Daimler AG
Equity Valuation

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Abstract

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This dissertation aims to estimate the fair value of a Daimler AG share at the end of 2018, concluding with a buy, hold or sell recommendation. To accomplish this, the methodologies used are the Discounted Cash-Flow (DCF), the Dividend Discount Model (DDM) and Relative Valuation. Regarding this last model, the multiples used are the Price-Earnings Ratio, the Enterprise Value to EBITDA and the Enterprise Value to Sales.

To introduce the assumptions taken, an overview of the firm is presented, as well as a sector and macroeconomic outlook. The firm overview comprises a description of Daimler's business model, detailing its segments and recent performance. The sector outlook enlightens the future of the automotive industry and its renovating trends, whereas the macroeconomic outlook set out the basis for the future economic growth.

The DCF model estimates a fair value for Daimler's share of €93. Relative Valuation results were not consistent, as each multiple produces a different recommendation. The DDM retrieves a share price of €37, while the stock is trading at €59, as of April 2019. Hence, this dissertation produces a buy recommendation, based on the DCF, regarded as the most accurate model. Supporting this result, is Morningstar Equity Research that estimates a fair value of €85, yielding also a buy recommendation. A comprehensive comparison with Morningstar model is not possible due to lack of information provided.

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Esta dissertação pretende estimar o justo valor de uma ação da Daimler no final de 2018, concluindo com uma recomendação de compra, venda ou de manter a ação. Para o efeito, os modelos usados foram o Discounted Cash-Flow (DCF), o Dividend Discount Model (DDM) e o Relative Valuation. Em relação a este último modelo, os múltiplos utilizados são o Price-Earnings Ratio, o EV to EBITDA e o EV to Sales.

De forma a explanar as suposições tidas, é realizado um resumo sobre a empresa, bem como perspetivas de mercado e macroeconómicas. O resumo sobre a empresa contém uma descrição do modelo de negócios, detalhando os seus segmentos e desempenho recente. A perspetiva de mercado procura elucidar sobre o futuro da indústria automóvel e as suas tendências renovadoras, enquanto a macroeconómica estabelece a base do futuro crescimento económico.

O modelo DCF estima que o justo valor de uma ação da Daimler é de €93. Os resultados do Relative Valuation não são consistentes, já que cada múltiplo deu origem a uma recomendação diferente. O DDM obtém um preço por ação de €37, enquanto esta está a ser transacionada no mercado a €59 a abril de 2019. Desta forma, esta dissertação recomenda comprar a ação, com base no DCF, considerado o modelo mais fiável. Este resultado é corroborado pela Morningstar Equity Research, que estima um preço por ação de €85, dando também uma recomendação de compra. Uma comparação pormenorizada com o modelo da Morningstar não é possível, dado a informação providenciada.

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1. Introduction

Valuation is the process of measuring the ability of an asset, in our case, a firm, to create value, this is, to determine how much the cash-flows that the asset is going to generate in the future are worth today. On a broader overview of the topic, one can argue that in a global market economy it is of utmost relevance to know how to correctly measure value to avoid market speculation, market bubbles or even a financial crisis in the worst-case scenario. In fact, those more easily happen when investors lose perception on how value is created, hence, to make intelligent and rational decisions, they must base them on independent and reliable studies, as this dissertation aims to be.

The purpose of this dissertation is, thus, to conduct an equity valuation of the firm Daimler AG, (hereinafter referred to as Daimler), presenting the best estimate of its fair value and providing an investment recommendation (buy, hold or sell). All in all, the objective is to answer the following question "What is the fair value of a Daimler's common stock, as of December 2018?".

To correctly assess a firm's value, one must bear in mind that there are several inputs that can affect the future cash-flows of the firm, coming from the overall market conditions, the specific industry where the firm is inserted and the firm's business model, among others. Additionally, it is essential to choose a model that best fits the firm structure, that is, one that has into account the most complete set of inputs possible in the calculation of the company value. Therefore, this dissertation firstly presents a Literature Review with the pertinent equity valuation models alongside its main advantages and shortcomings. Then, an overview of the automotive industry where Daimler is inserted, as well as its business model, are going to be considered, presenting both the business core drivers and the potential risks faced by Daimler's operations performance. Finally, it is going to be applied the valuation models that are considered well-suited to evaluate Daimler and a comparison with the valuation done by the equity research team of Morningstar Research Services LLC is going to be made, to analyse the results obtained and the underlying assumptions of the chosen models.

Equity Valuation is a topic rather subjective, as there is not a strict set of rules to follow to assess a firm's value, so this study – or any other of this kind for that matter – should not be regarded as an indisputable truth! This study has several shortcomings, either for the absence

of some piece of information regarding the future path of the firm (that, for instance, only the management of Daimler possesses and does not want to disclosure to gain a competitive advantage) or for the lack of acceptance of the models used, which have their inherent drawbacks. To mitigate this fact, a sensitive analysis is going to be conducted in the last chapter, both with a more conservative and optimistic approaches.

2. Literature Review

Valuation is not an exact science, and thus there are several approaches one can take to value a company. Depending on the characteristics of the firm, there are models that are better suited than others to assess its value, as different models capture different value drivers and have into account distinct pieces of information. Although there are differences on the various approaches and respective fundamentals that base them, it should be possible to compare the end results, given that there is consistency in the assumptions made (Young, et al., 1999).

Broadly speaking, valuation models can be divided into four main groups, namely cash-flow based models, liquidation and accounting valuation models, relative valuation models and option pricing theory models (Damodaran, 2007).

Regarding the liquidation and accounting valuation models, their fundamentals are based on the book value of the firm, thus they do not consider any information regarding the future of the business. Subsequently, those will not be presented in this dissertation, as they are not regarded as an accurate method of measuring the true value of a company with future cash-flows (Beaver and Demski, 1979; Barth and Landsman, 1995).

2.1. Cash-Flow Based Models

In a cash-flow based approach, the value of the firm is measured in terms of the present value of the cash-flows, discounted at a risk-adjusted rate, that it will generate in the future and those can be estimated in numerous ways.

One can separate cash-flow based models into firm valuation models, that aim to value the entire enterprise, or equity valuation models that assess only the equity value. Subsequently, the firm valuation approaches that are going to be explained in this chapter are the free cash-flow to firm (FCFF), where expected cash-flows are discounted at the cost of capital, the adjusted present value model (APV) that values the firm first as if it was solely financed by equity and then adds the effects of debt financing, and the economic value added model (EVA), valuing the firm in terms of the excess returns it is projected to generate on its investments. On the other hand, the models that focus on the equity part explained here are the free cash-flow to equity (FCFE), where estimated cash-flows are discounted at the equity required return, or cost

of equity, and the dividend discount model (DDM), where the value of the stock is estimated as the present value of the expected dividends on it.

2.1.1. Discounted Cash-Flow Models (DCF)

The discounted cash-flow is the valuation methodology most widely used in practice (Copeland, et al., 2000). The main reason for this, is that DCF methods rely merely on cash movements, which are considered to be the ultimate source of value for firms (Koller, et al., 2010).

This methodology allows us to perform the valuation either on the whole firm or the firm's equity value and consists of valuing the firm as the present value of its future expected cash-flows, discounted at a risk-adjusted rate. Both approaches should yield the same valuation, if the same set of assumptions is made. Hence, four inputs are needed to our value estimate: the expected cash-flows, the discount rate, the growth rate and the terminal value (Damodaran, 2011). The following formula represents the interaction between the abovementioned variables, to achieve the valuation:

$$V_0 = \frac{CF_1}{1+k} + \frac{CF_2}{(1+k)^2} + (\dots) + \frac{CF_t + TV_t}{(1+k)^t} \quad , \qquad TV_t = \frac{\mathrm{CF_{t+1}}}{\mathrm{k} - \mathrm{g}}$$

Where:

- V_0 = Value of the firm at period t=0, that is, its present value;
- CF_t = expected cash-flow generated in period n;
- k = risk-adjusted discount rate (%);
- g = growth rate in perpetuity (%);
- TV_t = terminal value of the firm at period t=n.

These variables differ according to the type of valuation we are doing, if it is the entire firm or only its equity part. Therefore, the detailed explanation of these variables and its differences is going to take place when the respective approach is described.

There are two conditions that need to be met in using this method. First, the growth rate used in the model must be less than or equal to the growth rate in the economy in which the firm operates. This is so because no company can grow in perpetuity more than the economy. Second, the characteristics of the firm must be consistent with assumptions of stable growth, implying that the use of a constant cost of capital for a growing firm assumes that the debt ratio of the firm is held constant over time or that for each period the investment in capital expenditure offsets depreciation expenses (Damodaran, 2007).

2.1.1.1. Firm DCF Model

The firm DCF method is one that aims to value the entire business, also termed as enterprise valuation. Resultant from the DCF method introduced above, in the enterprise valuation method the value of the firm is achieved by discounting the free cash-flows to firm (FCFF) at the weighted average cost of capital (WACC), which is going to be our risk-adjusted rate. Furthermore, since it is impractical to estimate cash-flows endlessly, a terminal value (TV) is also required to be estimated.

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

Each variable is going to be explained and described below.

2.1.1.1.1. Free Cash-Flow to Firm (FCFF)

The free cash-flows to firm is the amount of cash from operations, available to all capital providers, for distribution after depreciation expenses, taxes, changes in net working capital, and investments are paid.

$$FCFF = EBIT * (1-T) + Non\ Cash\ Charges - Capex - Changes\ in\ NWC$$

2.1.1.1.2. Weighted Average Cost of Capital (WACC)

The capital of a firm includes both equity and debt, so it is an indispensable condition to combine these two factors into a risk-adjusted rate. Hence, the WACC is going to be used as the discount rate, since it represents the rates of returns required by the firm's debt and equity holders combined, thus representing the firm's opportunity cost of funds (Koller et al., 2010).

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

The WACC is a weighted average of two different variables, the cost of debt (K_d) and the required return to equity (K_e), where the weights come from the firm capital structure market values. Moreover, it can capture the tax advantage deriving from leveraging a firm (Luehrman, 1997), the tax shields, by reducing the marginal tax rate to the cost of debt, as they were excluded from the free cash-flow. Therefore, one can say that the WACC is neither a cost nor a required return, but a weighted average of both (Fernandez, 2010).

2.1.1.1.3. Cost of Debt

The cost of debt refers to the risk that the lenders of the firm face, to account for the possibility that they will not receive their promised payment. It is the effective rate a company pays on its current debt. To compute this value, one should look at the average yield to maturity on issued bonds by the firm, if it is publicly traded, to have a more accurate value.

Nevertheless, if the firm is not publicly traded, one needs to estimate a default spread, perceiving the risk of default, over the risk-free rate. A reasonable proxy of the risk-free rate is the yield on government bonds, which portraits the expected return on a long-term investment with guaranteed returns. A fair estimation of the spread to cover the default risk, would be looking at the bond rating from a rating agency where a default spread can be estimated from the rating. If the firm is unrated, one could compute a "synthetic" rating from financial ratios of the firm, being the interest coverage ratio the most effective (Damodaran, 2011). Regarding this aspect, (Binsbergen, et al., 2010) demonstrated that, on average, the default cost of debt is approximately half of the total cost of debt, implying that agency costs and other nondefault costs contribute about half of the total ex ante costs of debt.

2.1.1.1.4. Cost of Equity

The required return to equity, or cost of equity, can be derived from market models such as Fama-French Three Factor Model or Capital Asset Pricing Model (CAPM). The second one is the most broadly used (Damodaran, 2011), and states that investors should be compensated by the time-value of money and by the risk faced. Therefore, the expected return computation requires a compensation for the time-value of money, the risk-free rate, and a compensation for taking risk, Beta, that is then multiplied by the market risk premium, i.e., the excess return of the market over the risk-free rate. Using historical figures on market premiums is the most popular approach (Damodaran, 2011).

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

Beta captures the systematic risk, that is, the risk of an asset in comparison with the market as a benchmark, and can be computed as demonstrated below, using the individual stock returns and market returns. A market weighted index should be used as a proxy for the market portfolio (Damodaran, 2011), and the timeframe used for the computation should be large enough to have plenty of observations, but not excessively large, as firm's characteristics and market conditions change over time.

$$\beta_i = \frac{Covariance(r_i, r_m)}{Variance(r_m)}$$

2.1.1.1.5. Terminal Value

The life of a firm is not expected to be finite, and as it is impractical to estimate cash-flows forever, one needs to compute a terminal value. According to (Damodaran, 2011), there are two ways one can compute a terminal value. On the one hand, there is the Liquidation Value, where the business is assumed to end in the terminal year and its assets are liquidated at that time. The Terminal Value would, thus, equal the value of the sale of all assets, after repaying the debt, and it is not a good measure as it does not translate the earning power of assets. On the other hand, the method that is most used, the stable growth model, where one can compute the firm

value in perpetuity once the firm reaches its steady state. Practitioners must decide on the explicit period - period taken to achieve a steady growth rate – and estimate cash-flows during that period, using the last period as a perpetual cash-flow, with a stable growth.

As stated before, one of the key assumptions is that the perpetual growth rate should be inferior to the economy where the firm operates and that it has a stable development of earnings, free cash-flows, dividends and residual income (Levin and Olsson, 2000).

$$Terminal\ Value_t = \frac{Free\ Cash\ Flow_{t+1}}{Cost\ of\ Capital - Perpetual\ Growth\ Rate}$$

2.1.1.2. Equity DCF Model

A cash-flow based valuation can be done using equity instead of the whole firm, and the reasoning behind this is the same for both methods, discounting the free cash-flows (free cash-flows to equity in this case, that are available to stockholders) at a risk-adjusted rate – the cost of equity. The relation between the free-cash flows is as follows:

$$FCFE = FCFF - Interest * (1 - T) + Net\ Debt\ variation$$

The free cash-flow to equity measures the cash left over after taxes, reinvestment needs, and debt cash-flows have been met (Damodaran, 2011).

$$FCFE = Net\ Income\ + Non\ Cash\ Charges - CAPEX - \Delta NWC + \Delta NetDebt$$

In this approach, an equivalent formula as for the FCFF applies, therefore being necessary to compute the terminal value as before.

$$Value\ of\ Equity = \sum_{t=1}^{t=n} \frac{FCFE_t}{(1+K_e)^t} + \frac{TV}{(1+K_e)^t}$$

According to (Pinto, et al., 2010), the FCFF should be used when a firm is levered, has a negative FCFE or a changing capital structure. This is justified by the fact that cost of equity is more sensitive to changes in the capital structure.

2.1.2. Adjusted Present Value model (APV)

In the APV model, the value of a levered firm is defined by the value of the unlevered firm plus the leveraging effects, which consists of the tax shield of debt, expected bankruptcy costs and agency costs, thus taking place an interrelationship between investment and financing decisions (Myers, 1974). APV emerged as a response for the WACC models' drawbacks, that as a discounting factor implies a simple and static capital structure, whereas APV requires fewer restrictive assumptions (Luehrman, 1997), and can help managers analyse not only how much an asset is worth but also where the value comes from.

So, using this methodology, the enterprise value is computed by discounting the FCFF at the unlevered cost of equity (K_{ue}), which is the value of the unlevered firm, plus the present value of the tax advantage of debt financing, the tax shield (TS), and the expected financial distress costs (FD).

$$Entreprise\ Value = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1+K_{ue})^t} + \frac{TV}{(1+K_{ue})^t} + PV(TS) - E(FD)$$

In general, as it is perceptible from the equation above, the value of leveraging derives from the trade-off between the benefits of tax shields and the expected bankruptcy costs, being possible to achieve a unique optimal capital structure and level of debt (Scott, 1976). Hence, it occurs a trade-off between benefits and costs, as the benefits of leveraging derive from the tax benefits of using debt as a form of funding, since interest expenses are tax deductible, but as one adds more debt it increases the bankruptcy risk and subsequent expected bankruptcy costs.

The impact and benefits of the leveraging effects on the value of a firm were first explained by (Modigliani and Miller, 1958, 1963), stating that adding debt would increase the value of the firm, under the presence of corporate tax and the assumptions of zero growth on the cash-flows and that the optimal discount factor for the tax shield of debt is the interest rate on the

debt. These two assumptions were their way of solving the problems inherent with this methodology, that both the unlevered cost of equity and the appropriate discount rate for the tax shield are not observable.

After computing the value of the unlevered firm, following the same reasoning described already in this dissertation, the next step is to calculate the benefits from debt financing, the tax shields, which is a function of the tax rate of the firm discounted to reflect the riskiness of this cash-flow. (Cooper and Nyborg, 2006) argues that the value of the debt tax saving is the present value of the tax savings from interest, discounted back at the cost of debt (K_d).

$$PV(Tax\ Shields) = \sum_{t=1}^{t=n} \frac{Debt_t * Interest_t\ Rate * Tax\ Rate_t}{(1 + K_d)^t}$$

The final step in this approach is to evaluate the leveraging effects on the default risk of the firm and the ensuing expected bankruptcy costs.

$$E(Financial\ Distress\ Costs) = Probability\ of\ Default\ *\ Bankruptcy\ Costs$$

The costs associated with financial distress poses the larger problem with the APV approach, as both the probability of bankruptcy and its costs cannot be estimated directly, and bankruptcy costs have a great influence on the valuation and are difficult to estimate (Damodaran, 2007). He argues that the best indirect way to estimate the probability of default is to use publicly traded bonds ratings (with the respective default probability) as a proxy.

As for the bankruptcy costs, they go beyond the conventional legal and administrative direct costs, that (Weiss, 1990) estimates to be up to 3% of total assets, since the perception of distress can do serious damage to a firm's operations such as loss of customers, suppliers and employees, as well as impairing access to credit and raising costs of stakeholder relationship (Opler and Titman, 1994). Furthermore, the perception of distress by competitors can also weaken the firm condition, if they practice, for instance, predatory pricing (Bolton and Scharfstein, 1990). To conclude, (Andrade and Kaplan, 1998) estimate financial distress costs to be 10 to 23 percent of firm value.

2.1.3. Economic Value-Added model (EVA)

The EVA is a profitability type of model, where the value of the firm is computed as a function of expected excess returns, that is, it is a refinement of the concept of residual income - the value that remains after all the capital providers have been duly compensated (Stern, et al., 1995). The fundamental behind these models are that value creation comes from the excess return on earnings in addition to the return that were already required by the cost of capital (K_c), rather than the fact that it generates positive earnings per se (Damodaran, 2007). This can be translated by the following equation:

$$EVA = Invested\ capital * (Return\ on\ Invested\ Capital - Cost\ of\ capital)$$

According to (Damodaran, 2007), one can compute the enterprise value as the present value of its EVA, which can be rendered by the sum of three parts, the capital invested in assets, the present value of the economic value added of these assets and economic value added by future investments.

$$Firm\ Value = Invested\ Capital + \sum_{t=1}^{t=n} \frac{EVA_{t\ assets\ in\ place}}{(1+K_c)^t} + \sum_{t=1}^{t=n} \frac{EVA_{t\ future\ projects}}{(1+K_c)^t}$$

The estimation of the assets in place should rely on book value, with some accounting adjustments to only reflect current period choices, rather than on market values, since market values also include expected growth besides the assets in place (Damodaran, 2007). Moreover, operating income, that is used as an input variable on the return of invested capital, should also have some adjustments to its book value. (Weaver, 2001) surveyed that, on average, a typical EVA calculation involves 19 adjustments to its book value, from a range that goes from 9 to 34.

2.1.4. Dividend Discount Model (DDM)

An alternative method that allows investors to see the value of equity, in addition to the FCFE, is the dividend discount model, the oldest discounted cash-flow based approach (Damodaran, 2007). The DDM values a stock as the present value of the future stream of

expected dividend payments (Farrell, 1985). As one cannot project future dividends in perpetuity, there are two main models based on different assumptions regarding future growth that tackle this matter, the Gordon Growth Model and the Two-stage Growth Model. A problem inherent to DDM is that firms may choose to hold back cash that they can pay out to stockholders, or do the opposite, pay more dividends than the cash-flow allows, funding the difference with equity issuance or new debt, consequently misleading the valuation (Damodaran, 2007).

2.1.4.1. Gordon Growth Model

This model is constructed to value a stock in a stable growth firm through infinity, so it is only suited for firms that are in a steady-state and can sustain such a stable rate forever (Damodaran, 2007). It requires, as inputs, estimates for dividends, cost of equity and perpetual growth rate. This model should be applied with caution, as it is very sensitive to its variables and thus very prone to unreasonable valuation results.

$$Price\ per\ Share_t = \frac{E(Dividend\ per\ Share_{t+1})}{K_e - Perpetual\ Growth\ Rate}$$

2.1.4.2. Two-stage Growth Model

The emergence of the Two-stage Growth Model comes as a response to the demand for more flexibility to cope with higher growth firms, that have not yet arrived at a steady-state. In this way, one can incorporate a high growth rate, higher than the economy one, in a first phase, and then do a perpetuity in a second phase when the firm achieves a stable-growth.

$$Price\ per\ Share = \sum_{t=1}^{t=n} \frac{E(Dividend\ per\ Share_t)}{(1+K_e)^t} + \frac{Terminal\ Value}{(1+K_e)^t}$$

2.2. Relative Valuation

A relative valuation approach is built on the assumption that stock prices, on average, have captured all available information and given that efficient market framework, it is possible to estimate the value of an asset by comparison to its peers (Liu, et al., 2002). This type of method should be regarded as a complement to other, more accurate, valuation method, to give a range approximation of what the value should be, but not to be solely reliable on that value (Fernández, 2001). Furthermore, it provides a useful analysis of the performance of the company in comparison to its competitors, as well as which companies the market believes capable of creating more value (Koller, et al., 2010).

By way of explanation, given the price of comparable assets (the peer group), we can look at a common measure to evaluate its price (the multiples).

2.2.1. Peer Group

A peer group is a selection of companies similar to the one that is being the object of the valuation, which can be somewhat problematic to define, as it is not clear which characteristics should be taken into account. An ideal peer group should include firms with similarity in the following features: industry, size, diversification (number of business segments in which the firm operates), financing constraints, operating leverage, and growth options (Albuquerque, 2009). However, Albuquerque further argues that empirical evidence suggests that some of these are not independent from one another, as, for instance, small firms tend to be less diversified, have greater financial constraints and less operating leverage.

One other approach to achieve a peer group is using statistical techniques. (Bhojraj and Lee, 2002) argues that by using a regression estimation it is possible to create a model that captures the key theoretical constructs of growth, risk and profitability, where the dependent variable is the chosen multiple to study and the firm's characteristics are the explanatory variables. Using this technique, one is able to generate a "warranted multiple", retrieving a weight for each characteristic that are then applied to the firm, that is, producing a "artificial" multiple for each firm based on the regression estimates and then rank the firms according to their "warranted" multiple. To conclude, the set of comparable firms would be those whose "warranted multiples" are closest to that of the target firm.

(Damodaran, 2007) states that there are shortcomings of using these statistical techniques, as applying regression techniques to multiples may result in odd results as the distribution for multiples' values across the population is not normal. Furthermore, as stated above, it may not be the case that the variables used as explanatory variables are independent as they are supposed to be, creating a multicollinearity problem thus affecting the explanatory power of the regression. Finally, the distribution for multiples change over time, so a regression that uses observations during a certain period of time may not be useful when valuing stocks later on in time and actually lose predictive power as it ages.

According to (Koller, et al., 2010) one should first consider peers operating in the same industry, as they will have similar risk profiles and consequently similar costs of capital. Then, a second sort by growth rates and return on invested capital (ROIC) should be applied, as those typically vary within an industry, thus abridging companies with the same level of performance. He further argues that a mistake often made is to compare a firm's multiple with an average multiple of the other firms in the industry, as one should factor in that firms that have an edge within an industry, i.e. superior performance, will trade at higher multiples. Hence, it is important to comprehend the value drivers of the industry and understand the operational and financial specifics of the firms to form an appropriate peer group.

2.2.2. Multiples

To utilize multiples to value firms, these need to be standardized by a common variable, such as earnings, cash-flows, book value or revenues. Depending on the chosen variable and its features, relative valuation can be based on two types of multiples, with a similar reasoning to the abovementioned approaches: either based on the company capitalization (equity value) or based on the company's value (enterprise value). The following tables present the most commonly used multiples (Fernandez, 2001):

Price Earnings Ratio

Price to Cash Earnings

Price to Sales

Price to Levered Free Cash-Flow

Price to Book Value

Price to Customer

Price to Units

Price to Output

Table 1 - Multiples based on capitalization

Enterprise Value to EBITDA

Enterprise Value to Sales

Enterprise Value to Unlevered Free Cash Flow

Table 2 - Multiples based on the company's value

Another choice that must be made is whether to use historical, current or forward-looking values when computing a multiple. According to (Koller, et al., 2010) one should use forward-looking multiples due to the principles of valuation and if no reliable forecasts are available the author recommends relying on the most recent past data possible and eliminate one-time events. Also, empirical evidence suggests that forward-looking multiples are more accurate than historical ones (Liu, et al., 2002).

The most widely used multiples are the Price Earnings Ratio (PER) and the Enterprise Value to EBITDA (EV/EBITDA) (Fernandez, 2001). (Koller, et al., 2010) recommends the usage of EV/EBITDA to the detriment of PER, mainly because PER multiples are affected by the capital structure and not just the operating performance, which can be manipulated (increased) by swapping debt for equity, so one must use it in stable companies (with a small growth) where surprises are not expected. Moreover, a second problem with PER multiples is that earnings may include one-time events, such as restructuring charges and write-offs, and other nonoperating items, which can be misleading. Thus, one should use enterprise value multiples as they are less susceptible to be manipulated and successfully integrate the key value drivers of operating performance, the ROIC and growth. Despite the superior advantage of using

EBITDA instead of earnings when calculating multiples, there are some non-operating items that also require adjustments, such as excess cash and operating leases.

2.3. Option Pricing Theory

In valuation, not considering the options contained in a project might cause an undervaluation of it. Managerial flexibility can have value, since managers can adjust their plans and strategies, which is not considered in a DCF approach. For instance, the standard DCF model framework understates the value of equity in firms with high financial leverage and negative operating income, as it does not have into account the option equity investors have to liquidate the firm's assets (Damodaran, 2005).

Furthermore, (Fernández, 2001) states that the DCF framework does not work when valuing a firm or a project that provides some type of future flexibility, that is, real options are present. Real options exist in an investment project when there is flexibility of actions, that is, there are several future possibilities for action and the solution of a current uncertainty is known. One can have many types of real options, such as: options to exploit mining, oil concessions, options to defer, expand or abandon investments, among others. Hence, option pricing theory can be useful to use when valuing commodity-based businesses, whose value depends on the underlying asset price, respective variance and options' lifespan.

The main two methods in valuation using options, are the binomial model and the Black-Sholes model. Both models require estimating and discounting the future cash-flows contingent on future states of the world and management decisions (Koller, et al., 2010). The second one is more useful for commodity risk, but has some drawbacks, as it relies on the assumption that it is possible to create and replicate a portfolio with the same characteristics as the option, as well as it implies the expected value of the cash-flows to be discounted at the risk-free rate (Fernández, 2001). Fernández further argues that another mistake inherent of this approach is the belief that the value of options increase when interest rates increase, which is wrong, since the negative effect caused by the increase in interest rates on the present value of cash-flows is greater than the positive effect of the reduction of the present value of the exercise price.

2.4. Literature Review Conclusion

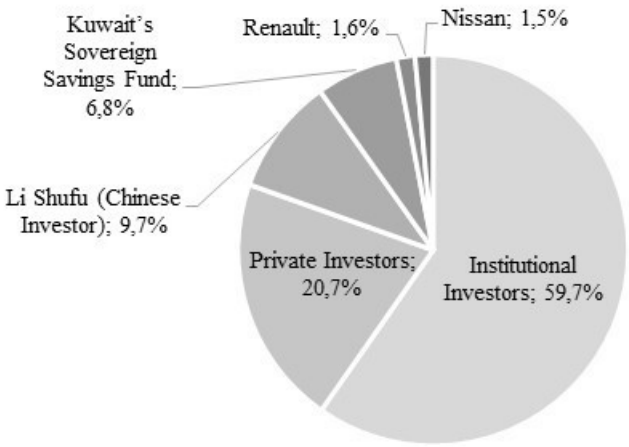
To perform an evaluation of Daimler the chosen models were the DCF, DDM and Relative Valuation. First, the DCF is the most used model and the one that most reliably can represent the true value of the firm, as it relies solely on cash movements. Then, to have a better sense of what values are reasonable, relative valuation is going also to be performed, to serve as a benchmark. Finally, and once Daimler has reported that intends to have a pay-out ratio policy of around 40% (the average of the last 5 years is 38,2%), the DDM is also a valid approach to be taken.

3. Company Overview

Daimler AG, the parent company of the Daimler Group, is an automotive manufacturer headquartered in Stuttgart, Germany, that develops, produces and distributes cars, trucks, vans and buses worldwide through over 8,500 sales centers. It has a workforce of more than 289,000 people, with historical roots that go back in time for more than 130 years.

The chairman of the board of management is Dr. Dieter Zetsche, who has been a member of the board since December of 1998 and leading the company since 2006, after the demerger with Chrysler AG. The remuneration structure of the board is divided into three components, base salary (30%), short-medium term performance goals (30%) and long-term performance goals (40%), where board members are obliged to hold part of their remuneration in company shares, thus creating incentives to secure Daimler long-term success.

Figure 1 - Overview by ownership



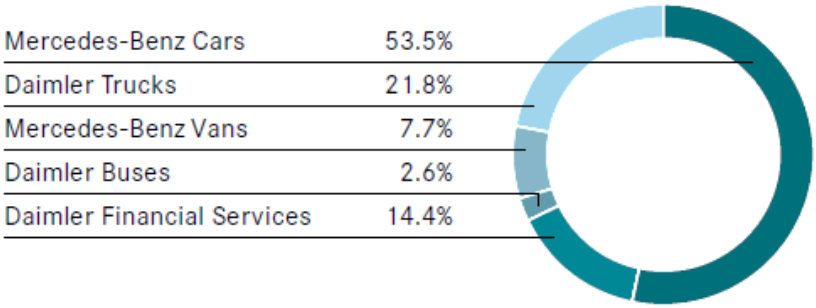
Source: Daimler Website

The ownership structure is rather diluted, with no shareholder holding a significant position, as seen in figure 1 above. As of December 2018, Daimler has 1.070 billion free floating shares, each giving 1 voting right. The firm shares are listed at the Frankfurt and Stuttgart stock exchanges and are part of the DAX 30 and the European Stoxx 50 indexes.

3.1. Business Model

The group is divided in five business segments: Mercedes-Benz Cars, Daimler Trucks, Mercedes-Benz Vans, Daimler Buses and Daimler Financial Services. In 2018 had a total revenue of €167.4 billion, a 2% increase regarding the previous year.

Figure 2 - Daimler's 2018 revenue by division (total of €167 billion)



Source: Daimler Annual Report 2018

Mercedes-Benz Cars

The division with the foremost relevance in the group revenues is the Mercedes-Benz Cars, that comprises the supply of premium automobiles under the brands Mercedes-Benz, Mercedes-AMG and Mercedes-Maybach. It also includes the new electric mobility brand EQ, to be launched in the next couple of years, as well as the urban brand Smart. The company is best known for this division, which is the leader in its segment for the third consecutive year (2016-2018), with unit sales of more than 2.3 million vehicles in 2018, being China (28% of the unit sales), United States (14%), Germany (14%) and other European markets (28%) their core markets.

Daimler Trucks

Daimler is also the world's largest producer of trucks above 6 metrics tons, that are comprised by the brands Freightliner, Western Star, FUSO and BharatBenz. Due to the similarities in production technology with trucks, the FUSO brand is also in charge of part of the production of buses. Regarding the main sales markets for this segment in 2018, those are the NAFTA region (37% of the unit sales, where most of the production facilities are located,

with 14 of the 26 in total), Asia (32% of unit sales) and EU 30 region (European Union, Switzerland and Norway, with 17% of sales).

Mercedes-Benz Vans

In this segment Daimler besides offering commercial solutions with the Sprinter large van, the Vito mid-sized van and the City urban delivery van, also targets the private costumer segment, with the Marco Polo camper van and more recently, in November 2017, launched the X-Class, which is the first premium pickup in its segment. This division has manufacturing facilities distributed worldwide, and its main region of sales is the EU 30, accounting for 66% of the division sales in 2018.

Daimler Buses

Daimler is the market leader when it regards to buses, more specifically above 8 metric tons, under the Mercedes-Benz and Setra brands. The core markets are the South-American and European ones, generating both almost 70% of the division revenue and in those regions are also located the 14 production facilities.

Daimler Financial Services

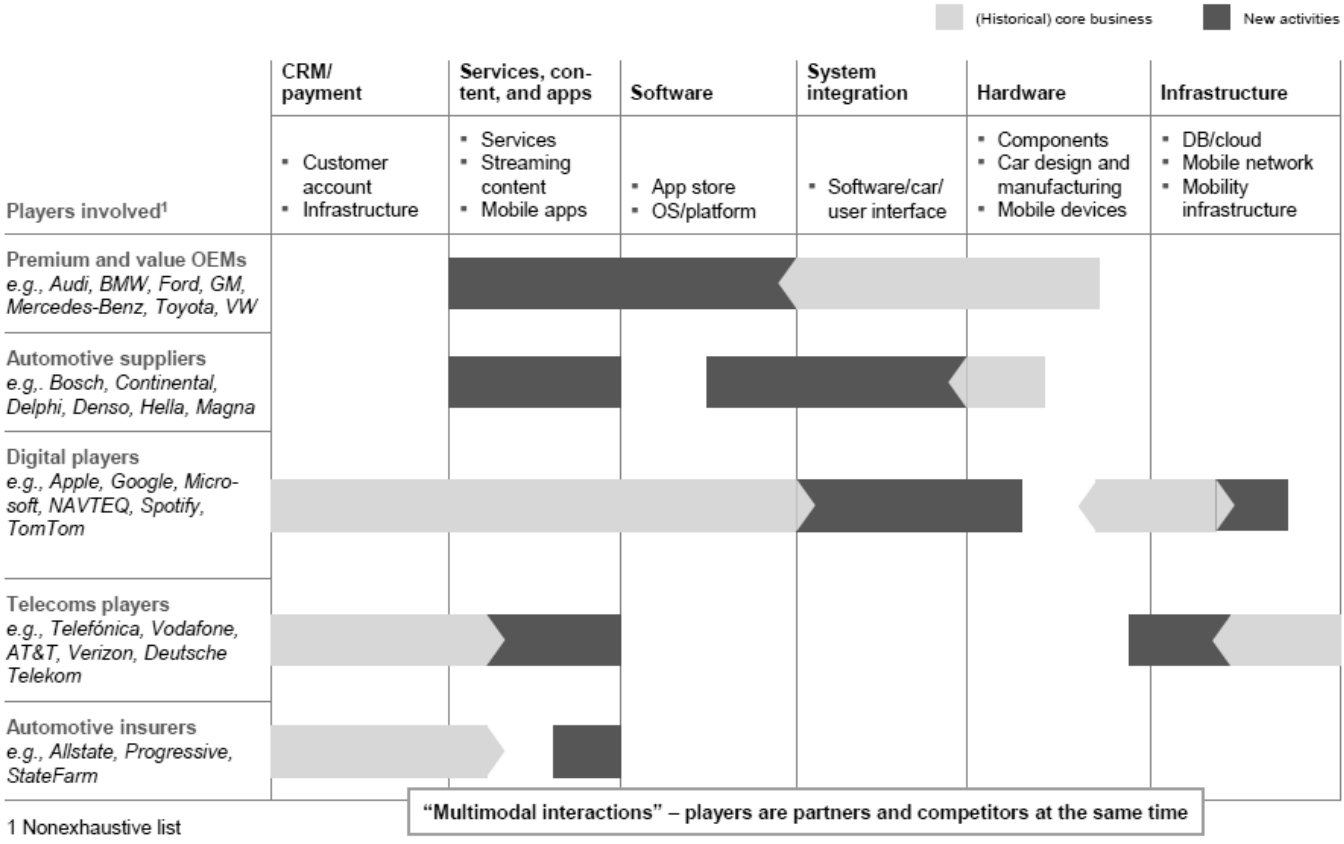
This division of Daimler provides financing and leasing solutions to end costumers, as well as insurance brokering, fleet management services and investment products. Furthermore, it is also responsible for several mobility services as the Moovel mobility platform, the Mytaxi app and the Car2go, the world's leading car-sharing business. This division supported roughly 50% of the vehicles sold by Daimler in 2018 with their leasing and financing plans.

3.2. Sector Outlook

The automotive industry is being transformed by disruptive trends, that are going to shape our mobility in the near future. Digitalization is shifting original equipment manufacturers (OEMs) business model to providers of mobility services, and other non-traditional players are extending their business into the "connected car", as it is represented in figure 3.

These technology-driven changes are being propelled by fast growing emerging markets such as China (which is the single biggest market for Daimler's cars), the accelerated use of digital solutions and changing consumer preferences towards urban mobility. Hence, the trends one can expect in the automotive sector are autonomous driving, connectivity, diverse mobility and electrification, with total industry revenues amounting up to €6.7 trillion by 2030 (McKinsey, 2016). The combination of these four factors is expected to cause a revolution in the industry, and thus request a lot from an investment perspective.

Figure 3 - Repositioning of several companies due to digitalization, with interest in the "connected car" product



Source – McKinsey

Following this line of thought, Daimler has demarcated four strategic pillars in their growth strategy, they named as "CASE": Connected, Autonomous, Shared and Electric, referring to the future fields of driving experience. These fields go hand in hand as they are interdependent. For instance, for autonomous driving to be possible, or ride-sharing to be efficient, it is necessary to have a vast software infrastructure that connects people and vehicles on the road.

For a better understanding of each one of these four pillars, please refer to Appendix 9.1.

3.3. Risks and Opportunities

Similar to every other business, risks and opportunities for Daimler will change according to supply and demand shifts. On the demand side, that is the consumer side, the main influences are the macroeconomic environment, political impacts, such as regulation and fiscal measures, and the industry specific demand already analysed above. As for the supply side one as to count with the production inputs, where the price of commodities like steel play a major role, among others.

This sector is cyclical and capital-intensive, and notwithstanding of having a solid reputation worldwide, Daimler faces rigid competition in all its segments, so it is of the outmost importance to keep investing in innovation. To assure their competitiveness, research and development expenses have been increasing for Daimler and accounts roughly of 5% of its revenues. By being one of the early adopters of new technology into the automotive space, Daimler is assuring to create a stronger customer base, strong technical and commercial legacies that will translate into higher revenues in the future, maintaining its pole position as the premium cars market leader.

A great part of Daimler's revenue is generated in the US (as seen in figure 4), and the current expansive fiscal policy could translate into a stronger growth in that area, boosting demand mainly of Mercedes-Benz cars and Financial Services segments. On the other hand, this could worsen the US debt situation, making the Federal Reserve to increase interest rates to offset inflation, thus increasing lending rates and decrease investment.

One other crucial area of business for Daimler is China, an emergent market, where it is reported that a new billionaire is arising every 5 days, thus, even though the automaker industry is a mature one, Daimler still has a great area of growth to cover in emergent markets, mainly in China, and the introduction of new electric vehicles will open the doors for more business opportunities. Nevertheless, as it operates almost worldwide, Daimler geographic risks are diversified and hence not exposed to any region conditions in particular.

Figure 4 – Daimler's revenue by region

In millions of euros	2018	2017[1]	18/17 % change
Daimler Group	167,362	164,154	+2
Regions			
Europe	68,496	68,309	+0
thereof Germany	24,802	24,311	+2
NAFTA	47,952	46,528	+3
thereof United States	41,152	40,076	+3
Asia	40,627	39,090	+4
thereof China	19,790	18,774	+5
Other markets	10,287	10,227	+1

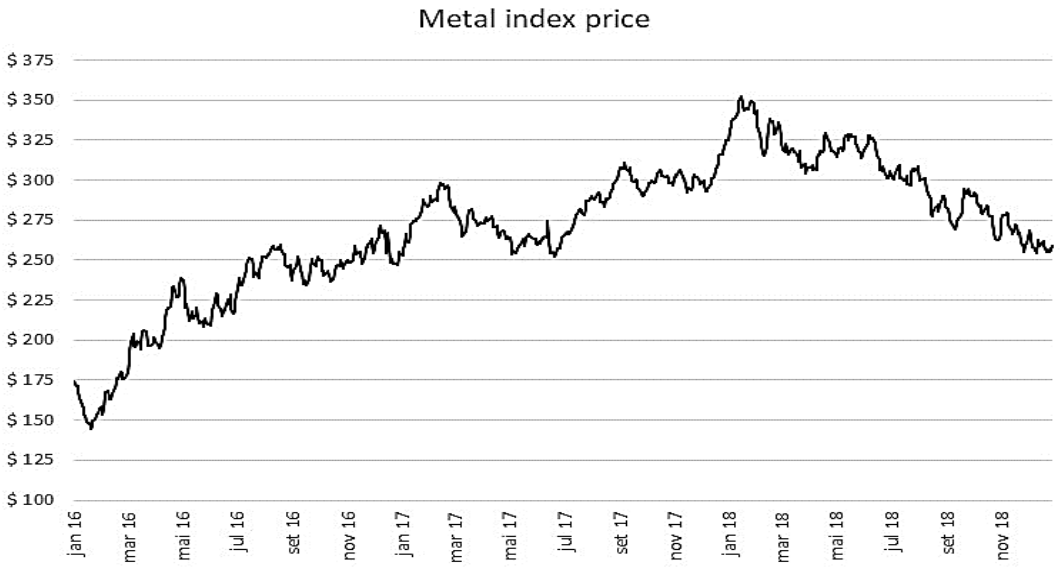
Source: Daimler Website

Competition is also expected to increase, as connectivity becomes part of a vehicle, it is expected that tech companies start to deviate part of their business to the automotive industry, being one more competitor and taking a slice of the market share and revenue stream. However, the higher complexity regarding the technological future of the industry will mandate that incumbent players to be both competitors and to cooperate, sharing multiple infrastructures to reducing production costs. Regarding the competition coming from new mobility services, as ride sharing, this may result in a decline of private vehicle sales. Daimler decided to capture this new market, creating new brands, thus transforming this risk into more opportunities to create value.

There are some risks regarding production. On the one hand, additional costs can arise from unionized labour demands. On the other hand, raw material prices have featured some volatility in the past and price fluctuations will have an impact on overall economic profitability. The main ones used in the automotive sector are metals such as steel and aluminium, plastic and glass. Aluminium is lighter than steel (which still is the more used commodity in the production) and is being used as its substitute since it helps improve the fuel consumption, due to the emissions standards increasing regulation, but it is more expensive. Consequently, the price of metals will largely influence production costs, where raw materials are reported to be roughly 50% of manufacturing cost of vehicles (source: Statista).

As a proxy for the price evolution of metals, please note the figure 5 below where the quotes of the Thomson Reuters Global Metal & Mining Index are presented. For the year of 2018 one can notice that there is a continuing decreasing trend, thus decreasing (or at least keeping constant) manufacturing costs. Also, Daimler is hedged against such commodities market risks (source: Daimler Website), being expected the overall cost to be constant over the next years.

Figure 5 – Price quote of Thomson Reuters Global Metal & Mining Index (Jan16-Dec18)



Source: Thomson Reuters

Finally, costs relating to complying with new regulation, mostly regarding emissions, as discussed above, will represent a significant increase in risks, as noncompliance will reveal to be very costly.

3.4. Macroeconomic Outlook

From being a premium brand in its main segment, Daimler is less exposed to recessions as wealthier costumers spending is less sensitive to markets downturns. Also, it can pass more easily the burden of inflation (or new tax increases) to the consumer side due to this rigid demand. Nevertheless, in a cyclical sector, and since it is a long lasting good, demand should be higher in periods of expansion and the opposite in periods of recession.

In 2018 there was a decrease in automotive stocks performance, comparing to the previous analogous period, and Daimler was no exception. This fall has several causes, as there is an increasing geopolitical tension in several regions of the globe, beginning in an ongoing trade

dispute and subsequent punitive tariffs, mainly driven by the US government protectionist measures and countermeasures from China. This affects not only global demand, but also puts additional pressure on commodity prices, where exporters are starting to face a lower demand in China. Furthermore, the Brexit negotiations and Italy's high national debt also had a negative impact on global stock markets and contributing to a rise in downside risks in global growth for the last semester of 2018.

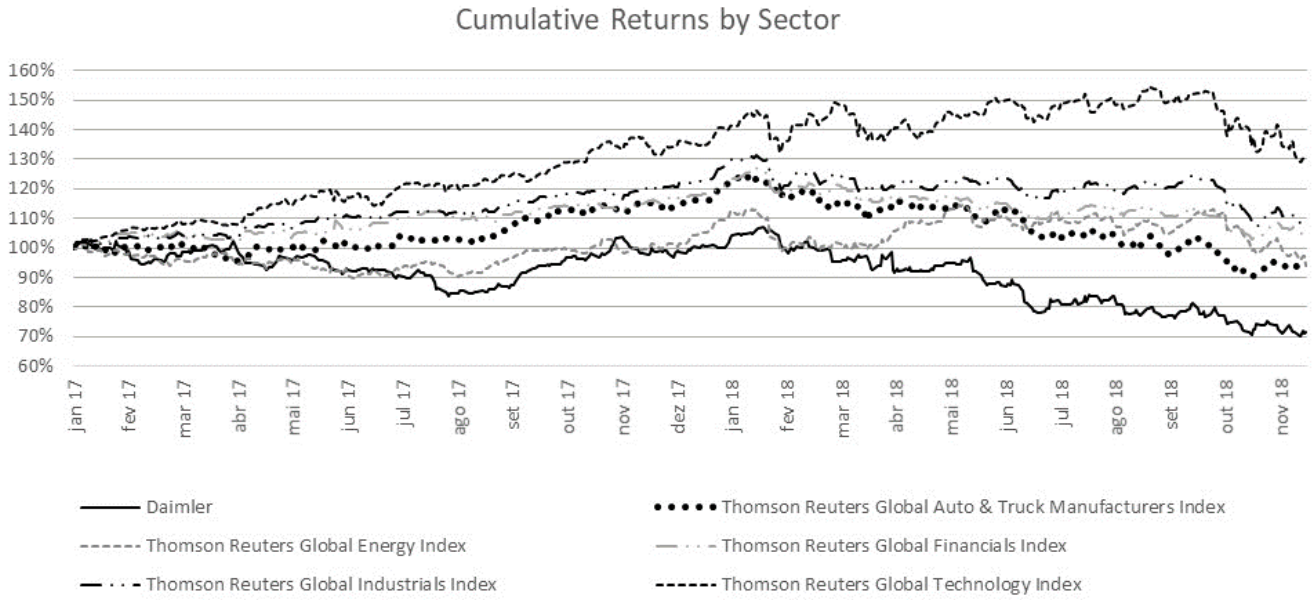
In the USA, one will see a continuation of the tariff action on steel and aluminium, creating barriers for Daimler production, as well as the expansionary fiscal stimulus, which could give rise to unexpectedly high inflation, thus generating a stronger-than-anticipated monetary policy response, making the Federal Reserve to increase interest rates to offset inflation, where one would see increasing lending rates and decrease investment. One can expect a slowdown in USA growth from 2020, as the fiscal stimulus begins to unwind, being the expansion at its peak for the country. Advanced economies had a 2.4% growth in 2018 and are expecting to have a 2.1% in 2019 and 1.7% in 2020 (source: IMF).

In emerging markets, namely in Asia, medium-term prospects continue to be positive, with margins for steady growth, with expected increased capital flows from economies that are starting to stagnate or where expansion may have peaked. However, growth is expected to be lower in 2019, result of the trade measures. China GDP growth is of 6.6% and 6.2% (projected), for 2018 and 2019 respectively.

Following the rational above, the International Monetary Fund (IMF) stated that the prospects for the future remain optimistic, with the continuation of the steady expansion since mid-2016, and while financial market conditions remain accommodative in advanced economies, they could tighten rapidly if trade tensions and policy uncertainty intensify. The growth rates for global GDP have been revised, projected at 3.7% for 2019.

It is clear, as one can observe in figure 6, that in the past year and a half Daimler stock is underperforming comparing to the overall auto industry, which in turn is also one of the worst performing industries for 2018, contrasting to the upward momentum (also confirmed by increasing sales and revenue growth) for the last 10 years, since the subprime crisis in 2008. The performance was capture by using as a proxy the returns of the Thomson Reuters indexes for each industry.

Figure 6 – Proxy of industry performance compared with Daimler's returns



Source: Thomson Reuters

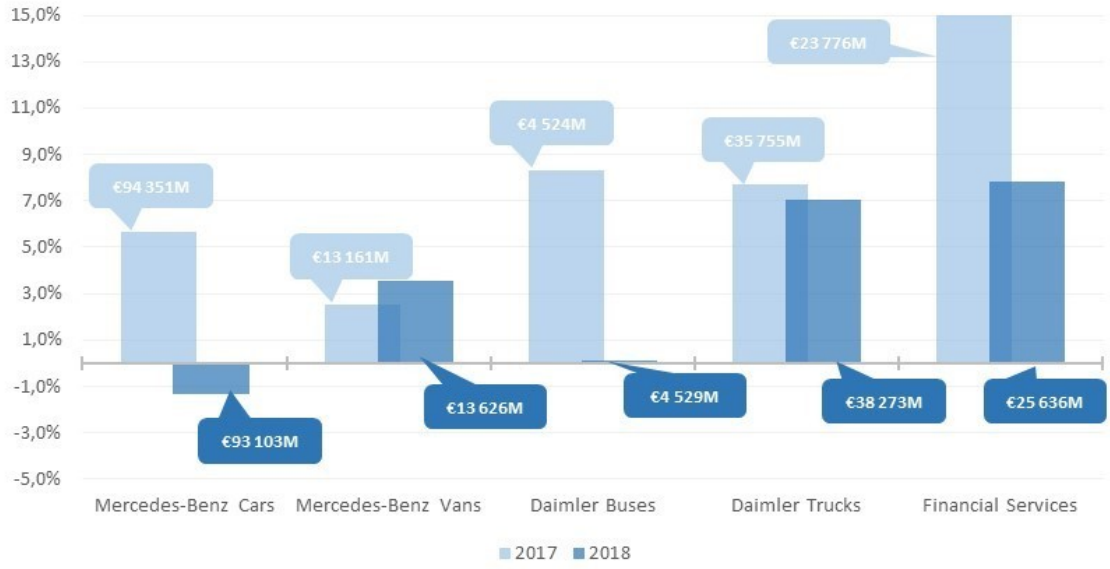
3.5. Business Development

Daimler's revenues and unit sales have been in an upward momentum for the last 10 years, since the Financial Crisis. However, for 2018, there was a small drop both in sales and revenue in the segment of Mercedes-Benz Cars following the slowdown of world economy, whereas the other segments continue to grow, but in a subdued way, comparing to the previous years (please see figure 7 and 8 below).

While in 2017 one could see a clear continuation of growth in sales, closely accompanied by a growth in revenue for all segments, the poorer demand in 2018 resulted in a decrease in performance for Mercedes-Benz Cars. This had several causes, beginning with an increased concern by consumers towards the auto industry with the introduction of the WLTP certification procedure. Then, in China, the largest market of this segment, sales were weaker due to the discontinuation of tax incentives for buyers of new small cars.

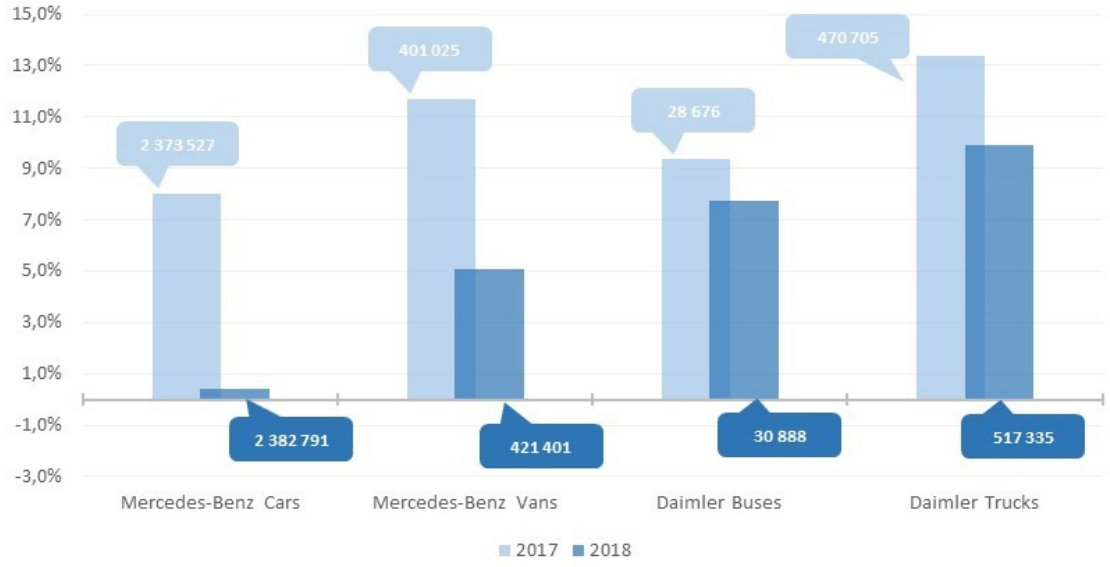
All the other segments, as shown in figure 8, had positive but smaller, growth in sales. This is in line with the stated above regarding world demand, where the economy reached its peak and stagnated in the second half of 2018.

Figure 7 – Daimler's revenue growth by segment (revenue in absolute values is shown; historical period)



Source: Daimler Annual Report 2018

Figure 8 – Daimler's unit sales growth by segment (absolute value is shown; historical period)



Source: Daimler Annual Report 2018

4. Discounted Cash Flow Valuation

To compute the forecasts, historical figures were used for the last 3 years (2016, 2017 and 2018) as basis for the estimation. Daimler adopted new accounting standards (IFRS 9 and IFRS 15) in the beginning of 2018, and full adjusted financial figures were provided since 2016, enabling the comparison only from this date onwards. The introduction of IFRS 15 results in changes to revenue recognition, whereas IFRS 9 affects the recognition and measurement of financial instruments. Furthermore, as the auto industry has been renovating its characteristics, with the introduction of new regulations and innovative products, 3 years seems a reasonable time span, expected to have incorporated in its figures this recent industry changes.

The explicit period chosen was six years, as amongst the industry literature reviewed – for instance (McKinsey, 2016) – it is identified a revolutionary period towards 2030 in the automotive industry, and consequently a big need for investment up to 2025. This is also a consequence of 2025 being the year where the diesel vehicles are going to start to be banned from circulation.

4.1. Revenue Growth

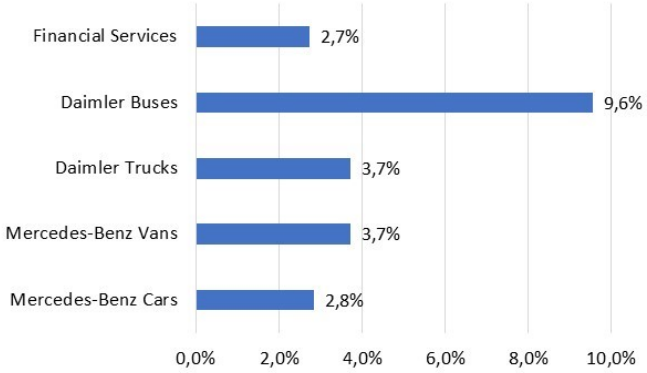
Regarding the computation of the revenues for Daimler, it was done a sum of the parts (appendix 9.2.). This was done individually for each one of the segments, since different segments show different growth rates.

For the forecasted years, the assumptions were made individually for each segment, following the rational that different segments will have different growths. The revenues forecast was done by using estimates of future unit sales for the operational segments, given Daimler is going to keep its market share on the segments as the markets grow. Consequently, other assumption needed is that the relation between unit sales and revenue is also going to be perpetually constant for each segment. Both relations are stable as seen in the table of the appendix 9.2.

In regards of the outlook for trucks, as different information was available (market growth instead of market sales), it was used the market growth as the starting point, where it is expected a market CAGR of 3,1% in unit sales until 2024, with Daimler maintaining the lead position

(source: IHS Market). This value was used as growth base for the unit sales, despite of Daimler having a far greater growth in the last 3 years. This market is very volatile and thus a reasonable approach should be taken.

Figure 9 – Revenue CAGR by segment (resulting in a total revenue CAGR of 3.3%)

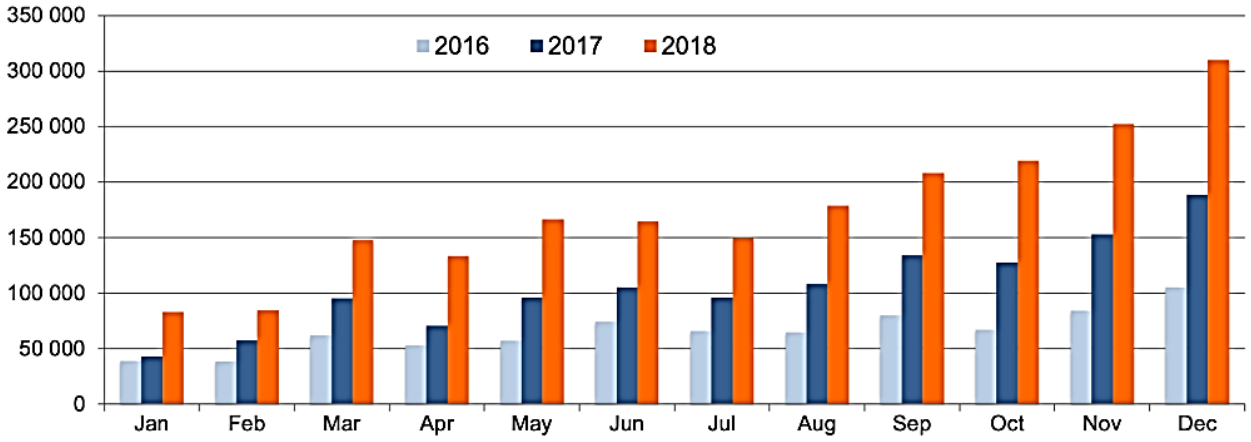


Source: Own estimates

Financial Services are expected to grow at a CAGR of 2,7% 2018-2024, following the overall average relative sales of group units. The source for the forecast of car sales was Statista. For the vans, represented as commercial vehicles, was OICA (International Organization of Motor Vehicle Manufacturers).

Analysing each segment individually, Mercedes-Benz cars and vans are expected to generate a revenue CAGR of 2.8% and 3.7% respectively until 2024. This dissertation is of the opinion that the ban in diesel vehicles will not have an impact in the overall market sales, since electric and hybrid vehicles will be a key driver of industry growth.

Figure 10 – Global monthly sales evolution of plug-in



Source – EV Volumes Website (Electric Vehicle World Sales Database)

Furthermore, this increase in sales is in line with the thought that Daimler is going to have a major role in the market revolution to come, where it is going to present several new hybrid and electric models, and even creating a whole new brand to face this new demand (please note the sales evolution in figure 10, where it is possible to see a substantial rise in hybrid vehicles sales).

China is probable to maintain the role of biggest market for Mercedes-Benz' cars, as they are also one of the biggest investors in new technology, proven by the recent investments of Daimler in R&D and new factories in this location and more yet to come in the next years (already have settled the construction of a new electric batteries factory for €145 million, adding to the more than one billion spent in R&D only in China in the last few years).

This location will also be a key one in Daimler growth, since in 2018 Daimler has lost some momentum due to the increase in import taxes and the discontinuation of the tax incentives to buy new small cars, thus will be important to establish and increase the number of car dealerships there.

Although Daimler buses are estimated to grow at a CAGR of 9.6%, its revenue does not have a meaningful impact in the overall growth, being less than 4% of total revenues.

One important note in the revenue forecasted taken into account in the end was the group revenue reconciliation, comprising elimination of intra-group transactions, that should not be taken into account. This is also shown in appendix 9.2.

4.2. Cost of Revenue

Daimler's cost of revenue has been constant throughout the years, as one can verify in figure 11, with a weight of circa 80% of revenues. Following the idea that Daimler can obtain raw materials at a fairly constant price, hedging against fluctuations, this weight was kept constant for the estimation period, using an average of the historical period.

Figure 11 – Daimler's historical and estimated cost of revenue

(in millions of euros)	2016	2017	2018	f2019	f2020	f2021	f2022	f2023	f2024
Revenue	153 261	164 154	167 362	173 297	178 712	184 444	190 379	196 524	202 888
(-) Cost of Revenue	121 298	129 626	134 295	137 686	141 988	146 543	151 258	156 140	161 196
Gross Profit	**31 963**	**34 528**	**33 067**	**35 611**	**36 724**	**37 902**	**39 121**	**40 384**	**41 692**
Historical Weight of Cost of Revenue	79,1%	79,0%	80,2%	79,5%	79,5%	79,5%	79,5%	79,5%	79,5%

Source: Daimler Annual Report 2018; Statistical analysis

Although one can argue that with the arrival of electric technologies the cost of production is expected to increase – McKinsey has estimated that the cost of producing an electric vehicle is, on average, higher in €12.000 than one of internal combustion engine - one should also note that this is going to be offset by higher revenues, having a nil impact when combining both factors, keeping gross profit fairly stable in percentage.

4.3. Other income statement assumptions

Other important assumptions regarding the income statement refers to forecasting general and administrative expenses, research and development costs (R&D) and the tax rate to be used. Since historically the weight of general and administrative expenses has had a clear linear relationship with revenue, that percentage was kept constant for the years to come. Regarding R&D, Daimler has stated that intends to spend close to €10b in the forthcoming years, thus the average growth rate for the historical period was kept until that level reached circa 5%, then kept constant for the remaining years, totalizing €10b in 2024. Finally, an average of the historical periods tax rates was used in the computations. Full income statement estimation is in appendix 9.3., where the remaining captions were computed as an average of the historical period, since their significance is also very low (for instance, other income and interests).

Figure 12 – Daimler's historical and estimated main income statement items growth

Historical | Forecast	2016	2017	2018	f2019	f2020	f2021	f2022	f2023	f2024
Weight of expenses	10,2%	10,2%	10,2%	10,2%	10,2%	10,2%	10,2%	10,2%	10,2%
Weight of R&D	3,4%	3,6%	3,9%	4,2%	4,5%	4,9%	4,9%	4,9%	4,9%
Tax rate	30,1%	24,0%	28,4%	27,5%	27,5%	27,5%	27,5%	27,5%	27,5%

Source: Daimler Annual Report 2018; Statistical analysis

The trends above mentioned and expected to reshape the market will demand greater R&D expenses and Daimler has stated it expects to be a market leader, thus the need for innovation and producing better and more efficient vehicles, even on the level of in-car content.

In this way, Net income is expected to reach €8/9 billion, with the R&D expenses having a substantial weight until 2024. After this period, one might argue that the need for R&D should be lower, retrieving a higher EBIT in the years to come.

4.4. Free Cash Flow to the Firm

To arrive to the FCFF one must account with all the reinvestment needs, thus being necessary to estimate future capital expenditure and net working capital needs, as well as depreciation and amortization expenses.

Figure 13 – Estimation of Daimler's FCFF

(in millions of euros)	2 016	2 017	2 018	f2019	f2020	f2021	f2022	f2023	f2024
EBIT	12 890	14 335	11 117	12 639	12 377	12 082	12 405	12 740	13 088
Tax rate	30,1%	24,0%	28,4%	27,5%	27,5%	27,5%	27,5%	27,5%	27,5%
(+) EBIT * (1 - tax rate)	9 005	10 897	7 956	9 161	8 971	8 757	8 991	9 234	9 486
(+) D&A	-	3 092	6 846	5 414	5 815	6 245	6 707	7 203	7 737
(-) CAPEX	10 701	10 158	8 833	10 657	10 009	9 390	8 804	8 252	7 737
(-) Changes in NWC	-	-	3 306	1 608	975	1 033	1 069	1 107	1 146
FCFF	-	-	**2 663**	**2 310**	**3 802**	**4 579**	**5 825**	**7 079**	**8 339**

Source: Daimler Annual Report 2018; Statistical analysis

4.4.1. Depreciation and Amortization

The caption of Depreciation and Amortization can be estimated using several methods according to (Koller, et al., 2010). Firstly, one can estimate depreciation as a percentage of revenues, a percentage of the net property, plant and equipment (PP&E) or based on equipment purchases and respective depreciation schedules if one knew beforehand the assets to be purchased. In this dissertation the method used was to estimate future periods PP&E along with the revenue growth rate and then to compute depreciation as a percentage of it (used the rate of the last year of the historical period to achieve a more accurate result). Same method was used to estimate amortization (of intangible assets).

Figure 14 – Estimation of future depreciation and amortization expenses

(in millions of euros)	2 016	2 017	2 018	f2019	f2020	f2021	f2022	f2023	f2024
Intangibles - net	10 910	12 620	13 719	14 914	16 212	17 624	19 159	20 828	22 641
Accumulated Intangible Amortization	(7 437)	(8 191)	(9 616)	(10 453)	(11 364)	(12 353)	(13 429)	(14 599)	(15 870)
Amortization		(754)	(1 425)	(837)	(910)	(990)	(1 076)	(1 169)	(1 271)
Property/Plant/Equipment, Total - Net	73 323	75 055	80 424	86 177	92 342	98 947	106 025	113 610	121 737
Accumulated Depreciation, Total	(56 224)	(58 562)	(63 983)	(68 560)	(73 464)	(78 720)	(84 351)	(90 385)	(96 850)
Depreciation		(2 338)	(5 421)	(4 577)	(4 904)	(5 255)	(5 631)	(6 034)	(6 466)

Source: Daimler Annual Report 2018; Statistical analysis

4.4.2. Capital expenditure and changes in Net Working Capital

Future capital expenditures (capex) computation was based on the average percentage to revenues of the historical period, maintaining that ratio for the first forecasted year. Its evolution was divided between reposition capex and expansion capex, assuming Daimler will be in expansion until 2024. The decrease in expansion capex was done in a linear basis. The reason behind this rational is that Daimler has a big need for expansion investment, as explained in the beginning of this chapter, until it reaches steady state in 2025. Thus, the assumption that D&A will offset capex, related to a stable company is met only in the end of the explicit period.

Investment in working capital were computed based on the assumption that the ratios Days Payables Outstanding (DPO), Days Sales of Inventory (DSI) and Days Sales Outstanding (DSO) would be kept constant as the last year of the historical period.

Figure 15 – Estimation of the inputs for future net working capital

(in millions of euros)	2 016	2 017	2 018	f2019	f2020	f2021	f2022	f2023	f2024
TR days	25	27	27	27	27	27	27	27	27
Inventory days	76	72	80	80	80	80	80	80	80
TP days	35	35	39	39	39	39	39	39	39
Trade receivables	10 614	11 995	12 586	13 032	13 440	13 871	14 317	14 779	15 258
Inventory	25 384	25 686	29 489	30 234	31 178	32 178	33 214	34 286	35 396
Trade payables	11 567	12 451	14 185	14 543	14 998	15 479	15 977	16 492	17 026

Source: Daimler Annual Report 2018; Statistical analysis

Other assets comprise deferred tax assets and tax refund claims, whereas other liabilities comprise deferred income, tax liabilities and deferred taxes. Thus, it is also necessary to

compute changes between the years, as it is going to affect the NWC. Its evolution was done as a function of revenues, maintaining the 2018 ratio to revenues.

The computation explained above resulted in the following figures for capex and net working capital (changes in trade working capital, other assets and other liabilities):

Figure 16 – Estimation of Capex and Net Working Capital

(in millions of euros)	2 016	2 017	2 018	f2019	f2020	f2021	f2022	f2023	f2024
Expansion Capex	-	7 066	1 987	5 242	4 194	3 145	2 097	1 048	-
Reposition Capex	-	3 092	6 846	5 414	5 815	6 245	6 707	7 203	7 737
Capex	**10 701**	**10 158**	**8 833**	**10 657**	**10 009**	**9 390**	**8 804**	**8 252**	**7 737**
Trade Working capital	24 431	25 230	27 890	28 723	29 620	30 570	31 554	32 572	33 627
Other assets		9 061	11 025	12 131	12 510	12 911	13 327	13 757	14 202
Other liabilities	-	7 992	9 310	9 640	9 941	10 260	10 590	10 932	11 286
NWC		-	**3 306**	**1 608**	**975**	**1 033**	**1 069**	**1 107**	**1 146**

Source: Daimler Annual Report 2018; Statistical analysis

4.5. Discount rate - WACC

The computation of the weighted average cost of capital is going to closely follow the method described on the literature review of this dissertation. A single WACC was used to discount all the periods since Daimler's intends to keep a credit rating of A, and consequently the preservation of its actual leverage ratios.

4.5.1. Cost of debt

Daimler's cost of debt is best proxied by the yield to maturity on their issued bonds. This way, the bond chosen was a euro 10-year maturity fixed bond, with a current yield to maturity of 1.32% (source: Daimler AG EUR Issuer Curve on Thomson Reuters), with a fair amount of liquidity (low bid-ask spread).

4.5.2. Cost of equity

There are several inputs needed to compute the cost of equity.

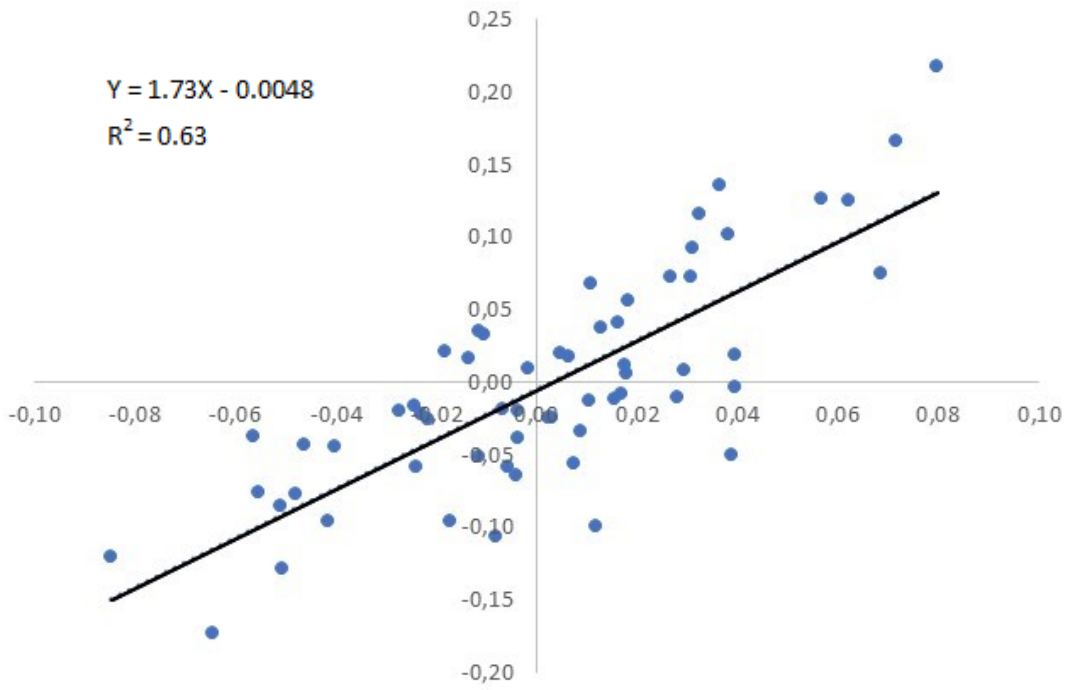
First of all, the risk-free rate. Given that Daimler's a Germanic company with most of investors being European, the appropriate risk-free rate is the German 10-year bund. The 10-

years bunds are currently with a 0.29% yield (source: annual fixed coupon bond of Germany maturing in 15/02/2029 on Thomson Reuters).

The levered beta for Daimler (systematic risk in comparison with the market) is computed by regressing its returns on market returns (change in quoted price). In this case, the market chosen was the Euro STOXX 600, since is one Daimler is part of and is market weighted, with data being retrieved on a five years window, with monthly returns for both.

According to (Damodaran, 1999), a monthly set of returns is preferred to daily or weekly data since these are more likely to be biased due to non-trading matters and have liquidity problems, thus reporting misleading betas. The window chosen was five years since one should choose a timeframe large enough to have plenty of observations, but not excessively large, as firm's characteristics and market conditions change over time. The slope of the regressing Daimler returns (Y) on the Euro STOXX 600 returns (X) retrieved a levered beta of 1.73, with an R-squared of 0.63 and a p-value of 0.00. The prices were retrieved on Thomson Reuters, already adjusted for dividends and stock splits, where computing returns is just the percentage change of prices between the months.

Figure 17 – Regression of Daimler returns (Y) on the euro STOXX 600 returns (X), Jan 2014- Jan 2019



Source: Thomson Reuters quote history; Statistical analysis

Moreover, to have a beta comparison with different data, it was computed the slope of the above-mentioned regression with weekly data on a three-year timeframe, retrieving a beta of 1.33 (R^2 of 46%). Or even, by using a different market index, the DAX 30 index, a beta of 1.46 was achieved, with a R^2 of 77% (the one used by Thomson Reuters). However, since STOXX 600 is a bigger market index, it was the chosen one to serve as benchmark.

Expected market return is arguably one of the greatest debates in the world of finance. According to (Koller, et al., 2010), it is consensual that the market risk premium should be around 5.5%. Damodaran (source: NYU Stern Jan2019 update on equity premium by country) states that the current market risk premium for a German company rated A, like Daimler, is 6%. For the purpose of this dissertation, a value of 6% was used.

Following the cost of equity equation presented in the literature review, a value of 10.7% is achieved.

$$E(R_i) = r_f + \beta_i * [E(R_m) - r_f] \; = \; 0.29\% \; + \; 1.73 \; * \; 6\% \; = \; 10.7\%$$

4.5.3. Market weights - Daimler capital structure

To conclude the computation of WACC it is necessary to know the capital structure to apply on the formula, that is, the market values for debt and equity.

Equity is simple to compute, just having to multiply the market price by the number of shares outstanding. At the time of writing, Daimler had 1.070 billion outstanding shares with a price of €59, resulting in an equity value of €64.1 billion. The following formula was used to achieve a proxy of the net debt market value, like the one reported by Daimler on its annual report of 2018:

$$\textit{Net Financial Debt} = \textit{financing liabilities} - \textit{cash \& equivalents} - \textit{marketable securities}$$
$$= €144.9B - €15.9B - €9.6B = €119.4B$$

Note that financing liabilities already comprise bonds, liabilities to financial institutions, liabilities from financial leases and liabilities from asset backed securities. Bonds represent 53%

of financing liabilities. If one checks Daimler bonds, it verifies they are trading very close to par (source: Thomson Reuters).

However, it is unlikely Daimler to maintain such a leveraged capital structure (figure 18 has the firm capital structure per year), thus one should expect equity ratio to raise. The Auto industry is a cyclical one, where performance has been poor, as demonstrated in figure 6, being this the main reason for this level of the equity ratio. Due to the low level of equity compared with debt, the WACC may be too low compared with the industry standard.

This level of equity to debt is not the optimal capital structure (theoretically, the optimal capital structure maximizes the enterprise value by the trade-off between interest tax shields and distress costs). As Daimler achieves better revenues results, Net Debt should decrease, not only by debt repayment, but also due to higher values of cash & equivalents. Thus, once it was not possible to get management information regarding the target level of debt, it is essential to check the evolution of Daimler's capital structure during the last years.

Figure 18 – Daimler's Capital Structure evolution

(in billions, as 31DecXX)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Net Debt	41,20	40,90	50,60	58,90	59,60	70,10	82,35	95,90	105,20	119,40
Market Cap.	39,80	54,25	36,27	44,19	67,30	73,83	83,03	75,65	75,76	64,10
D/(E+D)	51%	43%	58%	57%	47%	49%	50%	56%	58%	65%
E/(E+D)	49%	57%	42%	43%	53%	51%	50%	44%	42%	35%

Source: Daimler annual reports

One can see that the year of 2018 is an outlier, compared with the last 10 years. Thus, using the median of the last 10 years for the capital structure (excluding the year of 2018), the WACC is 5.9%, rounded up to one decimal place.

$$50\% * 1.32\% * (1 - 0.28) + \ 50\% * 10.7\% = 5.9\%$$

4.6. Terminal Value

To compute the terminal value, it is first necessary to know the perpetual growth rate. As Daimler is a global company, it is necessary to do a weighted average of the countries' GDP growth rate where Daimler's sales are more relevant to use as a proxy of the firm growth rate. To compute the firm expression worldwide, sales of Mercedes-Benz cars were taken as a proxy, since it was the only segment Daimler detailed with sales by country. Perpetual growth rate is hence 2.76%, calculated as at 2023 (IMF estimations).

Figure 19 – GDP forecasted growth rate of 2023 by country; Weighted average by car sales in 2018

	2018 car sales ('000)	GDP growth
China	677,7	5,6%
USA	327,2	1,4%
Germany	323,8	1,2%
UK	171,3	1,2%
Italy	87,4	1,2%
France	76,2	1,3%
Japan	72,6	0,5%
South Korea	68,1	0,6%
Spain	57,2	1,2%
Canada	45,2	1,6%
Weighted average		2,76%

Source: International Monetary Fund

Furthermore, as stated when estimating future capex, one should only compute the terminal value when a firm enters a steady state. This dissertation assumes Daimler will become stable after 2024, when the firm is already fully adapted to the new market demand and trends. Hence, Daimler does not need to keep a high level of investment (capex higher to D&A) to continue to innovate and develop new technologies.

To reflect this, the FCFF of 2025, which is used to calculate the terminal value is computed using the FCFF of 2024 multiplied by the perpetual growth rate, where capex offsets the D&A.

The DCF model can be finally computed as demonstrated in figure 20:

Figure 20 – Calculation of the DCF model inputs and outputs

(*in millions €)	2 018	f2019	f2020	f2021	f2022	f2023	f2024
FCFF*		2 310	3 802	4 579	5 825	7 079	8 339
Terminal value*							272 918
Discount rate		1,06	1,12	1,19	1,26	1,33	1,41
Enterprise Value*	218 774						
Net debt*	119 472						
Equity*	99 302						
Share Price (€)	92,81						

Source: Inputs disclosed before

Using the methodology explained in the literature review, the Enterprise Value concluded is of €218.8B. By assuming the net debt computed before, one arrives at the value of Equity of €99.3B. Since Daimler has 1.070 billion outstanding shares, the implied price is €93. The actual market price is of €59 as of the time of writing, representing an increase of 58% in the estimation compared with the actual price.

4.7. Sensitive analysis

Given the subjectivity of an equity valuation, it is essential to understand the impact of the inputs in the model. Thus, by varying the values of the inputs, according to different assumptions, we can see the potential range of outputs.

The sensitive analysis illustrated in figure 21 varies the discount rate, the WACC, according to different betas, and the perpetual growth rate. For the sensitivity of the betas, the chosen margin was 25% for each end, with increments of 5% in each level until reaching it. Concerning the perpetual growth rate, it is important to understand what the impact of an expansion economy may be and vice-versa, with increments of 0.20 percentage points, for each end.

Figure 21 – Daimler share price as per different perpetual growth rates and different discount rates (WACC)

		1,30	1,38	1,47	1,56	1,64	**1,73**	1,82	1,90	1,99	2,08	2,16	**Beta**
		4,5%	4,8%	5,0%	5,3%	5,6%	**5,9%**	6,1%	6,3%	6,6%	6,8%	7,1%	**WACC**
	1,96%	152,13	126,64	105,47	87,60	72,33	54,97	47,60	37,45	28,44	20,40	13,18	
	2,16%	172,95	143,45	119,29	99,15	82,11	62,91	54,83	43,75	33,97	25,29	17,52	
	2,36%	197,63	163,04	135,19	112,28	93,10	71,75	62,83	50,68	40,02	30,61	22,23	
Perpetual	2,56%	227,37	186,18	153,66	127,32	105,57	81,65	71,75	58,34	46,67	36,42	27,35	
Growth	**2,76%**	263,90	213,92	175,37	144,75	119,83	**92,81**	81,74	66,87	54,02	42,81	32,94	
Rate	2,96%	309,83	247,78	201,29	165,16	136,28	105,48	93,02	76,41	62,17	49,85	39,07	
	3,16%	369,35	290,04	232,74	189,41	155,50	120,01	105,85	87,15	71,28	57,65	45,83	
	3,36%	449,52	344,27	271,71	218,67	178,21	136,83	120,58	99,33	81,51	66,35	53,30	
	3,56%	563,35	416,39	321,28	254,70	205,50	156,52	137,65	113,28	93,10	76,11	61,62	

Source: Inputs disclosed before

Since CAPM was the chosen method to estimate the cost of equity, and the only firm specific input is beta, that was the factor selected to change in WACC. The growth rate chosen when calculating DCF was estimated based on forecasts for the year 2023, assuming Daimler continues to operate and expand in emerging markets, such as China. Since it is a variable with considerable weight in the calculation of DCF, it is important to understand its impact given lower values of expansion for these emerging markets, or, higher levels of growth for the developed ones.

5. Dividend Discount Model

Using a two-stage DDM to value the intrinsic value of a Daimler share, one arrives at a value of €37. To compute this model, the inputs used were the forecasted net income (the same as the DCF model), Daimler's cost of equity of 10.7%, perpetual growth rate of 2.76% and management information that aim to distribute roughly 40% of net income per year in dividends.

Figure 22 – Calculation of the DDM model inputs and outputs

(*in millions €)	2 018	f2019	f2020	f2021	f2022	f2023	f2024
Net income*		8 559	8 369	8 155	8 390	8 633	8 884
Income per share (€)		8,00	7,82	7,62	7,84	8,07	8,30
Dividend per share (€)		3,20	3,13	3,05	3,14	3,23	3,32
Perpetuity (€)							42,98
Cost of equity		1,11	1,23	1,36	1,50	1,66	1,84
Share Price (€)	36,88						

Source: Inputs disclosed before

6. Relative valuation

6.1. Peer group

One of the crucial stages of this methodology is the selection of a proper peer group, as it should contain firms as comparable as possible with Daimler. Bearing this in mind, and following the ideals defined in the literature review, the starting point should be choosing firms within the same industry. Then, one should consider firm size, diversification of business segments, operating leverage and profitability. Firms that do not operate globally or have a narrow spectrum of business, even though they are within the automotive industry, were not considered to be suitable peers.

The initial selection was done with the Thomson Reuters tool, able to select peers within the same sector, operating worldwide as Daimler does. The parameters chosen to perform the analysis of comparable firms were the market capitalization, total debt to equity (capital structure), 5-year monthly beta, operating margin, EBITDA margin and return on invested capital (ROIC). To being able to compare firm's parameters, those must be retrieved with the same source and characteristics. Since Thomson Reuters was the software used, the information regarding all the companies (including Daimler) is the one given by it, for a matter of comparison. For instance, beta calculated by Thomson Reuters is 1.46 (this value was also obtained when computing cost of equity, using the index DAX 30) instead of the 1.73 used in this dissertation.

Figure 23 – Initial peer group, selected firms (in green) and rejection motive (parameters in red)

Company	Market cap (€ 000)	Debt to equity ratio	5-year monthly beta	Operating margin	EBITDA margin	Return on capital
Daimler AG	64 082 300	186,3%	1,46	6,1%	15,0%	4,3%
Bayerische Motoren Werke AG	48 101 642	180,8%	1,30	9,4%	17,9%	5,6%
Volkswagen AG	83 282 713	163,0%	1,48	5,9%	17,6%	4,4%
Renault SA	17 077 484	145,4%	1,52	5,2%	11,9%	7,7%
Peugeot SA	21 602 497	45,4%	1,69	5,9%	11,9%	12,0%
Continental AG	28 833 717	25,8%	1,21	9,1%	13,7%	12,6%
Porsche Automobil Holding SE	10 181 229	0,0%	1,47	3 398,1%	-39,8%	10,7%
Fiat Chrysler Automobiles NV	23 110 379	58,8%	1,42	4,7%	11,4%	6,9%
General Motors Co	52 480 536	270,1%	1,31	3,0%	13,6%	6,0%
Ford Motor Co	41 052 427	429,2%	1,10	2,0%	8,7%	2,2%
Volvo AB	31 255 180	109,2%	1,44	8,8%	15,0%	9,8%
Toyota Motor Corp	192 750 156	101,5%	1,09	7,0%	14,1%	5,0%

Source: Thomson Reuters terminal

One important parameter not taken into consideration was the revenue growth rate, as this is a rather subjective one, and there is not a reliable source with this information, which constitutes a limitation of this analysis. Nevertheless, all the firms included in the initial peer group are mature ones, being expected to have similar growth rates (none is in an initial stage of development, where firms usually experience rapid growth).

From the initial peer group of firms within the automotive industry, the size, measured by market capitalization, was not a motive of exclusion since all the selected firms are big (all are worth multi-billion euros), with none being more than six times smaller than Daimler. Size is decisive because firms of different sizes are subject to different market opportunities, including risks and growth ones.

The firm's leverage, captured by the debt to equity ratio, was a motive of exclusion when firms had more equity than debt (hence, a ratio of less than 100%), or had three times more debt than equity (a ratio superior to 300%), as this would constitute capital structures significantly different than Daimler's, leading to different financing opportunities, and, consequently, growth.

Beta is capturing the risk of each firm, thus only firms bearing the same level of risk should be included. Beta calculated by Thomson Reuters followed the same methodology as this dissertation explains when computing the cost of equity. Using the same rationality of the sensitive analysis, firms with a beta with a 25% difference (in the higher or lower end, resulting in a higher bound of 1.83 and lower bound of 1.10) were excluded.

Regarding the profitability measures chosen (operating margin, EBITDA margin and return on capital), all the firms whose parameters are more than double or less than half of Daimler's, were left out of the final peer group.

The final peer group is composed by BMW AG, Volkswagen AG, Renault SA and General Motors Co.

6.2. Multiples valuation

The selected multiples were the price to earnings per share, enterprise value to EBITDA and enterprise value to revenue, as explained in the literature review. The multiples chosen were forward-looking, over the next twelve months (NTM), retrieved from Thomson Reuters terminal.

Figure 24 – Multiples valuation

Company	P/E (NTM)	EV/EBITDA (NTM)	EV/Revenue (NTM)
Bayerische Motoren Werke AG	7,25	10,22	1,37
Volkswagen AG	5,28	5,89	0,91
Renault SA	4,18	8,11	0,9
General Motors Co	5,68	8,66	0,96
Average	**5,60**	**8,22**	**1,04**
Enterprise Value (€ 000)	-	142 280	173 220
Equity (€ 000)	40 578	22 808	53 748
Number of shares	1 070	1 070	1 070
Price per share (€)	**37,92**	**21,32**	**50,23**
Price per share using BWM AG figures (€) - best comparable firm	**49,12**	**53,67**	**102,63**

Source: Thomson Reuters terminal; Daimler annual report 2018

As at 31st December of 2018, Daimler had a P/E multiple of 6.78, an EV/EBITDA of 10.60 and an EV/revenue of 1.10.

From all the firms considered, it is reasonable to state that BMW AG (Bayerische Motoren Werke AG) is the most similar company to Daimler (figure 23), as not only they have very similar figures (apart from operating margin), but also have very similar business, operating in the same segments, mainly concerning cars, where they face the same demand. It is the best comparable for Daimler, thus making sense to also use BMW multiples to assess Daimler's share price.

For the purpose of this dissertation, the multiples used to assess Daimler's fair price are the ones from BMW, averaging to €69.

Nonetheless, the values obtained through the relative valuation are meaningfully different across the different multiples and peer groups. Therefore, not consistent enough to be compared with the results from the DCF model, regarded as the most precise of the two.

7. Valuation comparison

Figure 25 – Daimler's share price per valuation model used

Valuation method used	Price per share (€)
DCF	93
DDM	37
Multiples average (BMW AG)	69
Multiples (peer group average)	37
Daimler's actual share price	59

Source: Inputs disclosed before

Daimler's price per share fair value is disclosed in figure 25, according to the model used. The DCF model retrieves a value of **€93** compared with the actual share price of Daimler of €59, resulting in an upside potential of 58%.

Furthermore, if one chooses to look at the values per individual model, it is not clear that the stock is over or underperforming. Thus, the dissertation recommendation will be solely based on the DCF model, regarded as the most accurate among the three, giving a buy recommendation.

7.1. Investment bank report comparison - Morningstar

In this part of the dissertation we compare the equity research done on Daimler by Morningstar Research Services LLC, with the assumptions and results of this dissertation.

Firstly, Morningstar equity research values Daimler using a three stage DCF model, where there the explicit period is divided into two stages with different growths, each one with five years. Then, at the end of the 10-year explicit period, they do a perpetuity. This is different from this dissertation, where the DCF model applied has only one stage explicit period, with different revenue compound annual growth rates (CAGR) for each business segment, and a perpetuity at the end of the six years explicit period.

Although it is not directly comparable with this thesis, it is possible to compare the assumptions of growth, the discount rate (WACC) and the reached target price. Morningstar discloses very little information about the estimation of the FCF for the explicit period, but it does state that expects a CAGR of 1% in the first stage and a 3% on the second stage, compared with the CAGR of 3.3% between 2019-2024 applied in this dissertation. Furthermore, without disclosing the beta used, they arrived at a cost of equity of 9%, a cost of debt of 6.5%, and a total WACC of 8.4%. The tax rate used was 28%.

Given the information above, where the WACC is superior to the one used in this dissertation (8.4% vs 5.9%), and that their share price is similar to the one arrived in this dissertation, one might think Morningstar puts a lot of relevance in the perpetual growth rate, which they do not disclose. This is not necessarily true, as they can also be assuming very low levels of FCF in the initial stage and the opposite on a latter stage. Also implicit in Morningstar values is a debt to total capital of 61%, contrasting with the 50% assumed as the target capital structure. This is not a substantial difference, but it is closer to the current market values of 65%.

Figure 26 – Comparison between Morningstar and this dissertation assumptions

	Dissertation	Morningstar
Revenue CAGR	3,3% (2019-24)	1% (2020-24) and 3% (2025-30)
Cost of equity	10,7%	9%
Cost of debt	1,32%	6,5%
Tax rate	28%	28%
WACC	5,9%	8,4%

Source: Morningstar research report

Finally, this dissertation concluded, through the DCF model, that the fair value of a Daimler share is €93, giving a buy recommendation, supported by the €85 share price with a buy recommendation of Morningstar, as of December 2018.

8. Conclusion

This dissertation aimed at value the fair price of a Daimler share and give a recommendation in accordance. The recommendation concluded is a buy recommendation, as oppose to hold or sell, solely based on the DCF methodology. Hence, it challenges the market price in place, as there is a meaningful upside from the results obtained. The DCF model estimated a fair value for Daimler's share of €93, in line with the also superior Relative Valuation result (multiples average of €69). Nonetheless, results from Relative Valuation were not consistent, as each multiple produces a different recommendation, thus it was not considered when giving the final recommendation. The DDM produced a share price of €37, while the stock is trading at €59, as of 30th April 2019. This way, the price is trading within the range determined by the models, but inferior to the DCF result, considered to be the most accurate.

Furthermore, also challenging the buy recommendation is the sensitivity analysis, besides the DDM model. As seen in figure 21, a small variation in the inputs has a significant change in the DCF result, meaning that values close to the one obtained are also within the realms of possibility, given the subjectivity of the assumptions taken. Thus, a hold recommendation is not an outlandish possibility.

The result obtained is supported by the one Morningstar Equity Research produced, as they concluded a fair price of €85, yielding a buy recommendation.

One should consider, when attempting at value a Daimler share (or any other in the automotive industry for that matter), this is a mature sector facing revolutionary trends. This means firms will face high capital requirements to cope with new demands from consumers, needing to invest considerable amounts in R&D. Thus, the lack of management information regarding planned expenditure or non-recurrent business balances (needing to calculate adjusted values of EBITDA or Net debt) constitutes a limitation of this analysis.

Lastly, given the status of Daimler compared with the sector contenders, it is expected that it continues to accomplish growth, maintaining, if not gaining, its market share.

9. Appendix

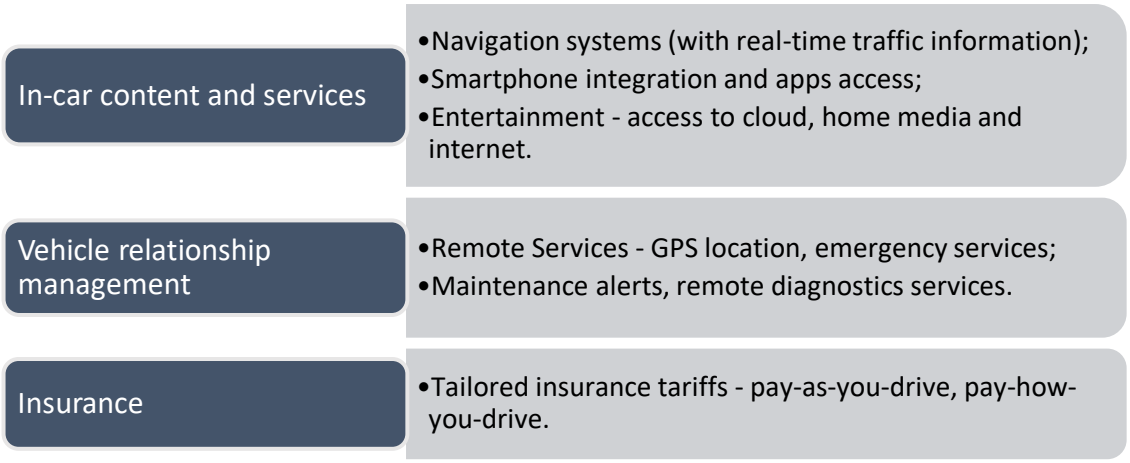
9.1. Four trends in the automotive industry

Connectivity and Autonomous Driving

Connectivity is the field, among the four presented, expected to have the promptest impact on the industry, as it is the one with more scalability with today's technology, this is, it is the field that by using the already resources available can increase consumer experience.

Connectivity on a car is the capacity of using information from the interaction of vehicles, their driver and the environment to serve as an input to a functional service. Connectivity services can be subdivided into four groups: in-car content and services, vehicle relationship management (VRM), insurance and driving assistance. This groups can be further subdivided by services as demonstrated in the list below.

Regarding the driving assistance service, it is excluded from the list as it is related with the autonomous driving. This type of service aims at creating safer and more convenient driving conditions. Nowadays, some of the features present on Mercedes-Benz cars are the blind spot object, pedestrian detection, lane assist, cruise control, collision warning with auto brake and park assistance. In the future, the firm, as well as the other players in the industry, aims at creating full autonomous driving, making it possible for the driver to be a mere passenger. This would create new infotainment business opportunities, as the driver would have the whole transit time for personal activities. With the entry of new players in the industry, namely tech giants, one could argue that market share for infotainment would be negligible, thus not expected that Daimler create any additional revenue in the short-term. (McKinsey, 2016) estimates that the hardware, software and services in which the driver spends his time and attention is going to account for a quarter of the industry revenues by 2030.



Nevertheless, broad consumer adoption of a "connected car" has significant barriers, being privacy the main one, as people in general are extremely cautious about their digital safety and data privacy. Moreover, with the utilization of digital technology appears the possibility of hackers being able to manipulate the connected car and theoretically cause an accident. Finally, most consumers are not willing to pay for car features they don't understand very well and don't feel the necessity to have, so fully penetration in the market may not occur in the short-term and will vary strongly at a local level (McKinsey, 2016).

As a response to this market demand, Daimler recently created the "Mercedes Me" platform, which is a connectivity service responsible to interact with the driver, offer online services and gather personal information.

Shared Mobility

As of today, 55% of the world population lives in urban areas, a tendency that is expected to increase up to 68% in 2050 (source: United Nations Website), thus increasing the hassle of having a car, due to traffic jams, lack of parking spots, costs with maintenance and fuel, among others. This is also a problem of today, as people are starting to change their mobility behaviour. Consequently, a range of diverse on-demand mobility solutions will appear, mainly in dense populational areas where privately own cars are proactively discouraged.

One of the key features of the automotive industry in the short-term, is being able to tackle these issues with ride-sharing solutions, that have the incentives to prosper due to be a low-priced solution, that reduces congestion on roads and is environmentally friendly.

As car-sharing is starting to gain more and more supporters, one could think the overall car sales would decrease, mainly in private vehicles. However, this is going to be partially offset by the fastest need to replace shared vehicles, since they are going to have a higher utilization and thus a faster depreciation due to wear and tear. Furthermore, global car sales are likely to continue to grow, mainly propelled by emerging markets, namely in China and India, with established markets no longer expanding in the future.

To cope with this market transformation, Daimler is repositioning the company from a traditional manufacturer to a mobility services provider with its car sharing solutions Moovel, Mytaxi and Car2go, that had an overall 21.3 million customers all over the world in 2018, where they are the market-leaders in the segment.

Electric Energy

Global warming is a reality that is starting to affect the world as we know today, with more recurrent extreme weather events, more polluted air and changes in the global ecosystem. To tackle this phenomenon, governments are being stricter with greenhouse gas emissions, and one way they are combating it is through vehicle emissions. Thus, automotive producers, such as Daimler, are facing pressure to change energy sources to greener and more efficient ones.

A recent scandal about automakers using software to manipulate reported emissions data took place in late 2015, named “Dieselgate”, that affected Volkswagen and put the whole industry on the alert for the use defeat devices and consequent lawsuits. Regarding Daimler, there are public investigations going on, since it has been reported that Daimler recalled some of the vans and cars models to update the software utilized that could be manipulating emissions, to comply with German regulation. Nonetheless, the action was voluntary, and Daimler has not been charged for wrongdoing until the moment.

Following the idea above, one of the increasing regulatory pressure against vehicle emissions was the recent adoption of the Worldwide Harmonized Light Vehicles Test

Procedure (WLTP) to more accurately portray consumption levels and gas emissions on the vehicles, being expected an increase in the book values announced until this year, leading consequently to higher taxes on cars.

Furthermore, several governments have called for a complete ban of fossil fuels cars, starting in the next years in big populated cities. For instance, UK, Spain, France, among other countries, have announced they are planning to ban sales and new registration of such vehicles by 2040, and others even sooner, as Norway set the deadline by 2025. Moreover, several cities want to completely ban diesel cars to circulate in them until 2025, such as Madrid, Paris, London, Milan or Oslo.

As a consequence of these increasing regulatory pressure, the need for a zero-emissions energy source, such as electricity, is stronger than ever. Thus, electric energy is set out to be the future of mobility, as we can already find widely available charging stations, consumer incentives towards electric vehicles such as tax breaks, special parking privileges, discounted electricity price, among others. Electric motors also have other advantages regarding conventional motors, as they are more efficient (consuming less energy for the same distance), offer an almost noiseless driving and have the maximum torque available from the start, thanks to the electric motor intrinsic characteristics, meaning powerful acceleration as soon as the car is turned on. The main issue to tackle with his type of technology is going to be their autonomy, as they cannot quite beat the range of conventional motors just yet.

As represent by the figure 10, the measures described are already having an impactful growth on the sale of plug-in vehicles (both hybrid and fully electric), with 2018 to have 2.1 million plug-in light vehicle sales, a 64% increase over 2017 total sales. China is, by far, the largest contributor with 1.2 million sales for 2018, that represents a more than half the market. The share leader continues to be Norway where 40% of new car sales were plug-ins (source: EV Volumes website).

Additionally, by the end of 2018, the plug-in vehicle population is roughly 5.4 million worldwide, being noticeable the exponential growth that is coming, since this only accounts for 0.4% in a global light vehicle population of around 1.3 billion.

In Daimler, the future of electric mobility is both represented nowadays by its Smart brand fully electric cars, by offering plug-in hybrids Mercedes Benz and soon by the EQ brand, the firm's electric intelligence brand. The firm pretends to launch until the end of this decade the first EQ series production model, the EQC, a sporty SUV that aims to meet the requirements of modern and sustainable mobility. By the first years of the next decade they will launch more than fifteen all-electric vehicles in all its segments, expecting to spend more than 10 billion euros in these expansion (source: Daimler Website). To conclude, Daimler is setting out to be one of the main propellers of future mobility, being likely to maintain, if not gaining more, market share.

9.2. Revenue table

	Financial Year			Forecast						CAGR
(*in millions of euros)	2016	2017	2018	2019f	2020f	2021f	2022f	2023f	2024f	(2018-2024)
Mercedes-Benz Cars										
Revenue*	89 284	94 351	93 103	95 393	98 159	101 006	103 935	106 949	110 050	*2,8%*
Unit Sales	2 197 956	2 373 527	2 382 791	2 395 878	2 465 359	2 536 854	2 610 423	2 686 125	2 764 023	*2,5%*
Worldwide sales*	77,3	79,0	78,7	81,0	83,3	85,7	88,2	90,8	93,4	*2,9%*
Revenue as % of unit sales	*4,1%*	*4,0%*	*3,9%*	*4,0%*	*4,0%*	*4,0%*	*4,0%*	*4,0%*	*4,0%*	
Market share	*2,8%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	
Mercedes-Benz Vans										
Revenue*	12 835	13 161	13 626	14 229	14 655	15 200	15 765	16 351	16 958	*3,7%*
Unit Sales	359 096	401 025	421 401	423 076	435 041	451 208	467 976	485 368	503 406	*3,0%*
Worldwide sales*	24,4	26,0	26,6	27,6	28,6	29,7	30,8	31,9	33,1	*3,7%*
Revenue as % of unit sales	*3,6%*	*3,3%*	*3,2%*	*3,4%*	*3,4%*	*3,4%*	*3,4%*	*3,4%*	*3,4%*	
Market share	*1,5%*	*1,5%*	*1,6%*	*1,5%*	*1,5%*	*1,5%*	*1,5%*	*1,5%*	*1,5%*	
Daimler Buses										
Revenue*	4 176	4 524	4 529	5 184	5 630	6 114	6 640	7 211	7 831	*9,6%*
Unit Sales	26 226	28 676	30 888	33 544	36 429	39 562	42 964	46 659	50 672	*8,6%*
Revenue as % of unit sales	*15,9%*	*15,8%*	*14,7%*	*15,5%*	*15,5%*	*15,5%*	*15,5%*	*15,5%*	*15,5%*	
Daimler Trucks										
Revenue*	33 187	35 755	38 273	40 872	42 136	43 442	44 789	46 177	47 609	*3,7%*
Unit Sales	415 108	470 705	517 335	533 372	549 907	566 954	584 530	602 650	621 332	*3,1%*
Revenue as % of unit sales	*8,0%*	*7,6%*	*7,4%*	*7,7%*	*7,7%*	*7,7%*	*7,7%*	*7,7%*	*7,7%*	
Financial Services										
Revenue*	20 660	23 776	25 636	25 892	26 663	27 488	28 339	29 218	30 125	*2,7%*
Growth of group unit sales	-	*109,2%*	*102,4%*	*101,0%*	*103,0%*	*103,1%*	*103,1%*	*103,1%*	*103,1%*	
Reconciliation*	**-6 881**	**-7 413**	**-7 805**	**-7 896**	**-8 143**	**-8 404**	**-8 674**	**-8 954**	**-9 244**	
weight on revenue	**4,5%**	**4,5%**	**4,7%**	**4,6%**	**4,6%**	**4,6%**	**4,6%**	**4,6%**	**4,6%**	
Total Revenue*	**153 261**	**164 154**	**167 362**	**173 297**	**178 712**	**184 444**	**190 379**	**196 524**	**202 888**	*3,3%*

Source: Daimler Annual Report 2018; Own estimates

9.3. Forecasted income statement

Income Statement	2016	2017	2018	f2019	f2020	f2021	f2022	f2023	f2024
(in millions of euros)									
Revenue	153 261	164 154	167 362	173 297	178 712	184 444	190 379	196 524	202 888
(-) Cost of Revenue	121 298	129 626	134 295	137 686	141 988	146 543	151 258	156 140	161 196
Gross Profit	**31 963**	**34 528**	**33 067**	**35 611**	**36 724**	**37 902**	**39 121**	**40 384**	**41 692**
(-) General/Administrative Expense	15 645	16 759	17 103	17 697	18 250	18 836	19 442	20 069	20 719
(-) Research and Development	5 257	5 938	6 581	7 297	8 119	9 007	9 296	9 596	9 907
(+) Other operating income (net)	1 052	1 216	868	1 045	1 045	1 045	1 045	1 045	1 045
Operating Income	**12 113**	**13 047**	**10 251**	**11 662**	**11 400**	**11 105**	**11 428**	**11 763**	**12 111**
(+) Other non-operating income (net)	275	(210)	210	92	92	92	92	92	92
(+) Investment Income	502	1 498	656	885	885	885	885	885	885
EBIT	**12 890**	**14 335**	**11 117**	**12 639**	**12 377**	**12 082**	**12 405**	**12 740**	**13 088**
(-) Interest Expense	546	582	793	640	640	640	640	640	640
(+) Interest Income	230	214	271	238	238	238	238	238	238
Net income before Taxes	**12 574**	**13 967**	**10 595**	**12 237**	**11 975**	**11 680**	**12 003**	**12 338**	**12 686**
(-) Provision for Income Taxes	3 790	3 350	3 013	3 368	3 296	3 214	3 303	3 396	3 491
Net income after Taxes	**8 784**	**10 617**	**7 582**	**8 869**	**8 679**	**8 465**	**8 700**	**8 943**	**9 194**
(-) Minority Interest	258	339	333	310	310	310	310	310	310
Net Income	**8 526**	**10 278**	**7 249**	**8 559**	**8 369**	**8 155**	**8 390**	**8 633**	**8 884**

Source: Daimler Annual Report 2018; Own estimates

9.4. Partial Balance Sheet

(in millions of euros)	2 016	2 017	2 018	f2019	f2020	f2021	f2022	f2023	f2024
Trade receivables	10 614	11 995	12 586	13 032	13 440	13 871	14 317	14 779	15 258
Inventory	25 384	25 686	29 489	30 234	31 178	32 178	33 214	34 286	35 396
Intangibles - net	10 910	12 620	13 719	14 914	16 212	17 624	19 159	20 828	22 641
Accumulated Intangible Amortization	(7 437)	(8 191)	(9 616)	(10 453)	(11 364)	(12 353)	(13 429)	(14 599)	(15 870)
Amortization		(754)	(1 425)	(837)	(910)	(990)	(1 076)	(1 169)	(1 271)
Property/Plant/Equipment, Total - N	73 323	75 055	80 424	86 177	92 342	98 947	106 025	113 610	121 737
Accumulated Depreciation, Total	(56 224)	(58 562)	(63 983)	(68 560)	(73 464)	(78 720)	(84 351)	(90 385)	(96 850)
Depreciation		(2 338)	(5 421)	(4 577)	(4 904)	(5 255)	(5 631)	(6 034)	(6 466)
Trade payables	11 567	12 451	14 185	14 543	14 998	15 479	15 977	16 492	17 026

Source: Daimler Annual Report 2018; Own estimates

9.5. Historical period Balance Sheet

(in millions of euros)	2 017	2 018
Intangible assets	13 735	14 801
Property, plant and equipment	27 981	30 948
Equipment on operating leases	47 074	49 476
Receivables from financial services	86 054	96 740
Equity-method investments	4 818	4 860
Inventories	25 686	29 489
Trade receivables	11 995	12 586
Cash and cash equivalents	12 072	15 853
Marketable debt securities	10 063	9 577
Other financial assets	6 806	5 733
Other assets	9 061	11 025
Assets held for sale	-	531
Assets	**255 345**	**281 619**
Equity	**65 159**	**66 053**
Provisions	22 136	24 406
Financing liabilities	127 124	144 902
thereof current	48 746	56 240
thereof non-current	78 378	88 662
Trade payables	12 451	14 185
Other financial liabilities	9 275	10 032
Contract and refund liabilities	11 208	12 519
Other liabilities	7 992	9 310
Liabilities held for sale	-	212
Liabilities	**190 186**	**215 566**

Source: Daimler Annual Report 2018

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