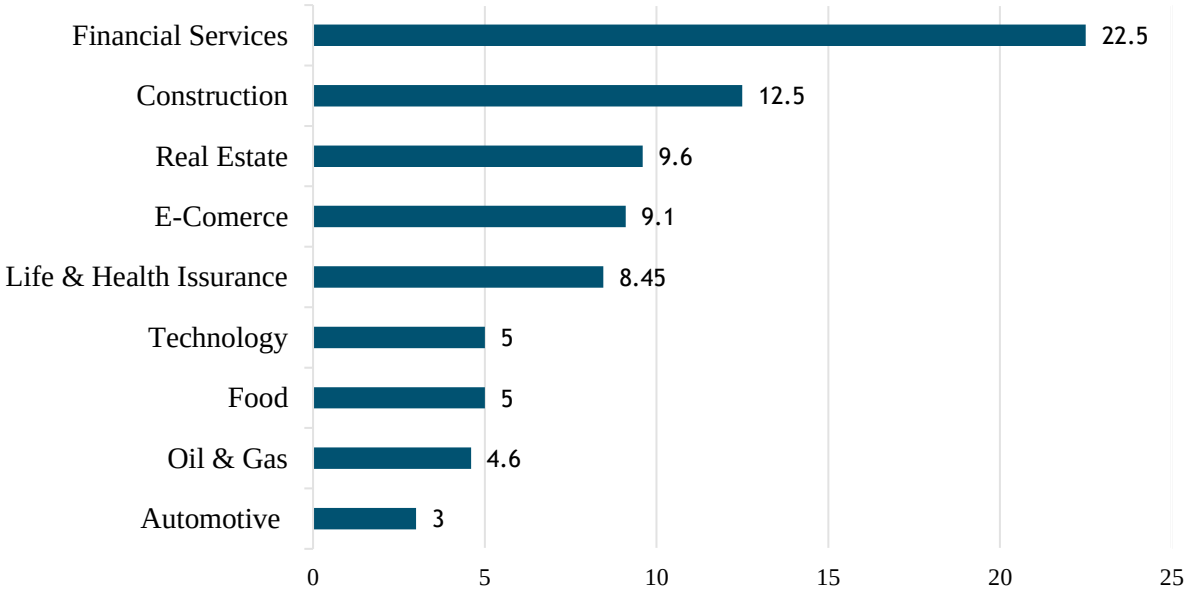
4. Automotive Industry

4.1 Industry Overview

The automotive sector has been one of the most important market sectors globally and fundamental for the countries' socio-economic development. Currently, the industry ranks 9th in terms of market capitalization, with a 2021 aggregated capitalization of $3 trillion, followed by industries like the oil and gas; food; information technology; life and health insurance; e-commerce; commercial real estate; construction; and financial services, as observable in the Figure 5.

The industry is divided into two major business areas: car manufacturers and car parts manufacturers. In recent years, auto suppliers are gaining even more relevance in the market due to the complexity and electronic parts of vehicles in the modern automotive industry, allowing car manufacturers to focus on other business areas and shift some of the R&D costs over to suppliers. Besides, the industry has also expanded to other business segments, especially what is called "Captive Finance Units," which aim to finance auto clients as an alternative to the traditional banks' loans.

Figure 5: Biggest Industries in the world by revenue in 2021 (in $trillion) Capitalization



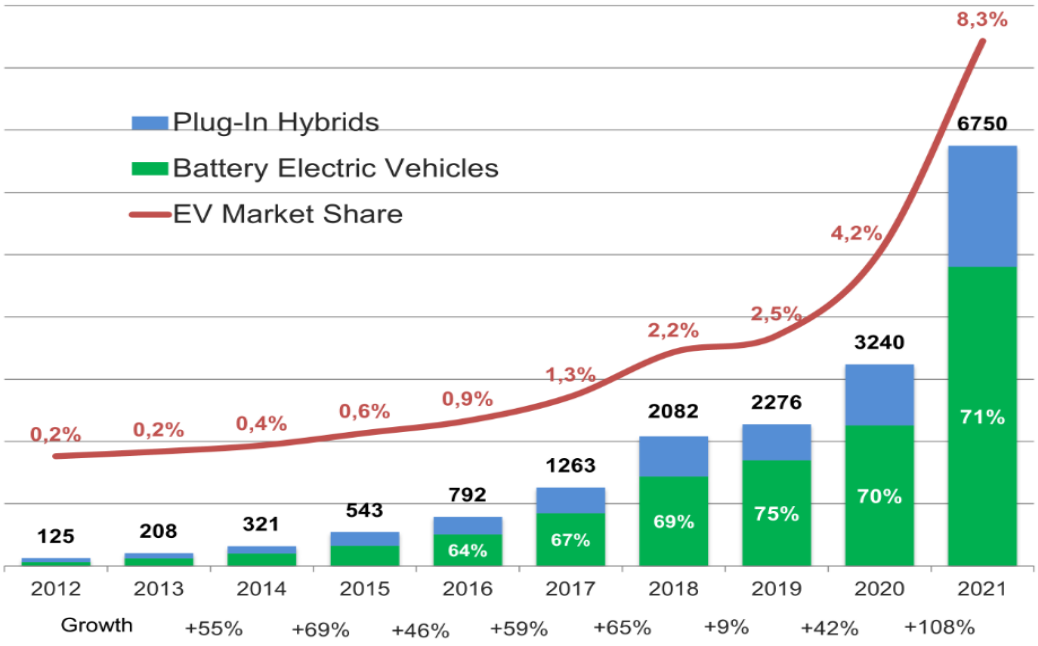
Source: Eresearch 2021. Sectors & Industries Overview

Additionally, the automotive industry has also been addressing climate change like no other. Recently, many significant players, like Ford and GM, are delivering strong measures to shift their core businesses to more environmentally wise ones, adapting current manufacturing

processes to battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and autonomous vehicles (AVs).

This disruptive change has made most of the EV automakers benefit from significant early-mover advantages by gaining market share within the automobile industry at an astronomically fast pace. In 2021, EV Market share had registered a significant increase of 97.6 %, going from a market share of 4.2%, in 2020, to 8.3%, in 2021. The change represents a 108% growth of EVs sales, going from 3.24 million units all way up to 6.75 million units. The following exhibit presents the EV sales volumes and Market Share from 2012 to 2021.

Figure 6: EV Volume of Sales and Market Share from 2012 to 2021



Source: EV- Volumes from 2012 to 2021

Considering the automotive market as a whole, including EV and ICE manufacturers, in 2021, the industry registered a recovery of 4.6% from the Pandemic crisis of 2020. As a result, the total sales volume increased from 77.66 million units in 2020 to 81.23 million units in 2021. However, since the beginning of 2020, the industry has registered a downward trajectory, going from a total volume of 94.75 million units in 2018 to 81.23 million units in 2021. According to consulting firm AlixPartners, gas soaring prices, the upward trend of alternative ways of transportation, such as e hailing and car-sharing, better public transport services, and continued chip supply shortages have been the main reasons for the downward trajectory of the sector.

Currently, automaker giant Toyota leads the industry, followed by VW Group and Mercedes-Benz. Ford Motor Company ranks 8th, being the second most valuable American company, behind the EV automaker Tesla.

4.2 Automotive Electrification

Automotive electrification is defined as the process of powering vehicles by electricity, which replaces vehicle components that operate on a conventional energy source with components that operate on electricity. Therefore, automotive electrification focus on the powertrain driven by electricity and its auxiliary systems, such as on-board and off-board charging systems and wireless power transfer. Besides, it also covers many other aspects of vehicle functionalities that exist in an ICE Vehicle, such as electronic power-assisted steering, electronic stability program, electronic traction control, and more. Driven by governmental moves in pursuing restrictions on gasoline and diesel cars and the ongoing customer demand for more sustainable automobiles, Automakers are attempting to electrify their vehicles portfolio and their core business as much as possible.

According to Pipper Sandler projections reports, among the 28 automakers analysed, just five of them have their business 100% electrified in 2021: Tesla, NIO, Li Auto, and Weltmeister. These companies are pioneers in the EV business and have recently gained more relevance in the sector due to the astronomical increase of the EVs Market share.

When it comes to the oldest automakers, General Motors, Volkswagen Group, and Renault-Nissan-Mitsubishi Alliance stand out as the automakers that have succeeded in electrifying their companies, with 4.2%, 3.7%, and 3.5%, respectively, in 2021. On the other side, Ford, Toyota, and Honda Motor have only managed to electrify their businesses up to 0.5% by 2021, despite their recent electrification efforts.

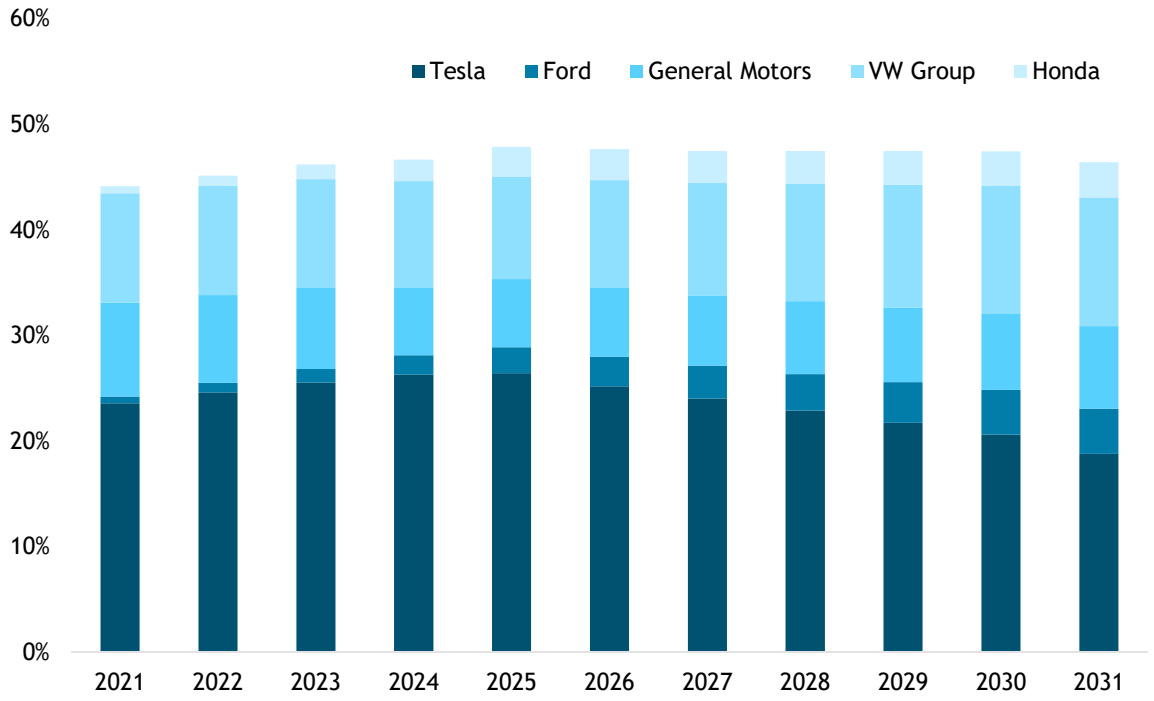
Nonetheless, it is essential to highlight that this is only the beginning of what will happen: a complete auto-industry revolution. According to the previously cited projection, the EV market would electrify at a pace of 18.5% in 2025, 45.6% in 2030, 75.2% in 2035, and 94.2% in 2040. This translates to 18.2 million EVs out of 98.5 million cars sold in 2025, 45.4 million out of 99.6 million in 2030, 71.1 million out of 95.4 million in 2035 and 81.9 million out of 87.1 million in 2040.

In the spite of that, it is noteworthy to understand Ford's role in the automotive industry and how the turnaround plan will positively impact the Company and his stakeholders. On the one hand, the Company will benefit from a growing EV market and increase its market share in the

following years. However, on the other hand, the Company will suffer from the increased competition from its main competitors. Such benefits will be reflected by the volume of the business, with revenues estimated to boost until 2040, while increased competition will difficult the dominance of Ford in the EV market.

The following exhibit presents the expected evolution of Ford's market share compared to its main competitors between 2021 and 2031.

Figure 7: EV Market Share by Company



Source: Pipper Sandler projections report 2021

4.3 Policy, Consumer Behaviour and Technology

According to McKinsey's report on "Why the automotive future is electric", there are three crucial changes that are the key for the transformation of the automotive industry: Policy, Consumer Behaviour, and Technology. Under these pillars, it is believed that EV adoption will increase at a fast pace until 2030, reaching values of 45% on a global scale.

Regarding policy, during the past years, there has been a global agreement among governments and administrations to overcome the primary concern surrounding the automotive industry: Pollution. The Chinese Government has recently announced its plan to reach carbon neutrality by 2060, alongside side with the European Union and United States. For such plan, different

governments are giving several financial benefits for electric car producers and others, such as giving competitive advantage by pulling several policies like purchase rebates and tax exemptions. One demonstrative example is the total exemption from road tax in Portugal. Additionally, the US government has recently presented a 50% electric vehicle target for 2030 as part of the projected $555 billion investment to combat the climate change crisis, in order to close its gaps with Europe and China, which are increasing their position in the EV market. Besides, China has recently announced its plan to reach an automotive electrification rate goal of 40% by 2030, requiring Chinese automakers to electrify their business up to a certain percentage each year. Moreover, the European Union has also developed a "Fit for 55" program to reduce net greenhouse gases by at least 55% by 2030.

Even though policy has a massive impact on the transformation of the automobile industry, consumer behaviour is also changing. For example, in 2021, 41% of the customers looking to buy a new car were inclined to go electric, representing an impactful shift of 11% in EV interest compared to 2020. Based on the study conducted by Ernst & Young, this impactful shift comes from the customer's awareness combined with the upgraded Technology and availability of a greater variety of models that the market presents today.

Regarding Technology, it has been considered for many the central pillar of the industry's transformation. According to the report, the industry has attracted over $400 billion in investment to develop further advanced driver-assistance systems (ADAS) and autonomous driving systems (ADs). Even though there is a long way to go, it is believed that these developments will certainly change completely the automotive industry that we know today into a more sustainable, safer, and efficient one.

4.4 The main concerns in EVs Market

As mentioned previously, EVs have an indispensable role to play in tackling climate change. The ongoing rise trajectory of the EV Market shows noteworthy that the automotive industry is committed to become ecologically and electrified, however concerns about the range, charging time, charging options and overall vehicles prices are holding some consumers back and slowing the uptake of EVs around the world.

4.4.1 Overall EVs Prices

Price is one of the main reasons for the customer's hesitancy. EVs' prices are higher than the prices of the ICE vehicles; however, there is a reason for EVs having higher upfront costs: the battery. EVs typically have a large pack of battery, since it is the sole source of power for

propulsion, and also supplies auxiliaries (lighting in the car, headlights, etc.) and heating/cooling inside the car. Typically, the batteries are Lithium-ion and have expensive electrode components such as Cobalt and Manganese. Moreover, manufacturing costs are expensive to enable batteries for multiple charging-discharging cycles.

Even though the EVs range of prices is between $30 000 to $40 000, and the associated battery is around $10 000, recent trends show that EVs prices are falling. One of the main reasons comes from the introduction of LFP batteries, which have cheaper and readily available materials. According to specialists this might be the turning point on guaranteeing lower-priced and more environmentally sustainable EVs, with Tesla, Ford, and Volkswagen having already inserted these batteries in their EV models. Although they are much less competitive in terms of autonomy than the ones composed of cobalt.

Besides, EVs are expensive in the short run, they can save consumers approximately from $4 500 to $12 000 in the long run since they have low maintenance costs. In addition, there are various incentives/exemptions from taxes provided by the government to support sustainability.

4.4.2 Range Charging options and Time

Battery Range is probably the most important feature when opting for an EV. Lucid Motors CEO (Peter Rawlinson) during an interview mentioned that the range and efficiency are widely recognized as the most relevant proof points by which EV technical prowess is measured. Currently, automakers are investing R&D resources across the range of their EVs in order to ensure a certain level of autonomy for EV customers. NIO is the automaker with the longest battery ranges, with its most recent model, the NIO ET7, having a range of over 1000km. Alongside, comes Tesla, Mercedes, and BMW, which dominate the market with vehicles such as the Mercedes EQS, Tesla Model S, and BMW IX, all of which have autonomy ranges of 780km, 644km, and 612km, respectively. Even if EVs' autonomous range has improved, they are still not an ideal solution for customers who frequently travel long distances.

Aside from that, the lack of range is made worse by the charging options and charging times. Despite increased availability of EV charging infrastructure, there is still a long way to go to overcome the issue of available chargers. Furthermore, the duration of recharge remains a barrier for customers, as it takes at least 2 hours to fully charge the EVs, as opposed to the ICE vehicles, which can be filled up in less than 5 minutes.

4.5. Automotive Risks

The automotive industry is in a period of profound transition. Vehicle manufacturers, their suppliers and dealers are facing unprecedented challenges from geopolitical risks that have impacted customer demand and investment decisions. According to the World trade organization (WTO), the ongoing situation resulted in two main issues that are believed to be the biggest bottlenecks in today's economy: (i) supply chain crisis (Chip shortage crisis) and (ii) inflation.

4.5.1 Chip shortage crisis

Semiconductors are one of the most important pieces of technology ever invented. According to SIA (Semiconductors Industry Association), these tiny chips are crucial for the production and performance of today´s modern vehicles, besides other products such as phones, computers, televisions, gaming consoles, washing machines and more. Nowadays, is needed more than thousand semiconductors inside the car, since they are responsible from the ignition until the braking system. Some of the biggest players in the chip industry include companies like Intel (INTL), Qualcom Inc. (QCOM), and Nvidia (NVDA), whose aggregate revenue volume has surpassed $100 billion in 2020, with 15% of it coming from the automotive sector.

However, since the beginning of the covid-19 pandemic, which imposed lockdowns and affected important chip-making regions, such as China, there have not been enough semiconductors in the market to satisfy demand needs. These shortages have been affecting automakers who have seen most of their production plants being halted for several weeks. According to consulting firm AlixPartners, the semiconductor chip shortage has costed over $210 billion in revenues, in 2021, with companies like Ford and GM, registered massive earnings cuts by about $2.5 billion and $2 billion, respectively.

This shortage crisis has forced automakers to rethink both in the short-term and long-term, in order to understand how they can manage their chips and also how to make their supply chain more efficient. Several chip-industry leaders, such as the CEO of Intel and Nvidia have reportedly confirmed that they do not expect semiconductor supply levels to go back to normal until late 2023, meaning that every company affected needs to start implementing measures to soften the impact of such a shortage. Some solutions are OEMs could start conducting more efficient short-term chip-sourcing plans according to their specific needs; or arranging dual-source manufacturing partnerships with several chip producers; or even vertically integrating their production processes, by manufacturing their semiconductors.

4.5.2 Inflation

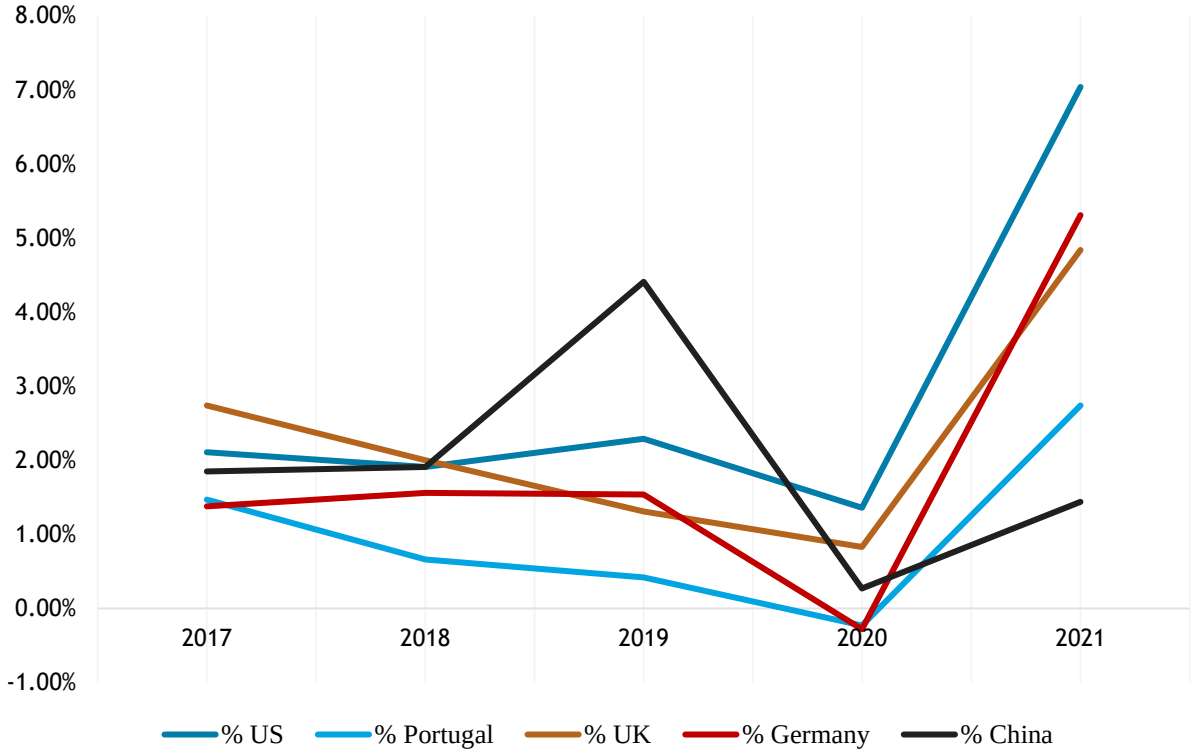
Inflation directly affects the purchasing power, as the increase of prices automatically means that people cannot buy as much for the same amount of money as before. Usually, these sudden inflation spikes are not a synonym for good news for most industries, especially in the automotive sector.

Since the beginning of 2021, inflation rates have registered an upward tendency, with Europe registering a 4.1% inflation rate, a 13-year all-time high, and the US a 7.04% inflation rate, the country's highest during the last 25 years. However, surprisingly for some, China's inflation remained low as the economy registered only a 1.44% inflation rate in late 2021, as observable in exhibit 8.

According to the US government and European Union, this upward tendency was caused due to the forced stop of the economic activity and, consequently, the imposed lockdowns; however, in Europe the picture gets intriguing since the energy sector has registered a +23.5% inflation in 2021. The main drivers were the skyrocketing natural gas prices that, according to the Dutch Title Transfer Facility (a leading benchmark in Europe), rose from €16 megawatt hourly at the beginning of January 2021 to €88 by late October 2021. Tim Gore, head of IEEP, pointed the relaxation of pandemic restrictions combined with gas supply shortages on the global market, the main reasons for the ascendant prices of energy.

In the automotive industry, the increase of the inflation rates has been reflected in the drop of most of the sales during 2021. The increase in manufacturing costs, and commodity prices has been also contributing to that drop, which consequently has forced companies to try to look for an alternative. Nonetheless, according to NADA (National Automobile Dealers Association), this has been an opportunity for EV automakers to conquer the auto market even further since soaring non-renewable prices have been capturing more demand for electrical means of transportation.

Figure 8: Annual Inflation Rate from 2017 until 2021



Source: Inflation.eu – Worldwide Inflation Data, May 2022

5. Ford Motor Company Valuation

5.1. Valuation Assumptions

As mentioned previously, at this point of the project we will start valuing Ford Motor Company with the valuation models previously selected: FCFF Model, Price-to-Earnings ratio, and EV/EBITDA. In the line with it, it is important, firstly, to focus on the explanation of the assumptions employed in our estimations, in order to, be coherent with the reality worldwide and with the industry in which Ford Motor Company operates.

Starting with the FCFF Model, where cash flows will be projected with a horizon of five years (2022 - 2026), our main focus will be on the explanation of the forecasted revenues, EBITDA, Depreciation & Amortization costs, Capex, and Net Working Capital. Besides, we will be carried out to understand the impacts of WACC and the TGR associated, and, then, through a sensitivity analysis, understand how different changes could affect Ford´s final share price.

Regarding the Relative Valuation Model, which will be the last model, the focus will be on the peer group that will be constituted by companies belonging to the same industry and sharing similar characteristics, and then, the comparison of the results of the industry average with the ones estimated for Ford Motor Company.

5.1.1 Revenues

Revenues are a very important heading for the valuation of Ford Motor Company since they will have a significant impact on the estimation of other assumptions that are dependent on, and give a better understanding of the company´s value creation. Before estimating the forecast revenues of the company, it is important to understand and reflect on the challenges that the company and the industry are facing today and how that will impact the expected revenues of Ford for the next years. According to the World Trade Organization (WTO), the impact of Covid-19, Inflation, and the Chip Shortage Crisis have been the biggest bottlenecks in today's economy, and, especially in the automotive industry. Due to these impacts, in 2021, Ford registered massive earnings cut of about $2.5 billion, and the Automaker has been obligated to halt most of its production for several weeks.

Despite the situation, it is still believed that the revenues will continue growing, especially, due to the recent investments in new technologies to keep the pace in autonomous vehicles, ride-sharing, and electric vehicles.

Taking into consideration the information provided by the Bloomberg Service until 2023 of the projected revenues for Ford; its potential revenue growth; and using the simple average of

the growth rate from 2021 until 2023 (8.00%) for the estimation of the potential constant growth rate between 2024 and 2026; the expected revenues of Ford Motor Company until 2026 are the following:

(in million $)	2021	2022F	2023F	2024F	2025F	2026F
Growth (%)	7.23%	6.91%	9.89%	8.00%	8.00%	8.00%
Revenues	136 341	145 761	160 172	172 988	186 829	201 778

Table 2: Ford Motor Company Revenues Projections (2022-2026)

Source: Bloomberg Service, 2022

5.1.2 EBITDA – EBITDA Margin

For the estimation of the projected EBITDA, usually it is used the average of the EBITDA margin´s historical performance. By using EBITDA margin, we are assuming that the cost of sales will increase proportionally with the revenues increase. However, according to the financial information of the last historical dates (2016-2020), it recorded a significant drop in the revenues and EBITDA, not representing the growth projections for beyond 2021 (Appendix A). Therefore, the calculation of the EBITDA margin for 2024 until 2026 was based on the simple average from 2021 until 2023, which was previously estimated by the Bloomberg service.

In the following table, we can see the projection of Ford Motor Co.'s EBITDA by applying the EBITDA margins mentioned to the revenues projected previously.

(in million $)	2021	2022F	2023F	2024F	2025F	2026F
Revenues	136 341	145 761	160 172	172 988	186 829	201 778
Margin	9.00%	10.33%	10.38%	9.90%	9.90%	9.90%
EBITDA	12 269	15 062	16 629	17 131	18 501	19 982

Table 3: Ford Motor Company EBITDA Projection (2022-2026)

Source: Bloomberg Service, 2022

5.1.3 Depreciation & Amortization Costs

According to Koller et al (2010), the Depreciation and Amortization costs can be estimated by three different methods: using the equipment purchases, the percentage of revenues, and a percentage of Property, Plant, and Equipment (PPE). For the projection of Ford´s Depreciation and Amortization costs, we decided to use the second method: a percentage of revenues, since it is a similar approach to the one previously estimated.

Starting with the estimation of the ratio of D&A costs over revenue from 2016 until 2020, we computed the simple average of the ratios and obtained an average of 5.67% (Appendix B). Then, we applied the average to the revenues projected from 2024 until 2026, since the Bloomberg Service previously provided ratios from 2021 to 2023.

In the following table, we can see the projection of Ford Motor Co.'s D&A Costs by applying the D&A ratios mentioned to the revenues projected previously.

(in million $)	2021	2022F	2023F	2024F	2025F	2026F
Revenues	136 341	145 761	160 172	172 988	186 829	201 778
D&A (%)	5.68%	2.93%	2.87%	5.67%	5.67%	5.67%
D&A	7 746	4 276	4 593	9 803	10 587	11 435

Table 4: Ford Motor Company D&A Costs Projection (2022-2026)

Source: Bloomberg Service, 2022

As observable in table 4, from 2022 and 2023, it is expected that the depreciation and amortizations costs will decrease since according to consulting firm AlixPartners, the automotive industry will continue to suffer from the chip shortage crisis until 2023, alongside, the ongoing Covid-19 Pandemic, which will continue to affect most of the manufacturing processes and supply chains.

However, on the other hand, we believe that at the beginning of 2024, the D&A ratio will go back to normal since is expected the recovery of the chips supply chain and even more commitment to the transformation of the automobile industry into a more sustainable, safer, and efficient one.

5.1.4 Earnings Before Interest and Taxes (EBIT)

EBIT is an important indicator to a company since from it we are able to understand how profitably a given company is operating. With all the necessary information for its computation,

EBIT is estimated by the difference between EBITDA and D&A costs, as observable in the following table:

(in million $)	2021	2022F	2023F	2024F	2025F	2026F
EBITDA	12 269	15 062	16 629	17 131	18 501	19 982
D&A	7 746	4 276	4 593	9 803	10 587	11 435
EBIT	4 523	10 786	12 036	7 328	7 914	8 547

Table 5: Ford Motor Company EBIT Computation (2022-2026)

Source: Bloomberg Service, 2022

5.1.5 Effective Tax Rate

The effective tax rate is defined as the tax rate that is paid on the company´s pre-tax profits, in the special case of FCFF i.e. EBIT, as interest expenses are ignored. According to the 2021 Ford financial report, the effective tax rate for the automaker, considering the US statutory tax rate of 21% and the income tax jurisdictions for the affiliates non-US, is 21.9% for 2021. Since, from 2018 until 2021, the statutory tax rate of the US did not change (Appendix C), for the purpose of this project, the rate applied from 2022 until 2026, will be also 21.9%.

5.1.6 Capital Expenditure (Capex)

Capital Expenditures are defined as funds used by a company to normally acquire, upgrade or/and maintain physical assets such as property, buildings, technology, and others. According to the last financial reports by Bloomberg, from 2016 until 2021, Ford´s Capex remained constant, reaching its highest value in 2018, with a Capex of $7 785.05, and its lowest value in 2020, due to the Covid-19 pandemic, of $5 741.95. In 2021, the company has registered a Capex value of $6 226.97, representing a 4.57% Capex/Revenue ratio (Appendix D).

Given that, and considering that invested capital should grow in line with revenue growth, which is 2% in TGR, and cannot be lower than D&A costs average, previously estimated, we projected the Capex from 2022 until 2026 by adding 1 p.p. to the average of D&A costs of 5.67% (Appendix B). We obtained an average of 6.67% and applied from 2022 until 2026, in order to estimate the forecast Capex, as observable in the following table:

(in million $)	2021	2022F	2023F	2024F	2025F	2026F
Revenues	136 341	145 761	160 172	172 988	186 829	201 778
Capex/Revenues	4.57%	6.67%	6.67%	6.67%	6.67%	6.67%
Capex	6 227	9 717	10 677	11 532	12 455	13 451

Table 6: Ford Motor Company Capex Computation (2022-2026)

Source: Bloomberg Service, 2022

5.1.7 Net Working Capital

Ford´s Working Capital is the difference between the automaker´s current assets – cash (sometimes cash is not included in Working Capital Needs as it is seen as a non-operating asset but you may consider cash as being a part of working capital needs), accounts receivable/costumers, and inventories - and its current liabilities – accounts payable and debts. With it, we are able to measure the automaker´s operational efficiency, liquidity, and its short-term financial health.

Based on the information provided by the Bloomberg Service, and estimating the NWC as similar to previous approaches, we, firstly, estimated the WC/Revenue ratio from 2016 until 2020, with the Working Capital and Revenues previously provided (Appendix E). Then, by applying the simple average of WC/Revenue ratio, we obtained an average of 12.71% and applied it from 2022 to 2026. Finally, using the ratio and projecting the working capital for the forecast years, we projected the working capital changes from 2021 until 2026, as observable in the following table

(in million $)	2021	2022F	2023F	2024F	2025F	2026F
Revenues	136 341	145 761	160 172	172 988	186 829	201 778
WC/Revenues	13.40%	12.71%	12.71%	12.71%	12.71%	12.71%
WC	18 269	18 530	20 362	21 991	23 751	25 651
ΔNWC	(1 283)	261	1 832	1 629	1 760	1 900

Table 7: Ford Motor Company Net Working Capital Estimation (2022-2026)

Source: Bloomberg Service, 2022

As observable in table 7, our projections expect that for the forecasted years Ford Motor Co. will have a positive working capital. This positive trend indicates that the automaker will be able to fund its future operations and activities, allowing the company to grow. Besides, this working capital will allow the company investment in its transformation in order to meet the need for electric passenger and commercial vehicles and pursue leadership positions in electrification, connected vehicle services, and mobility solutions, including self-driving technologies.

5.1.8 Terminal Growth Rate

As previously mentioned, for the estimation of the enterprise value in the FCFF Model it is necessary to estimate the terminal value of the company. For that estimation, we need to compute the terminal growth rate, which is a constant rate at which the company is expected to grow forever.

The constant growth rate is estimated using the following formula:

$$TGR = (1 + Expected\ Inflation\ Rate) * (1 + Expected\ GDP\ Growth\ rate) - 1$$

Equation 21: Terminal Growth Rate

Since Ford is an international brand that operates in over 125 countries, we selected the regions that have more impact on Ford´s revenue for 2021, and consider their expected inflation rate and GDP growth rate, as observable in the following table:

	Revenues in 2021 (millions)	Weight (%)	Expected Inflation 2021	Exp. GDP Growth-rate	Inflation rate Weighted	GDP Growth-rate Weighted
USA	87 012	76.70%	7.04%	5.70%	5.40%	4.37%
Canada	11 153	9.83%	4.80%	4.60%	0.47%	0.45%
UK	7 607	6.71%	4.84%	7.40%	0.32%	0.50%
Germany	6 327	5.50%	5.31%	2.80%	0.29%	0.15%
Mexico	1 440	1.27%	7.36%	4.80%	0.09%	0.06%
Total	**113 449**	**100%**			**6.58%**	**5.53%**
TGR						**12.48%**

Table 8: Ford Motor Company TGR estimation

Considering that a company cannot grow forever at a rate higher than the one observable in the economy in which it operates (Damodaran, 2002), in this case, we have prudently used the 5-year average of the 10-year government bond yield **(2.0%)** to estimate future growth.

5.2. Discounted Cash Flow

5.2.1. Free Cash Flow to the Firm

As previously mentioned, the FCFF is "the sum of the cash flows to all claim holders in the firm, including stockholders, bondholders, and preferred stockholders", in other words, the amount of cash flow generated after accounting for taxes, depreciation & amortization costs (expenses), Net Working Capital, and investments in fixed assets (Capex). After establishing and understanding all the assumptions mentioned of Ford, we were able to compute the FCFF, as observable in the following table:

(in million $)	2021	2022F	2023F	2024F	2025F	2026F
EBIT	4 523	10 786	12 036	7 327	7 914	8 547
Tax Rate	21.9%	21.9%	21.9%	21.9%	21.9%	21.9%
Tax Value	991	2 362	2 636	1 605	1 733	1 871
EBIT (1-T)	**3 533**	**8 424**	**9 400**	**5 723**	**6 181**	**6 675**
(+) D&A	7 746	4 276	4 593	9 803	10 587	11 435
(-) Capex	6 227	9 717	10 678	11 532	12 455	13 451
(-) ΔNWC	(1 283)	261	1 832	1 629	1 760	1 900
FCFF	**6 335**	**2 722**	**1 484**	**2 364**	**2 554**	**2 758**

Table 9: Free Cash Flow to the Firm (2022-2026)

Source: Bloomberg Service, 2022, Own Calculations

5.2.2 Cost of Capital

5.2.2.1. Cost of Debt

The cost of Debt is defined as an effective rate that companies pay on their debt, such as bonds and loans. As previously mentioned, it can be estimated using two different methods: the pre-tax cost of debt or the after-tax cost of debt, which is tax-deductible. In order to compute Ford Motor Co.'s cost of debt, we decided to use the second methodology, which required three inputs, such as risk-free rate, spread, and the automaker tax rate.

To determine the value of the risk-free rate, we used the 10-year yield US Bond, which according to Bloomberg on 31-dec-21 was 1.51%. Then, taking into account Ford´s Financial Report of 2021 and the non-financial service firms' ratings interest coverage ratios and default spread table (Appendix F), we estimated a spread of 1.93%, since Ford´s Motor Co. was rating as BB+/Ba1. Thus, using formula 9 to estimate Ford Motor Co.'s cost of debt, we obtained a rate of 2.69%.

Risk-free Rate	1.51%
Spread	1.93%
Tax rate	21.90%
Cost of Debt	**2.69%**

Table 10: Cost of Debt, Own Estimations
Source: Bloomberg 2022

5.2.2.2. Cost of Equity

As previously mentioned, the cost of equity is defined as the future return that shareholders/companies demand when investing in equity, in other words, it is the compensation the market demands for the risk of ownership. For the estimation, we are going to use the traditional formula of CAPM, since the dividend discount model only can be applied to companies that pay dividends regularly, which is not the case for Ford in 2021.

Using formula 6, previously presented in the Literature Review, there are some components that we need to consider, such as risk-free rate; beta unlevered, Debt and levered; debt-equity ratio; effective tax rate; equity and country risk premium. Of the nine components needed for the computation, there are four of them previously estimated and provided by Bloomberg service, which are: risk-free rate (1.51%), Ford´s Debt ($138 092), Ford´s equity ($48 622), and effective tax rate (21.9%). Considering Ford´s equity and debt, we computed a Debt/Equity ratio of 2.84. Therefore, taking into consideration Ford´s 5-year unlevered beta of 0.64, and using formula 8, previously presented in the Literature Review, the value of beta levered for Ford Motor Co. in 2021, is equal to 1.28.

After computing the beta levered, to estimate the cost of equity, we needed to analyse and estimate the equity risk premium (ERP) and the country risk premium (CRP). The equity risk premium is defined as the excess return earned by an investor when investing in the stock market, and the country risk premium is the return demanded by investors from a country when

buying its sovereign bonds compared to other countries. The CRP takes into consideration political instability, and economic risks, such as inflation, sovereign debt, currency fluctuations, and others. Even though Ford Motor Company is located in the US and the country has a risk rank of Aaa, Ford´s CRP for 2021 needs to consider the different countries that the automaker operates. Considering the automaker´s revenue of 2021, we choose the CRP of the five countries with more revenues in 2021: Germany, Canada, México, United Kingdom, United States; and for the other countries we assume the Global CRP estimated by Damodaran of 1.02% (Appendix G). Therefore, in 2021, Ford´s CRP registered a value of 0.22%.

Regarding the equity risk premium, we estimated using the US average market premium, which, in 2021, registered a risk premium of 5.5%.

Given this information, through the CAPM formula, the estimated cost of equity of Ford is 6.91%, as observable in the following table:

Risk-free	1.51%
Unlevered Beta	0.64
Tax rate	21.90%
Debt ($ million)	138 092
Equity ($ million)	48 622
D/E ratio	2.84
Debt Beta	35.09%
Levered Beta	1.28
Equity Risk Premium (US)	5.50%
Country Risk Premium	0.22%
Cost of Equity (CAPM)	**6.91%**

Table 11: Cost of Equity, Own Estimations
Source: Bloomberg 2022

5.2.2.3. Weighted Average Cost of Capital (WACC)

After the estimation of Ford´s cost of equity and cost of debt, and considering the effective tax rate of 21.9%, and Ford´s capital structure, we estimated the WACC, using formula 5,

previously presented in the Literature Review. We achieved a 3.35% WACC, as observable in the table below

Cost of Debt	2.69%
Cost of Equity	6.91%
Debt ($ million)	138 092
Equity ($ million)	48 622
Capital ($ million)	186 714
Debt/Capital	73.96%
Equity/Capital	26.04%
Tax Rate	21.90%
WACC	**3.35%**

Table 12: WACC, Own Estimations
Source: Bloomberg 2022

5.2.3. Discounted Cash-Flow – Valuation Results

After computing the forecast FCFF from 2022 until 2026 (5.2.1), the WACC (5.2.2), and the TGR of 2%, since a company cannot grow forever with a rate higher than the one observable in the economy in which it operates (Damodaran, 2002), we estimated Ford´s Enterprise value for 2021, using formula 2. It is important to highlight that we also computed the FCFF regarding perpetuity, using the terminal value formula (formula 3). In 2021, we estimated that Ford´s enterprise value was $187 362.89 million.

Thereafter, subtracting the value of Debt and adding the value of Non-Operating Assets, which includes: Pension plans contributions, shareholders distributions, and investments in equity securities, acquisitions, and divestitures, to Ford´s Enterprise Value, as presented in formula 4, we estimated Ford´s Equity Value as $112 138.89 million.

Finally, considering 4 034 million common shares outstanding and divided by the estimated Equity Value of $112 138.89 million, we obtained a final share price of $27.80.

The table below presents all the inputs needed to compute Ford´s final share price for 2021.

(in million $)	2021	2022F	2023F	2024F	2025F	2026F
FCFF	-	2 722	1 484	2 365	2 554	2 758
WACC	-	-	-	-	-	3.35%
TGR	-	-	-	-	-	2.00%
Terminal Value	-	-	-	-	-	208 263
FCFF	-	2 722	1 484	2 365	2 554	211 021
Enterprise Value	**187 363**					
(+) Non-Operating Assets	13 275					
(+) Cash	49 593					
(-) Debt	138 092					
Equity Value	**112 139**					
Shares Outstanding	4 034					
Value per Share	**27.80**					
Value (31dec21)	**20.77**					

Table 13: Discounted Cash Flow Valuation (FCFF)

Source: Ford Annual Report 2021, Bloomberg Service, 2022, Own Calculations

5.2.4 Sensitivity Analysis

As previously observed, the estimation of Ford´s final share price using the FCFF model is impacted by different variables such as revenues, debt, WACC, Terminal Growth Rate (TGR), and others. These different variables affect the final share price in different magnitudes, especially, the WACC and the Terminal Growth Rate. In order to better understand how Ford´s final share price can deviate from the value reached in our estimation, we performed a sensitivity analysis, with variations of ±0.25% (WACC) and ±0.2% (TGR) from the initial values, as observable in the table below (Table 14).

		WACC				
		2.85%	3.10%	**3.35%**	3.60%	3.85%
TGR	1.60%	32.31	23.77	17.66	13.09	9.53
	1.80%	41.60	29.96	22.80	16.38	12.07
	2.00%	55.27	38.41	**27.80**	20.50	15.17
	2.20%	77.33	50.62	35.51	25.79	19.02
	2.40%	118.96	69.78	46.46	32.85	23.93

Table 14: Sensitive Analysis

We can immediately conclude that small changes in the WACC and/or in the TGR have an impact on Ford´s final share price. As observable, the higher/lower the WACC, caeteris paribus, the lower/the higher will be our final share price; whereas, in the Terminal Growth Rate, the higher/lower our rate is, caeteris paribus, the higher/lower will be our final share price. Based on table 14, we are able to state that the best scenario for Ford´s share price happens when the WACC is equal to 2.85%, and the TGR is 2.40%; and the worst scenario is when the WACC is 3.85%, and the TGR is 1.60%; reaching values of $118.96 and $9.53, respectively. The best scenario can happen if the cost of equity reduces due to the increases in GDP and/or inflation; on the other hand, the worst scenario can happen if the cost of equity increases due to the increase in risk-free rate and/or CRP, which consequently increase the WACC.

This sensitivity analysis allows us to better understand how difficult it is to correctly estimate Ford´s final share price for 2021, going in agreement with what was previously mentioned in the Literature Review, regarding the accuracy problems of the model due to these valuations being made by future projections, sensitive to bias and subjectivity.

5.3. Relative Valuation (Multiples)

As previously stated in the Literature Review, the Relative Valuation Model is a different way of approaching the valuation of a company in the corporate finance world. This methodology, rather than valuing a company based on its fundamentals, as observed in the DCF Valuation Model, value the company by looking at how the market is pricing other similar companies or industries (Damodaran, 2006).

From the wide range of multiples presented in Table 1, we selected one multiple from the Equity Value multiples - Price-to-Earnings (PER) – and one from the Enterprise Value multiples – EV/EBITDA.

Therefore, to make the assessment as accurate and realistic as possible, we, firstly, established the Peer Group for our valuation. For the selection, we consider the following criteria: Market Capitalization of 2021, Sales in 2021, and the historical main competitors of Ford Motor Company. According to the established criteria, the automakers that constitute the final peer group for the estimation of the relative valuation of Ford are General Motors (GM), Honda, Toyota, Volkswagen Group (VW Group), and BMW Group.

Based on the 2021 financial reports of the automakers, alongside with the information provided by the Bloomberg Service, the values of the relative multiples per automaker are the following:

Company	**PER**	**EV**	**EBITDA**	**EV/EBITDA**
General Motors	8.74	173 930	21 375	8.14
Honda	6.63	91 870	3 237	28.38
Toyota	9.08	393 240	36 115	10.89
VW Group	8.77	230 820	55 145	4.19
BMW Group	4.90	126 440	27 010	4.68
Comparable Average	**7.62**	**203 260**	**28 576**	**11.25**
Ford Motor Company	4.63	175 588	10 483	16.75

Table 15: Peer Gourp and Relative Valuation

Source: 2021 Financial Reports, Bloomberg Service, Own Estimations, 2022

As observable in table 15, the price to earnings of the average of the peer group selected is 7.62x, whereas Ford presented a ratio of 4.63x. This could mean an indication of a potential undervaluation, as observable in the DCF Valuation model, since Ford´s shares are cheaper than the shares of its main competitors, as Ford´s future investors have to pay $4.63 instead of $7.62 for each revenue unit.

On the other hand, looking at the EV/EBITDA ratio, Ford´s presented a ratio of 16.75, which is above the average of the peer group selected. Even though this could mean that this enterprise values multiple is overvalued, this may also indicate that investors are pricing it considering bullish expectations of future potential operational results. Besides, Ford´s enterprise value is

above the considered peer group average, being the third most valuable automaker among the considered automakers in this analysis.

Using the ratios previously estimated in table 15, we determined Ford´s share price by multiplying Ford´s earnings per share for 2021 (Bloomberg Service) with Ford´s PER multiple of 4.63x; and by multiplying Ford´s EV/EBITDA ratio of 16.75 with Ford´s EBITDA of 2021, adding the Non-Operating Assets, and subtracting Debt, and dividing by Ford´s shares outstanding. This led us to a final share price of $20.60, and $12.59, respectively.

Ford Motor Company	**PER**
Ford´s Earnings per share	4.45
PER	4.63
EBITDA	10 483
Enterprise Values	175 588
(+) Non-Operating Assets	13 275
(+) Cash	49 593
(-) Debt	138 092
Equity Value	71 311
Shares Outstanding (million Shares)	4 034
PER	**20.60**
EV/EBITDA	**12.59**
Value (31dec21)	20.77

Table 16: Relative Valuation

Source: Bloomberg Service, Own Estimations, 2022

5.4. Valuation Results

Ford Motor Company	**Share Price**
FCFF Model	27.80
PER	20.60
EV/EBITDA	12.59
Market Value (31dec21)	20.77

Table 17: Valuation Results

Source: Bloomberg Service, Own Estimations, 2022

From the table above, it is observable that different methodologies, lead us to different outputs and different conclusions. According to the first valuation model estimated, DCF Valuation Model, the share price is $27.80, which is above the reference price of $20.77 (Market Value on 31dec21), whereas in the relative valuation model the share price is $20.60 and $12.59, which are both below the reference price.

According to the DCF Valuation Model, our recommendation is to buy (or hold if you already own it) Ford´s shares, since the price previously calculated indicates that the market price is undervalued. The continued investment in electrification, connected vehicle services, and mobility solutions, including self-driving technologies, and the growth prospects of sales, alongside the automobile industry revolution, contribute to reinforcing the recommendation made. Besides, the recommendation is also supported by the intrinsic calculation made by Yahoo Finance for Ford, which indicates that at the beginning of December 2021 Ford´s shares were undervalued by 41%.

Regarding Relative Valuation models, our recommendation would be to sell the shares, since the reference market value indicates that Ford´s shares are overvalued. However, as stated previously in table 15, the PER ratio of 4.63x (below the average of the peer group) indicates that there is a potential undervaluation of Ford´s share price, and the EV/EBITDA of 16.75, (above the average of the peer group) indicates that investors are pricing it from bullish expectations of future potential operational results.

In this sense, our recommendation is to buy or hold Ford´s shares, since according to our estimation Ford´s shares price on 31ST December of 2021 was undervalued.

6. Conclusions

The main goal of this project was to determine the fair value of Ford´s shares price, in order to give a reliable investment recommendation to Ford´s investors. From the wide range of valuation models presented in the literature review, we managed to apply the DCF Valuation Model, using the FCFF Model, and the Relative Valuation Model. As previously stated, the choice of the valuation models was based on the characteristics of the automaker during 2021; however, we recognize that other models could have been useful for our investment recommendation, giving a different perspective of Ford´s close share price on the 31st December 2021.

Regarding the FCFF Model, the focus was on the prospected cash flows, considering different assumptions in order to make our projection coherent with the reality worldwide and with the industry in which Ford Motor Company operates. Establishing these assumptions was a challenging part of our estimation since we had to consider the positive impact of the automobile industry transformation, and the challenges that the automaker is facing today, such as the chip shortage crisis, and inflation. It is important to highlight that by the time this project is delivered, new reports might have been developed, supporting different assumptions and presenting new challenges, like the Russia x Ukraine conflict that started at the beginning of 2022, and consequently leading to different results than the ones estimated.

The Relative Valuation Model, on the other hand, values the company by looking at how the market is pricing other similar companies or industries (Damodaran, 2006). From the wide range of multiples presented in Table 1, we selected one multiple from the Equity Value multiples - Price-to-Earnings (PER) – and one from the Enterprise Value multiples – EV/EBITDA, and selected a Peer Group considering the Market Capitalization of 2021, Sales in 2021, and the historical main competitors of Ford Motor Company. Hence, the main goal of this valuation model is to be a complementary approach to the DCF Valuation Model.

As previously stated, based on final share prices obtained using both methodologies, our recommendations for Ford´s investors are to buy or hold shares, due to the value of $27.80, which is above the reference price of $20.77 (Market Value on 31dec21). Besides, the potential undervaluation of Ford´s share price and bullish expectations of future potential operational results by the investors, given by the Relative Valuation multiples estimations, contribute to reinforcing our recommendation.

Even though according to our estimations, it is believed that Ford´s stock in the market is undervalued, we recommend that new assessments should be made in order to quantify the continue impact of inflation and supply chain disruption that automakers are facing today.

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8. Appendices

Appendix A: Ford Motor Company EBITDA from 2016 to 2020

	2016	2017	2018	2019	2020
Revenue	151 800	156 776	160 338	155 900	127 144
EBITDA	14 503	13 334	11 616	9 515	3 498
EBITDA Margin	9.55%	8.51%	7.24%	6.10%	2.75%
Average					6.83%

Source: Bloomberg Service

Appendix B: Ford Motor Company D&A Costs from 2016 to 2020

	2016	2017	2018	2019	2020
Revenue	151 800	156 776	160 338	155 900	127 144
D&A Costs	8 717	8 453	8 413	8 941	7 906
EBITDA Margin	5.74%	5.39%	5.25%	5.74%	6.22%
Average					5.67%

Source: Bloomberg Service

Appendix C: Ford Motor Company Tax Rate from 2017 to 2021

	2017	2018	2019	2020	2021
Effective Tax Rate	6.40%	15.00%	21.00%	21.00%	21.00%
Average					16.88%

Source: Ford Motor Company Report 2021

Appendix D: Ford Motor Company Capex from 2016 to 2020

	2016	2017	2018	2019	2020
Revenue	151 800	156 776	160 338	155 900	127 144
Capex/Revenue	4.61%	4.50%	4.86%	4.90%	4.52%
Capex	6 992.06	7 048.96	7 785.05	7 631.93	5 741.95
Average					4.67%

Source: Bloomberg Service

Appendix E: Ford Motor Company NWC from 2016 to 2020

	2016	2017	2018	2019	2020
Revenue	151 800	156 776	160 338	155 900	127 144
WC	18 200	22 200	19 080	15 915	19 552
WC/Revenue (%)	11.99%	14.16%	11.90%	10.21%	15.38%
Average (%)					12.71%
ΔNWC	-	4 000	(3 120)	(3 165)	3 637

Source: Bloomberg Service

Appendix F: Credit Risk Ratings

If interest coverage ratio is			
greater than	≤ to	Rating is	Spread is
-100000	0.499999	D2/D	14.34%
0.5	0.799999	C2/C	10.76%
0.8	1.249999	Ca2/CC	8.80%
1.25	1.499999	Caa/CCC	7.78%
1.5	1.999999	B3/B-	4.62%
2	2.499999	B2/B	3.78%
2.5	2.999999	B1/B+	3.15%
3	3.499999	Ba2/BB	2.15%
3.5	3.9999999	Ba1/BB+	1.93%
4	4.499999	Baa2/BBB	1.59%
4.5	5.999999	A3/A-	1.29%
6	7.499999	A2/A	1.14%
7.5	9.499999	A1/A+	1.03%
9.5	12.499999	Aa2/AA	0.82%
12.5	100000	Aaa/AAA	0.67%

Appendix G: Credit Risk Ratings (Selected Countries)

Country	CRP (%)	Revenues Weight	Weighted CRP
United States of America	0.00%	63.82%	0.00%
Canada	0.00%	8.18%	0.00%
United Kingdom	0.60%	5.58%	0.03%
Germany	0.00%	4.57%	0.00%
Mexico	1.58%	1.06%	0.02%
All Other	1.02%	16.79%	0.17%
Total	**2.18%**	**100%**	**0.22%**
Source: Country Default Spreads and Risk Premiums 2021 – Damodaran Website			