



CATÓLICA
LISBON
BUSINESS & ECONOMICS

The BMW Group Equity Valuation

International Master of Science Thesis in Equity Valuation

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7th of September 2018

Dissertation written under the supervision of Professor José Carlos Tudela
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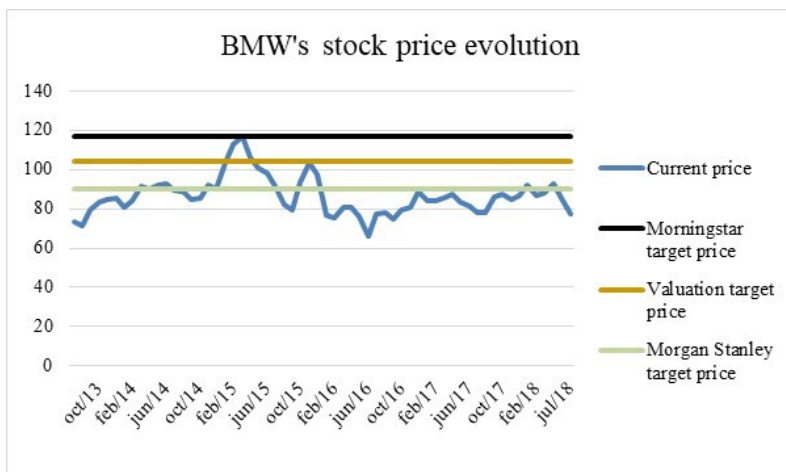
Dissertation submitted in partial fulfilment of requirements for the MSc in
Finance, at the Universidade Católica Portuguesa.

Research Note

Overview

Bayerische Motoren Werke (BMW) is a German-based company that operates in the automobiles, motorcycles and financial services segments. It is one of the biggest players on the automobiles and motorcycles segments and also leads in what concerns financial services related to vehicles sales financing. The company has its roots back in 1916 and has been able to survive many crises including World War II and, most recently, the 2008 financial crisis. Over the last few years, the company has always put itself one step ahead the competition and has been able to achieve, year after year, sales volumes' records. Nowadays, BMW is leading in what concerns electrical mobility and autonomous driving. 2017 proved to be the best year in BMW's history by achieving record revenues in its three segments. However, concerns about a war trade between The USA and Europe and China together with the ongoing discussion about diesel-powered engines appear as challenges the company will face. Nevertheless, it is believed that the company is undervalued in the market by reaching a price target of €104,18, which represents an upward potential of roughly 34%.

Figure I - BMW's stock performance



BMWG.DE

Recommendation:

BUY

Company data (30-06-2018)

Market Cap (€ millions): 50 531

of Shares (millions): 657,6

Current Price: €77,63

Valuation target

Valuation Date: 30-06-2018

Market Cap (€ millions): 68 510

of shares (millions): 657,6

Price Target: €104,18

Morgan Stanley Valuation

Valuation Date: 17-07-2018

Price Target: €90,00

Morningstar Valuation

Valuation Date: 11-05-2018

Price Target: €117,00

“Strategy Number One > NEXT”

BMW has been implementing since 2007 a new strategy which clearly aims to the future. The “Strategy Number One > NEXT” represents a vision the company holds for the next years and is based on innovation, strong investments, electrical and autonomous mobility and growth. As a matter of fact, BMW has been one step ahead its competitors on what concerns electrical and autonomous mobility. The company aims to be the world leader in providing premium products and services for individual mobility by 2020. Furthermore, the company expects to achieve in less than 10 years a completely electrified fleet either by means of hybrid models or completely electric cars. Furthermore, the company has been developing efforts in order to build a completely autonomous commercial car. These appear to be indicators that the strong investment registered in the last years is not expected to slow and the perspectives of future growth are high.

Risks and challenges

BMW is a company that operates at a global level and therefore, risks and challenges are expected to be a big part of BMW’s concerns. On the first hand, BMW is inserted in one of the most competitive markets worldwide. Not only that, the premium segment is highly-cyclical and therefore is tremendously exposed to macroeconomic factors. Although the company has been positioning itself on the front line, this remains a challenging factor. Another major risk that BMW faces is related to exchange rates. Operating worldwide, the company is highly exposed to exchange rate changes. However, BMW has adopted a strategy of producing in the local of sale. This means that the company is hedging for this risk naturally as exchange rate fluctuations will influence both the production and sales. The war trade between The USA and Europe and China also represents a challenge for BMW. The threat of imposing import tariffs could result in higher exportation prices for BMW and therefore a decrease in Revenues. However, producing locally also hedges for this risk. The last challenge found has to do with the ongoing concern about environmental issues, and diesel-powered engines in particular, that has been taking place in Europe. By now, some countries have already imposed strict rules for diesel-powered engines circulation within major cities. These prohibitions could result in major losses for BMW. Once again, the electrification strategy seems to outcome this challenge.

Valuation output

After analyzing the risks BMW faces and the strategy the company has been implementing, a DCF valuation was performed. This valuation results of a thorough investigation over the available public information and it is believed that it represents the best valuation.

Nevertheless, major unanticipated changes in macroeconomic or regulatory issues could result in changes to the recommendation. The output of the valuation was produced based in the following ground assumptions:

Figure II – WACC assumptions

Cost of debt	1,69%
Marginal tax rate	30,00%
D/V	32,82%
Cost of Equity	8,03%
E/V	67,18%
WACC	5,78%

Source: KPMG tax rates by country and own calculations

Figure III – Forecasted results

<i>(amounts in €millions)</i>	2018E	2019E	2020E	2021E	2022E	2023E	2024E
Gross Profit	19 900	20 423	20 868	21 248	21 642	22 120	22 530
EBIT	10 280	10 553	10 785	10 984	11 190	11 439	11 654
Net Income Before Taxes	10 317	10 590	10 823	11 022	11 228	11 477	11 691
Net Income	7 149	7 346	7 507	7 645	7 788	7 961	8 109
FCFF	1 058	3 790	3 845	3 939	4 015	4 063	4 197
PV FCFF	1 029	3 483	3 341	3 235	3 118	2 983	2 912
Terminal value				69 034			

Source: Own calculations

The results above mentioned yielded a share price target of €104,18. The valuation produced a “Buy” recommendation by finding that BMW’s stocks are trading at a discount of roughly 34% when compared to the price at the date of the valuation: 30th of June 2018. It is believed that this undervaluation is partly due to the challenges stated above. However, BMW’s positioning seems to respond well to these challenges and therefore, it is expected that sooner than later the market adjusts its valuation of BMW’s stocks.

Abstract

More likely than not, valuation is present in everyone's daily life. Whether one wants to value a property, an insurance proposal or even a stock, the need for valuation appears. This dissertation focuses on the need for valuing investment opportunities in stocks, namely in the BMW Group.

I start with a brief presentation of the available literature in what concerns valuation methods. One may notice that the literature is so extent because no formal decision on what the best valuation method should be has yet been reached. Therefore, the choice between the available methods depend on the characteristics of the company being valued but is also laid on the analysts' preference. The chosen methods for valuing BMW were the DCF with a WACC approach and Multiples.

After reviewing the relevant literature, a brief presentation of the BMW Group was made, and the valuation was carried forward. The DCF valuation provided a price target of €104,18 showing a clear undervaluation as of the 30th of June 2018. As for the Multiples valuation, it proved to be more challenging as the market has been suffering from many uncertainties.

Lastly, a comparison between this valuation and two other produced by professional analysts was made. The conclusion of this comparison was that a valuation method is only as good as the assumptions where it lays its roots on. Nevertheless, all three valuations appointed in the same direction: BMW is actually undervalued and an upward movement in its share price is expected.

Sumário

Avaliação representa um importante conceito na vida diária de cada um. Quer se pretenda avaliar um imóvel, uma apólice de seguro ou uma ação, a necessidade de avaliação torna-se evidente. Esta tese foca-se na necessidade de avaliação no que respeita a ações, nomeadamente do Grupo BMW.

Primeiro, começo por apresentar de forma breve a literatura disponível relativa a métodos de avaliação. A primeira conclusão é que a literatura é extensa porque não existe nenhuma opinião unânime acerca do melhor método de avaliação a usar. Assim, a escolha entre os diversos métodos prende-se não só com as características da empresa-alvo, mas também com as preferências pessoais de cada analista. Os métodos escolhidos foram o “Discounted Cash Flow” (DCF ou método da atualização dos fluxos de caixa) com recurso ao WACC e os múltiplos.

De seguida, foi efetuada uma breve apresentação do Grupo BMW e efetuou-se a avaliação. Através do DCF, encontrou-se um preço alvo por ação de €104,18, o que representa uma clara subvalorização a 30 de junho de 2018. Relativamente aos múltiplos, este método tornou-se mais desafiante, uma vez que o mercado de ações automóvel tem sofrido os impactos de diversas fontes de incerteza.

Por último, efetuou-se uma comparação entre o resultado obtido e aquele produzido por duas empresas de avaliação. Verificou-se que a qualidade de um método de avaliação está dependente dos pressupostos assumidos. No entanto, todas as avaliações apontaram na direção de uma subvalorização das ações do Grupo BMW e, portanto, é expectável que estas venham a valorizar-se.

Acknowledgements

Writing a thesis represented the most challenging task I have performed so far in what concerns academic career. Not only I was confronted with crucial concepts and new learnings in the equity valuation field but also had to develop many soft skills in order to produce this paper. All this process would not be possible without the help of people surrounding me.

First of all, I would like to thank Professor José Tudela Martins for all his effort on providing me such a useful help along this process by quickly replying to the questions I made and for the valuable inputs provided.

Then, I would like to show my appreciation to my family for supporting me in this whole process and always pushing me to exceed myself. I would also like to mention my girlfriend and her family whose support and valuable inputs were so useful along the way.

Lastly, I would also like to thank all my friends and colleagues for the motivation and the help they provided during this process.

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1. Introduction

Valuation in its many forms represents one of the most important concepts in our daily life. Particularly, in the financial field, valuation plays a central part as it is the basis for everything. Whether one wants to invest its money in stocks, bonds, real estate or any other asset, a thorough valuation is needed. This paper focus on equity valuation and intends to reach a value for the BMW Group as of the 30th of June 2018.

In the first section, a review of the available literature is made, and the most common valuation methods are presented. Throughout the last 20 years, the appearance of new and fastest spreadsheets and the computer evolution turned some methods much easier to apply as noted by Luehrman (1997). Furthermore, the 2008 crisis led people to consider different investment opportunities that were not dimmed as valuable before the crisis. The extensive literature is explained by an insatiable search for better methods, tailored for each individual scenario. Although this search has no foreseen end, it is strongly believed that the methods presented and used in this paper give a solid response to the needs of any investor.

The second section of this paper includes a brief presentation of BMW and its industry. In the last few years, the automobiles and motorcycles sectors have seen a major increase in competitiveness. Brands need now to be much more flexible to consumer needs and companies need to adapt their strategy to meet regulatory rules concerning CO2 emissions. The fast evolution of technology in the fields of electrical and autonomous mobility present now the major challenges for the industry. This section is followed by the valuation of BMW. All the assumptions that led to the price target of €104,18 are explained and all the process is stated. A Relative Valuation was also performed to access the reasonability of the DCF Methodology.

Lastly, a comparison with professional research reports is made where the main differences are explained. Both reports used, and this paper, lead to the conclusion that BMW is undervalued, and it represents a solid investment opportunity. It is strongly believed that sooner than later, the market will perceive the undervaluation of BMW and will adjust the price upwards.

2. Literature Review

2.1. Overview

Valuation is no longer a task that is restricted to finance experts. According to Luehrman (1997), valuation plays a crucial role in many areas such as: launching new products, building new facilities or entering a strategic partnership. As so, any manager nowadays should be able to perform valuation or else they will be outperformed by one who has those skills. The need for valuation comes from the fact that every asset has value. The Balance Sheet of any company shows financial Assets, valued most of the times at their market value, but also real Assets, which may be trickier to value if they are not publicly traded.

According to Damodaran (2002), the first step to understand valuation is to recognize where the value comes from. And this is where the literature becomes very extant. Throughout the years, many authors have developed numerous models trying to bring to the world the best valuation model. These models vary mostly on the required inputs and on the information provided regarding the sources of value. But one thing must be stated from the beginning: using the same assumptions and estimating the various models in a correct and consistent way, any model should yield the same conclusions as stated by Young et al. (1999).

To better understand the available models, their differences, how they relate and where mistakes may be found, Damodaran (2002) groups the models into 3 areas: Discounted Cash-Flows (DCF), Relative Valuation (Multiples) and Contingent Claim Valuation (Option Pricing Theory). Young et al. (1999) defines a fourth area: Return-Based Approaches. However, this area is no more than a special case of DCF as Damodaran (2002) explained. In this paper, I will focus mainly on DCF and Multiples but, later in this chapter, a brief explanation of the main models will be made.

2.2. Valuation Methods

In this section, a brief presentation of the above-mentioned methods is made alongside with their main pros and cons.

2.2.1. The DCF Method

The DCF Method is the more widely appreciated in the academic community and relies on the simple assumption that the value of an asset is represented by the present value of the Cash Flows (CFs) it is expected to generate.

$$[1] \quad PV_0 = \sum_{t=1}^{\infty} \frac{CF_t}{(1+r)^t}$$

Where:

CF_t = Cash-Flow the asset is expected to generate in period t

r = Discount rate reflecting the riskiness of the asset's CFs

This idea arises from two main theories. First, the financial golden rule which states that a dollar today is worth more than a dollar tomorrow and therefore, the expected CFs generated by an asset should be discounted for today to reflect their riskiness. Luehrman (1997) decomposes the discount rate used in two parts: first, one must consider the time-value of money, being the return one would get in a risk-free investment with the same maturity; then, one should also consider a risk premium for bearing that investment's risk. This is no more than an opportunity cost, being the return that a company could expect on another investment with the same risk characteristics. The second theory is that "*cash is king*" as stated by Koller et al. (2000). The ability of a company to generate CFs represents the best indicator on a company's performance. Although earnings seem more intuitive, they may be subject to a lot of cosmetic operations and lead to erratic conclusions. Increasing earnings on the short-term just to "look better" may destroy value as the company is not as focused on the long-run value creation as it should be. Ultimately, looking at the capital providers of a company, the value they expect is not the amount of earnings the company is able to generate but the CFs they get from those earnings. The next subtopics present a brief introduction to different approaches within this method.

2.2.1.1. Enterprise DCF (WACC)

The first and most commonly used approach is the Enterprise DCF. This model values the entire company (both Debt and Equity) as the sum of the present value of the future CFs generated by operations. This means that the company is viewed as a group of risky Assets which generate future CFs. These CFs are called Free Cash Flows to the Firm (FCFF) and represent what is left from the companies' operations after meeting the obligations to keep the company working but before making any payment to Debt or Equity-holders. It means that, to value the entire firm, or its operations, one should compute the CFs that are available to all capital providers. As the net profit stated in the Income Statement already takes into consideration part of the payments due to Debt-holders, namely the interest paid, to get the FCFF, one should start with Earnings Before Interest and Payments (EBIT) and then decrease this item by the amount of taxes the company would pay as if it was 100% Equity-financed. As for the tax rate to be used, in some firms, one may find meaningful differences between marginal and effective tax rates. Damodaran (2002) explains that these differences arise from deferred taxes, using tax credits or different accounting and taxation standards. The author defends that the marginal tax rate should be used because on the long-run, there are no reasons for differences in the two tax rates. However, one should pay attention to the effective tax rate of the company in the years preceding the valuation date and if the difference between the tax rates is considerable, then the effective tax rate may be used in the first years of the estimation period. Nevertheless, this rate should converge to the marginal tax rate and, in perpetuity, the marginal tax rate should be used.

By computing taxes on EBIT, results linked to capital structure are not taken into consideration in the CF. Those adjustments should be made when the correct discount rate is computed. Another adjustment that should be made comes about investments in Capital (CAPEX) and Working Capital. These expenses do not account for the Income Statement but still represent a decrease in the available CF and therefore should be deducted. Furthermore, in this line of thinking, Net Profit is already decreased by the amount of depreciations and amortizations made by the company and deducting the investments made in these categories but not adding up the expenses would result in undervaluing CFs. Then, all other non-cash items on the Income Statement should be added up to the Net Profit to get the FCFF.

Although they may represent expenses or revenues in accounting terms, they do not really decrease the cash available to capital providers. Lastly, one should add the CFs linked to non-operational sources.

Table 1: Calculation of FCFF

	EBIT	P&L
-	Taxes on EBIT	New Calculation
+	Depreciations, amortizations, provisions and other non-cash charges	P&L
-	Investment in working capital	BS
-	Investment in CAPEX	BS
=	FREE CASH FLOW FROM OPERATIONS	
+	Cash flows from non-operational sources	P&L/BS
=	FCFF	

After computing the FCFF, the discount rate should be estimated. The first thing that should be noticed is that within this methodology, one is valuing the Assets of the firm and not a specific capital source. In any company, their Assets should be equivalent to the sum of their Debt and Equity. This is the golden rule in accounting. If the Assets of the company are financed by the firm's total Liabilities, then the risk of both sides of the Balance Sheet should be somehow linked. As Damodaran (2002) presents, it is very intuitive that the cost of capital should represent no more than a weighted average of all the financing sources of the company: the Weighted Average Cost of Capital (WACC).

First, we find Debt which represents the less risky form of providing capital to a firm. This is so because Debt has seniority over Equity and therefore, Debt-holders are the first to be repaid in case of default. However, it does not mean that Debt is riskless. For the Debt-holders, there is a risk of default and therefore, they demand interest payments to provide the capital. The interest payments represent the return required by investors and is composed by the risk-free rate plus a default premium demanded to reflect the riskiness of the company.

The risk-free rate represents what an investor expects to get by investing in risk-free Assets. To define a risk-free asset, Damodaran (2002) says that there may be no default nor reinvestment risks on that asset. Such asset can only be found on zero-coupon treasury bonds because it is assumed that governments do not default and there is no reinvestment risk as we are talking about zero-coupon bonds. However, historically, one may find cases of countries

going bankrupt. In those cases, a risk adjustment may be taken into consideration or adjustments to the CFs projected should be made. Among the specialists, it has been somehow consensual that the US and Germany government bonds should be considered risk-free and then represent the best rate to use. As BMW is a Germany-based company, Germany government bonds will be used to compute the estimated costs for the firm. Furthermore, Koller et al. (2000) defend that the risk-free rate should be estimated using 10-year treasury-bonds because it is the maturity that best fits an Equity investment.

As for the default premium, Damodaran (2002) presents 3 different scenarios to compute this item. The first is a company which long-term bonds are widely traded. In this scenario, the required return on Debt may be computed as a yield from the price the bonds are trading for with the coupon they assure. However, not all firms have widely traded long-term bonds.

In this second scenario, we have a company which bonds are not traded in the market with frequency, but still are rated by rating agencies. Through that rating, one may estimate the default premium recurring to tables such as the one presented below:

Table 2: Conversion table between interest coverage ratio, rating and spreads

If interest coverage ratio is			
>	≤ to	Rating is	Spread is
-100000	0.199999	D2/D	18.60%
0.2	0.649999	C2/C	13.95%
0.65	0.799999	Ca2/CC	10.63%
0.8	1.249999	Caa/CCC	8.64%
1.25	1.499999	B3/B-	4.37%
1.5	1.749999	B2/B	3.57%
1.75	1.999999	B1/B+	2.98%
2	2.249999	Ba2/BB	2.38%
2.25	2.499999	Ba1/BB+	1.98%
2.5	2.999999	Baa2/BBB	1.27%
3	4.249999	A3/A-	1.13%
4.25	5.499999	A2/A	0.99%
5.5	6.499999	A1/A+	0.90%
6.5	8.499999	Aa2/AA	0.72%
8.50	100000	Aaa/AAA	0.54%

Source: Damodaran’s Website

However, many private firms do not have widely traded long-term bonds and the company is not rated. In this third scenario, one must estimate the required return on Debt by looking at the interest rate demanded for the latest borrowing history or estimate a synthetic rating from the company's fundamentals and then use the table above to calculate the default premium.

The required return on Debt by the capital providers is now computed. However, this is not the same as the cost of Debt for the firm because most economies have tax benefits on interest payments. To get the actual cost of Debt for the company, one must decrease the required return by Debt-holders for the tax savings amount. To do so, Damodaran (2002) presents that one multiplies the rate computed above by one minus the company's marginal tax rate.

Damodaran (2002) adds that companies incurring in losses will not be able to recover those tax savings, unless they may be used in posterior years when the result turns positive.

Performing valuation must be very sensitive to this analysis and much attention should be paid to companies who expect losses. This tax adjustment is also where the funding effects take place. As stated before, the FCFE does not include the results of capital structure. By adjusting the cost of Debt, those effects are now included.

The Equity stake, as it was stated before, is riskier than Debt. Therefore, investors demand a higher rate of return to bear that risk. The most appreciated approach to estimate the cost of Equity is the Capital Asset Pricing Model (CAPM) according to Damodaran (2002) and Koller et al. (2000). This model was first introduced in the 1960's based on the work of Markowitz on portfolio diversification and defends that the cost of Equity should include the risk-free rate plus a beta that represents the systematic risk of the company multiplied by the market risk premium. Furthermore, it assumes that the investor's portfolio is well diversified and therefore only bears systematic risk.

$$[2] \quad k_e = r_f + \beta(r_m - r_f)$$

Where:

k_e = Expected return on Equity

r_f = Risk-free rate

r_m = Expected return on the market portfolio

β = Systematic risk of the company

The risk-free rate should be estimated in the same way as it was explained on the cost of Debt. Equity investments are considered long-term and therefore long-term treasury bonds should be used.

As for the market risk premium, it represents the differential between what the market portfolio is expected to pay its investors and the risk-free rate. CAPM assumes that only non-diversifiable risk should be compensated. The market portfolio represents the premium required on an investment with average risk as Damodaran (2002) presents. In most cases, it is compared to an index where the stock under valuation is traded. Both Damodaran (2002) and Brealey and Myers (1996) agree that the use of historical data is the best way to compound the market risk premium. If it is true that investors do not necessarily expect the same returns as in the past, it is also true that, on average, they expect the same risk premium. The biggest difference we can find on past returns comes from differences on the risk-free rate as stated by Brealey and Myers (1996).

Damodaran (2002) defends that differences between the premium estimated by different investors are due to three main reasons. First, the time frame used may differ as some analysts defend that the best predictor for future returns should be the latest returns. However, Damodaran (2002) explains that decreasing the window of time used will result in bigger standard deviations for the premium and therefore, the advantages are eliminated by this increase. So, the biggest time frame used, the better results will yield. The second reason for differences is the choice of the risk-free security. On valuation matters, treasury bonds with a 10-year maturity are the ones that better suit the goals. The last reason is whether one should use arithmetic or geometric averages to compound the market risk premium. Brealey and Myers (1996) defend that the arithmetic average should be used if the cost of capital is estimated over historical returns or risk premiums. Nonetheless, Damodaran (2002) defends the use of geometric averages because empirical studies suggest that returns on stocks are negatively correlated over time and therefore, the average mean will be overestimated.

Lastly, we need to estimate the Beta to get our cost of Equity. The Beta represents the firm's exposure in comparison to the market portfolio's risk. A Beta equal to 1 means that the company has the same risk and therefore the same required return as the market portfolio. The most widely used approach to estimate Betas compiles historical data and a regression of the stock return against the stock index is computed as follows:

$$[3] \quad R_j = a + \beta R_m$$

Where:

R_j = Returns on the stock;

a = Interception of the regression;

β = Slope of the regression

R_m = Returns on the Market Portfolio

This regression, not only gives us the Beta we are looking for but also gives us the R-Squared (R^2). The later gives us information on how good the regression is on fitting the actual returns on the stock, it means, the R^2 shows us the amount of the return that may be explained by market movements. The return in excess is due to firm-specific risk.

To estimate this regression, the investor should make three decisions as Damodaran (2002) presents. First, the estimation period should be defined. Using a longer period increases the amount of observations but the company may have changed their risk exposure over time and old observations may lead to erratic conclusions about the current risk characteristics of the company.

Second, the return interval must be chosen. If using intraday data results in more observations for the regression, it also includes nontrading periods and therefore the Beta may come biased. Weekly or monthly returns may reduce this bias but also reduce the amount of observations.

Lastly, market portfolio must be defined. Most analysts agree that the market where the stock trades is a good proxy for the market portfolio. Therefore, a German company like BMW should be compared to the German index, DAX.

The cost of Debt and the cost of Equity basis were already explained. However, to use the Enterprise DCF, one needs the cost of capital. As stated above, the most common approach to calculate the cost of capital is the WACC.

$$[4] \quad WACC = k_E \frac{E}{V} + k_D(1 - t) \frac{D}{V}$$

Where:

k_E = Cost of Equity

k_D = Cost of Debt

E = Equity Market Value

D = Debt Market Value

V = Enterprise Value

t = Marginal tax rate

The WACC represents a weighted average cost of all the financing sources of a company. In fact, the weights used in the computation of the WACC are no more than the market values of those sources over the total Enterprise Value.

The market value for Equity is usually straightforward. As Damodaran (2002) brings to us, the market value of Equity is estimated by multiplying the number of outstanding shares for their current price. As for the Debt market value, it is not as straightforward as Equity. Firms' debt usually comprises not only bonds traded in the market but also bank loans and others which are not traded. To get the Debt market value, one may look at the entire Debt as one coupon bond, which coupons are the interest expenses, the face-value is the book value of Debt and the maturity is a face-value weighted average of the maturities of all the Debt instruments. One may now apply equation 4 to compute the cost of capital.

Lastly, the forecast horizon must be decided. Valuing a company assumes, most of the times, that the company will be there forever, meaning infinite CFs. Estimate 10 CFs seems reasonable but estimating 100 or even more seems like a visionary and impossible task. To perform this kind of valuation, one must predetermine the forecast horizon during which the CFs will be estimated each year and then a terminal value which assumes that CFs will grow forever at a stable rate. This idea is based on the notion that firms are not able to grow forever at a high rate. If a firm is constantly growing more than the economy in which it operates, then it will eventually become the economy itself which is not reasonable. It means that, in the long run, a company will always tend to grow at most at the same rate as the economy, or

even less than the economy because new firms will continue appearing in and growing rapidly.

After, one needs to estimate a forecast horizon during which the company is growing differently from the steady state and then consider a stable growth rate forever. The forecast horizon to be considered should take into consideration three factors according to Damodaran (2002). The first is about the size of the firm. A bigger firm is not expected to grow as rapidly as a small firm. So, bigger firms tend to the steady state growth rate more rapidly than small firms. Second, a firm that is performing better than the economy today is expected to keep doing so for a longer period than a firm which is not in such position. Third, if the competitive advantages of the firm are fading, then the firm is not expected to grow as rapidly as one which competitive advantages are stable. Defining the forecast horizon is probably one of the trickiest parts in valuation, so much attention should be paid to this factor.

We may now compute the terminal value. The terminal value represents the valuation of a company at the terminal year. One simply computes a perpetuity of CFs growing at a stable rate as follows:

$$[5] \quad \textit{Terminal Value} = \frac{CF_T}{r-g}$$

Where:

CF_T = Expected CF in the terminal year T

r = Discount rate in perpetuity

g = Stable growth rate in perpetuity

The terminal value represents a very big slice of the value of a company and much attention should be paid to its estimation. Young et al. (1999) alert us for this situation by pointing that analysts spend 10% to 20% of the time on terminal value estimation whereas it represents 90% to 80% of the total market value of a firm.

Finally, a simple subtraction must be made. Reaching the point where the value of the entire firm was found, one needs then to subtract the value of Debt to achieve the value of Equity.

The price per share is no more than the value of Equity obtained divided by the number of shares outstanding.

2.2.1.2. APV Method

The second approach within DCF is the Adjusted Present Value (APV) method. While, on Enterprise DCF, one assumes that the capital structure will remain constant (by calculating the WACC), this model implies that the capital structure does not affect the value of the unlevered company and the benefits and costs of issuing Debt may be considered separately in the valuation process. Then, this model is better suited for leveraged buyouts or distressed companies as Koller et al. (2000) presents. Furthermore, Luehrman (1997) states that APV always works even when Enterprise DCF does not.

$$[6] \quad \text{Value of the firm} = \text{Value of unlevered firm} + \text{Tax savings on debt} + \text{Bankruptcy costs}$$

The first thing to do while valuing a company through APV is to calculate its value as if it was 100% Equity financed. Therefore, to get the correct cost of Equity, which will be the same as the cost of capital, one needs to compute the unlevered Beta. Damodaran (2002) presents the following relationship for the levered and unlevered Betas:

$$[7] \quad \beta_L = \beta_U + \beta_U(1 - t) \frac{D}{E} - \beta_D(1 - t) \frac{D}{E}$$

Where:

β_L = Levered Beta for Equity

β_U = Unlevered Beta for Equity

β_D = Beta for Debt

t = Corporate tax rate

$\frac{D}{E}$ = Debt to Equity ratio at market values

Although Damodaran (2002) defends that the Debt to Equity ratio should be considered at market values as firms tend to maintain that ratio, Fernandez (2007) considers that it is more realistic to use book values as most rating agencies and banks, when deciding on conceding a new loan, look at those values.

After computing the new Beta, the CAPM may be used to estimate the cost of capital. Afterwards, one may use the same rationale as in the Enterprise DCF to value the unlevered firm.

The second step within this method is to compute the effects of the leveraged capital structure. Usually, these effects are decomposed in tax savings and bankruptcy costs. The tax savings may be estimated using a DCF approach. First, one needs to compute the tax savings expected to happen in the future and discount them at the appropriate discount rate. It must be assumed that the tax rate will remain constant and that either Debt will be constant in value or in weight over the total enterprise value. Otherwise, one will have to estimate each year of tax savings, which, as seen before for the FCFF is not possible. As for the correct discount rate, Damodaran (2002) defends that, as those tax savings are necessarily related to Debt, then they should be discounted at the cost of Debt. Lastly, the expected bankruptcy costs must be estimated by multiplying a probability of default by the present value of bankruptcy costs. This is where APV approach becomes tricky. Estimating the probability of default may be made through the link some authors present between the rating of the Debt of a company versus their probability of going bankrupt. However, this is not rocket science and therefore, errors are expected. Furthermore, it is not easy to estimate the actual bankruptcy costs. Direct and indirect costs may vary considerably from case to case. We have now found the Enterprise Value of the company. To get the Equity Value, one must subtract the Debt Value in market prices, just as one did in the Enterprise DCF method.

Although APV approach proves to be more flexible and transparent than Enterprise DCF and even yield some interesting results as for the source of value, it is more prone to errors in estimating the parameters for the valuation.

2.2.1.3. Equity DCF

As stated before, one is trying to reach a value for equity. Therefore, valuation directly over the Equity stake may be done. One may use the Free Cash Flow to the Equity (FCFE) approaches. In this topic, 2 perspectives arise: dividends, which represents the most obvious CF an Equity holder may expect and FCFE.

2.2.1.3.1. Dividend Discount Model

By investing in stocks, one is expecting to get CFs in the future. Those CFs may be divided into Dividends and the value of the stock in the day it is sold in the future. However, Damodaran (2002) considers that the value for which a stock is sold in some point in time is no more than the expected Dividends it should pay from that point on. It is, once again, the financial golden rule: any asset may be valued as the present value of the expected future cash flows. It is now intuitive that the Dividend Discount Model (DDM) is calculated as the sum of the present value of future dividends the company is expected to pay:

$$[8] \quad E_0 = \sum_{t=1}^{\infty} \frac{DIV_t}{(1+k_E)^t}$$

Where:

DIV_t = Dividend the firm is expected to pay in period t

k_E = Cost of Equity

Once again, as in the Enterprise DCF model, the task of estimating Dividends until eternity is impossible. This way, the same techniques used in the previous models may be used. Firstly, one may assume the Gordon Growth Model, which states that dividends are already stable, and they will grow at a stable rate forever. This way, the value of a firm's Equity today is computed by a perpetuity where the Dividend in the next year represents the CF to be discounted, the discount rate is the Cost of Equity as computed in the previous topics (using CAPM) and the growth rate should be estimated as well.

$$[9] \quad E_0 = \frac{DIV_1}{k_E - g}$$

Where:

DIV_1 = Dividend the firm is expected to pay in period 1

k_E = Cost of Equity

g = Expected growth rate for dividends

However, assuming dividends are already in a steady state and that the distribution policy will not change may not hold. As it was done before, on the growth rate estimation at the Enterprise DCF model, one may consider a multiple-stage growth model where the growth rate will stabilize in the future but is not yet stable. In this scenario, dividends should be computed each year until the terminal year and, in that point, a perpetuity may be computed.

Although this model seems quite intuitive, it does not work in many cases for several reasons. First, companies tend to smooth dividends over time. Therefore, changes in earnings, meaning changes in the companies' operations, do not necessarily reflect changes in dividends.

Second, not all companies distribute dividends, which may lead to some erratic conclusions.

Koller et al. (2000) defend that this model is better suited for financial institutions because banks may create value on the Liabilities' side and this model incorporates that value creation.

2.2.1.3.2. FCFE Model

Another broader way to look at an Equity-based discount model is by introducing the concept of FCFE. This approach is no more than relaxing the assumption that the CFs due to Equity-holders are solely dividends. By doing so, one eliminates the constraints about the DDM not including changes in operations. Damodaran (2002) presents us a useful guide to calculate the FCFE. First, there is the need to get the net income. Contrarily to what happened while calculating the FCFF, here one should start with net income as this already takes into consideration part of the CFs to Debt-holders. To compute the FCFE, one needs to add all the non-cash items stated in the Income Statement as they do not represent cash outflows.

However, investments in Capital (CAPEX) and Working Capital should be subtracted as they

are cash outflows that do not account for the Income Statement. Lastly, repayments or issues of Debt should be also considered to reach the CFs to Equity.

Table 3: Calculation of FCFE

	Net Income	P&L
+	Depreciations, amortizations, provisions and other non-cash charges	P&L
-	Investment in working capital	BS
-	Investment in CAPEX	BS
-	Repayments or issues of Debt	BS
=	FCFE	

After computing the FCFE, one uses the same rationale as in the DDM valuation and values the company by estimating the expected growth rate. However, the fact that changes in the payout ratio of the company will not interfere in this method should be taken into consideration. Lastly, one should take into consideration that both models will yield the same conclusions if a firm pays to its shareholders all the available cash. In this scenario, FCFE will equal Dividends and therefore, the results will be the same.

2.2.1.4. Return Based Approaches

In the previous approaches, one discounts the CFs the company is expected to generate at a rate that reflects the riskiness of the company. This means that the company generates value by the differential between what the company gets and what the market demands. In other words, this is the opportunity cost theory. In this line of thinking, some researchers propose models where the CFs are not discounted as raw CFs but rather, excess CFs are discounted as they represent the actual value creation for the economy. As before, one may look at a company through the Assets point of view (Economic Value Added) or through an Equity point of view (Dynamic ROE).

2.2.1.4.1. Economic Value-Added Method

The Economic Value-Added Method (EVA) defends that the value of a company may be computed by adding, to the value of the Assets in place, the economic profit of a project. This economic profit is computed by calculating the differential between the Return on Invested Capital (ROIC) and the Return on Capital demanded for bearing that level of risk. Then, one should multiply that differential for the value of the Assets in place.

$$[10] \quad \text{Economic Profit} = \text{Invested Capital} (\text{ROIC} - \text{WACC})$$

In the previous topics, the calculation of the WACC has been explained. As for the ROIC, it represents the actual return that the company gets on its investments. Lastly, a perpetuity on the economic profit must be computed (assuming the company is already in a steady state or will converge to such a growth rate in some future point) and then, as stated above, the value of the Assets in place should be added.

$$[11] \quad PV = C + \frac{C(\text{ROIC} - \text{WACC})}{\text{WACC} - g}$$

Where:

C = Value of Assets in place

g = Expected growth rate

Equation 11 may be adapted to reflect multi-stage growth models as was done before. Using this method, one may track a company's performance in a determined year as presented by Koller et al. (2000). Through an Enterprise DCF valuation, one is not able to track company's performance as FCFF may be subject to cosmetic operations and not investing today to achieve a higher FCFF may result in potential losses for the firm.

2.2.1.4.2. Dynamic ROE

The Dynamic ROE is very similar to EVA but it values Equity instead. However, the rationale is the same: the value of Equity is measured by the differential between the return

the company is generating for their Equity-holders and the return one should expect for an investment bearing the same risk.

$$[12] \quad E = \text{Equity Book Value} + \frac{\text{Equity Book Value}(\text{ROE} - k_E)}{k_E - g}$$

Where:

ROE = Return on Equity

k_E = Cost of Equity

g = Expected growth rate

ROE may be looked at as the actual returns the Equity-holders are getting in their investment. As in the previous method, this approach is less sensitive to cosmetic operations when compared to the DDM or FCFE approaches.

2.2.2. Relative Valuation

The second methodology this paper focus on is the Relative Valuation, commonly known as Multiples. In this methodology, a company is valued by looking at similar firms in the industry and analyzing how those firms trade. Performing a Relative Valuation starts off by considering the group of companies that may be compared to the one being valued. This is also the trickiest part about relative valuation. Defining the peer group is a work of art. Goedhart et al. (2005) defend that the comparable companies should be the ones that match the expectations on their ROIC and growth with the company being valued. Some consensus also comes about considering only firms within the same industry for the set of possible comparable firms. Goedhart et al. (2005) point out that the peer group may be as small as one company. Then, the Multiples to use should be decided. First, one must decide on which value driver performs better on estimating the price of a company. Liu et al. (2002) found that earnings perform better than any other indicator, followed by CFs and only then sales come on their ability to explain stock prices.

Table 4: Examples of Multiples

Earnings Multiples	$\frac{P}{EPS}$	Price to Earnings Ratio
	$\frac{P}{\frac{EPS}{G}}$	Price to Earnings to Growth Ratio
	$\frac{EV}{EBIT}$	Enterprise Value to EBIT Ratio
	$\frac{EV}{EBITDA}$	Enterprise Value to EBITDA Ratio
Cash Flow Multiples	$\frac{EV}{FCFF}$	Enterprise Value to FCFF
Sales Multiples	$\frac{EV}{Sales}$	Enterprise Value to Sales Ratio
	$\frac{P}{Sales}$	Price to Sales Ratio
Book Value Multiples	$\frac{P}{Equity_{Book\ Value}}$	Price to Book Ratio
	$\frac{EV}{Assets_{Book\ Value}}$	Enterprise Value to Book Ratio

Next, one must decide whether historical or forecasted data will be used. Without a surprise, Liu et al. (2002) present empirical evidence that forecasted indicators perform better than historical ones. This is very intuitive taking into consideration that in finance, the historical data means very little on what's to come.

When compared to the DCF methodology, this approach provides a simpler and faster way to reach a value for a company. However, Multiples should not substitute a more robust valuation method but rather should represent a complement. Damodaran (2002) points out that Multiples may misestimate the results if the entire market is under or overvalued. As it is a relative valuation, errors on valuing other companies in the market will be reflected on the valuation to be performed. Furthermore, the fact of Multiples being so easy to calculate and require so little explicit assumption may also lead to erratic conclusions.

2.2.3. Contingent Claims (Option Pricing Model)

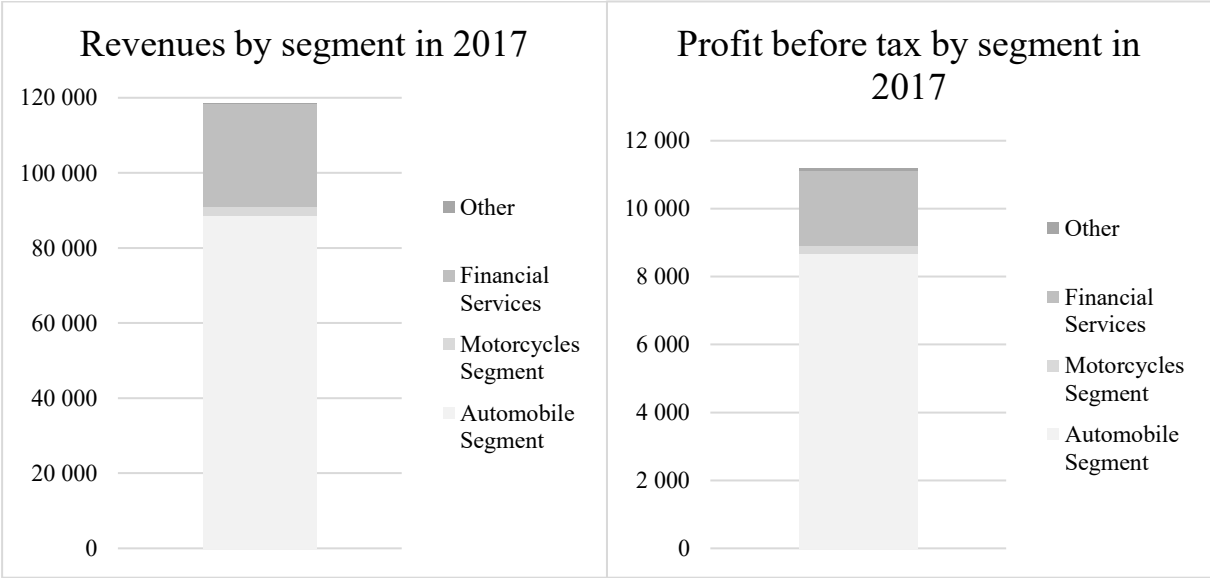
Through the DCF or the Relative analysis, one is valuing a company assuming that the decisions on whether to invest or not in a project should be made today. However, in some specific cases, this assumption does not hold. On the exploitation of a natural reserve, through DCF or Relative approaches, one should decide today about investing or not in the exploitation and should account for estimated CFs where positive and negative values must be taken into consideration. For instance, if the prices of oil in the market drop considerably, the company will incur in losses. This way, the decision about a project is based on the Net Present Value it is expected to generate. This assumption may be waived if we consider the exploitation of the oil reserve as an option instead of an obligation to exploit it. It represents the basics of a financial option. This example is not a financial but rather a real option, and so, the fact that the underlying is not traded in the market should be looked at. This brings some constraints in the assumptions that should be made to value the option.

Then, by using models such as the Black-Scholes or the Binomial Model, one may compute the value of the firms' Assets and therefore the Enterprise Value of a company. Luehrman (1997) defends that the Option Pricing Model should be a complement rather than a replacement to another methodology. Damodaran (2002) defends that this model is more useful for patents or companies owning and exploiting natural reserves. Despite useful insights about flexibility which are not considered in other approaches, this model also brings some constraints over its complexity. It is a model that has some considerable costs of learning and therefore, analysts tend to ignore its advantages. Nevertheless, new financial tools and faster spreadsheets tend to eliminate those costs. Also, this model needs very restrictive assumptions as for the variance and dividend yields, which does not always reflect the actual status of a company.

3. The company

Bayerische Motoren Werke (BMW) has its roots back in 1916. With over 100 years of history, BMW focus nowadays on three different premium segments: automobiles manufacturing, motorcycles manufacturing and financial services.

Figure 1: BMW’s Revenues and Profit Before Tax by segment in 2017 excluding eliminations (in €millions)



Source: BMW’s 2017 Annual report

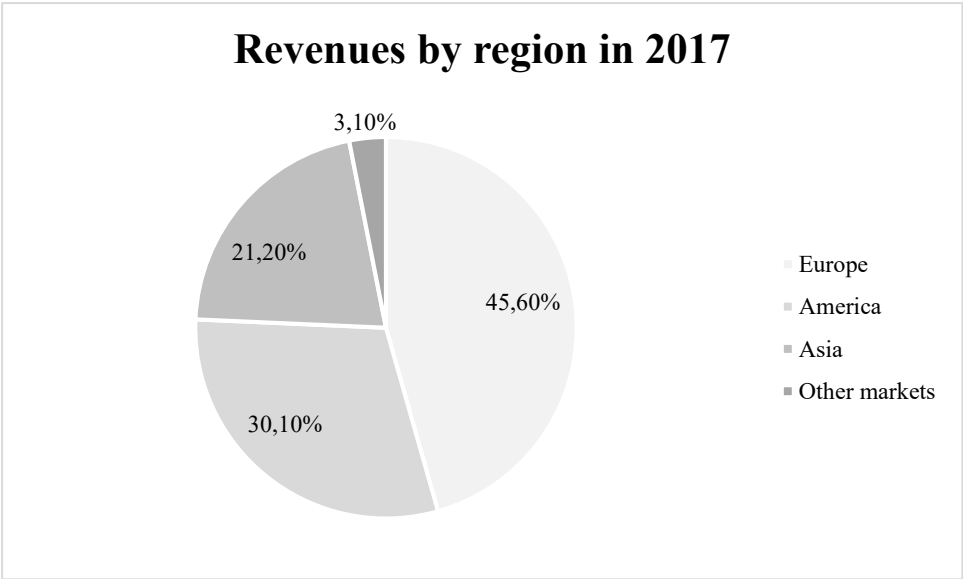
Although BMW is currently a leader player on the sectors it operates, history was not always easy. As a German-based company, BMW suffered strongly the effects of World War II. As an engine manufacturer, BMW was considered a supplier of war material for the German army. Not only this brought serious implications on its reputation and on its rebuilding capacity after the war, it also obliged BMW to employ forced labor. Nevertheless, BMW was able to survive all the crises and made it clear that perseverance pays out. Nowadays, the company pays special attention to sustainability in its many forms: employee satisfaction, environmental issues and financial wealth. As an indicator of the payoffs brought by BMW’s strategy, 2017 proved to be, for the seventh consecutive year, a sales’ record breaker by delivering over 2,4 million vehicles in the automobiles segment, according to the company’s annual report. This is the result of the “Strategy Number One > NEXT” implementation, a program that has two main targets for the BMW Group: be profitable and assure that long-

time value creation remains unaffected through challenges. This strategy, as stated in the Group’s website is based on four ground pillars:

- “Growth”,
- “Shaping the future”,
- “Profitability” and
- “Access to technology and customers”.

Not only the BMW Group concerns about company’s growth and profitability but also aims to be one step ahead any move in the market. The proof is that the company is leading the market in what concerns electrical mobility with its BMWi brand, the iPerformance designation and, most recently, with the MINI electric. In 2017, a new sales volume record in electrical vehicles was set for BMW by surpassing the barrier of 100 thousand vehicles delivered. Furthermore, autonomous driving and connectivity with customers are areas where BMW has been performing intense research in the last years. In recent years, BMW has been developing and delivering to customers integrated mobility services such as DriveNow, a brand for renting electric BMW vehicles throughout the world. Nowadays, BMW is a globally present company by operating 30 production and assembly facilities in 14 different countries and having sales points in over 140 countries.

Figure 2: BMW’s Revenues by region in 2017 as a percentage of total revenues



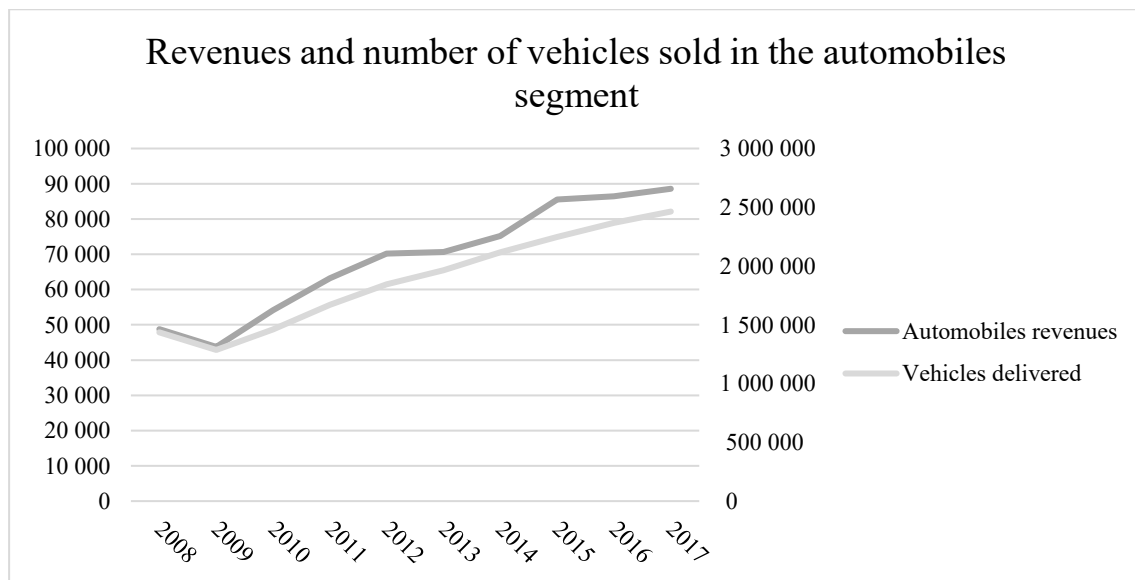
Source: BMW’s 2017 Annual report

3.1. The automobiles segment

The automobiles segment represents the biggest stake on the company's revenues. The BMW Group operates nowadays under 3 brands: BMW, MINI and Rolls-Royce. The BMW brand is oriented to deliver to the customer a thrilling driving experience in a premium segment by building cars with powerful engines and high-quality materials but never denying the comfort that is subjacent to the brand. The MINI brand intends to be a mark on creative design of compact cars, still built with passion and very oriented to the pleasure of driving. Lastly, the Rolls-Royce brand places itself on the most exclusive luxury segment and the cars under this brand are built with careful attention to detail and perfection, by building each car individually and customized.

The automobiles segment reached in 2017 its best year in sales. Even further, sales up to the second quarter of 2018 recorded a slight increase in the number of vehicles delivered. This number is expected to grow in 2018, setting a new record in sales. This extraordinary growth is due mainly to new models coming out such as the new BMW Series8 and renewals of old models such has the Rolls-Royce Phantom.

Figure 3: Automobiles segment's Revenues (in €million, left axis) and number of vehicles sold (right axis)



Source: BMW's Annual reports

The automobiles market represents one of the most volatile goods' market in the world. Strongly dependent on economic cycles, this market suffered considerably from the 2008

global crisis. BMW was no exception for this crisis and saw some decrease on its revenues. However, the market has been recovering and BMW was able to perform strongly in these exceptional circumstances by innovating and being one step ahead its competitors. Even though the momentum of this market is expected to continue, some markets have reached its maturity and continued growth is now a challenge. Furthermore, the ongoing discussion about diesel engines in Europe and the commercial war between The USA and Europe and China threatens its growth. Nevertheless, forecasts of light vehicle sales for the next few years by IHS Markit expect positive growth in the global market.

3.2. The motorcycles segment

As for the motorcycles segment, BMW operates under its homonymous brand. Just like in the automobiles segment, 2017 was an extraordinary year in sales by recording an all-time high for deliveries of motorcycles and this record is expected to be surpassed during this year. However, a decrease in sales during the first semester of 2018 was recorded due to fails in the production system caused by the renewal of many models. This problem is expected to be overpassed in the second half of 2018.

The motorcycles market has also seen some influences of the 2008 crisis. However, urban mobility issues have been privileging this mean of transportation and therefore, the market has been experiencing a strong increase in sales worldwide. The Persistence Market Research forecasts a Compounded Annual Growth Rate (CAGR) of 3,9% for the next few years and therefore, expects the market's momentum to continue.

3.3. Financial services segment

Created to fill a gap in the market, the financial services segment focuses mostly on providing BMW's customers with financial solutions for purchasing vehicles, mainly through direct financing or leasing agreements. Furthermore, insurance and banking products are also available for customers but represent a much more modest stake in the business. In accordance to the momentum the company faced in 2017 in what concerns sales of vehicles, the financial services segment reached in 2017 its best year and has even gone further since, by managing a portfolio of over 5,5 million contracts at the second quarter of 2018.

4. Valuation of the BMW Group

Given the characteristics of the BMW Group and the positive and negative points of each valuation model stated in the Literature Review, the Enterprise DCF valuation was performed. This choice was mainly due to the flexibility of the model and the characteristics of the company by being a manufacturer. Also, the capital structure of the BMW Group being constant in the last years makes this model as a suitable choice over the APV Model. To complement this valuation method, a Relative Valuation was performed.

4.1. Enterprise DCF valuation

Within this section, the inputs and outputs of the valuation are explained. The date of the valuation is the 30th of June 2018 and all the references made are related to that date unless stated otherwise. All the assumptions were made by using the relevant available information at that date both from the company as from other sources such as the Thomson Reuters Eikon Platform or others below identified.

4.1.1. Forecasts

The first step for a DCF valuation is to forecast the financial performance of the company. To do so, one must decide about the forecast horizon to use and, from that point on, consider the company will continue growing at a stable rate forever. The forecast horizon used was of six and a half years. This horizon intends to capture the momentum BMW is living concerning sales and get to a steady-state sustainable growth. Furthermore, this horizon intends to capture the forecasts for the automobiles market that may be estimated by now. A longer forecast could result in losing some sense of proximity and then lead to erratic forecasts and a wrong valuation. On the other hand, a smaller forecast horizon could be too reducer as it would not catch all the effects of the momentum lived by the company.

After that, a steady-state growth rate of 1,5% was computed. This growth rate represents the expected growth for the automobiles industry in 2024 minus a differential of roughly 0,35%. This differential pretends to capture the challenges expected in the three segments such as: the growing concern about diesel-powered engines, the high competition in the market and the growing regulatory constraints in the financial services segment. The starting point for the calculation of this rate was the automobiles growth rate as it represents the biggest stake of BMW's revenues. Furthermore, it is a reasonable rate as it is lower than the world growth rate

expected by then (over 3%), which should be the comparable rate taking into consideration the global presence that BMW has achieved in the last years.

4.1.1.1. Income Statement

To compute the FCFF of the BMW Group for the forecast horizon, one started by forecasting the items on the Income Statement. This way, one may get the EBIT which is the starting point for the computation of the FCFF.

4.1.1.1.1. Revenues

Revenues represent the product of a company's operations. BMW's Revenues come mainly from 3 sources: automobiles, motorcycles and financial services segments. Other Revenues from non-core sources such as mobility services were also considered although they represent a residual value.

The automobiles segment is the one that represents the biggest stake of BMW's operations and therefore its Revenue are of extreme importance to BMW. To estimate the expected Revenues for this segment, data from IHS for the outlook on global light vehicle sales was gathered. It was assumed that BMW's revenues will continue to evolve as the market evolves meaning that BMW will keep its market share. Although this is a very competitive market, BMW has always been one step ahead in what comes to electric mobility and launching new models with the newest technology. Thus, BMW does not expect to lose any market share for its competitors. Furthermore, BMW's Revenues are clearly linked to global sales and are somehow immune to an individual country's performance. By applying this method, an average growth rate of around 2% was used. This rate represents a slight decrease on BMW's Revenues' growth rate from the past years but is in line with the expectations of the company and with the slowing from the last two years. Until 2015, BMW was growing in a double-digit number, but that growth rate has been decreasing as the effects of recovering from the crisis vanish. As a matter of fact, 2016 and 2017 presented much more modest rates by growing less than 3,5% on average.

In the motorcycles segment, BMW's Revenues suffered with the effects of the 2008 crisis. Furthermore, in 2018, the first 6 months proved to be short from expectations with some problems in the production line due to the renewal of many models. Nevertheless, BMW still has a big presence in this market worldwide and the expectations are not to lose any market share. Proof of that is the renewal of many models that has been taking place in the last few months. Following the same line of thinking of the automobiles market, to estimate the

motorcycles Revenues for BMW, one assumed that it will continue growing at the same rate as the global market for the segment. Therefore, data from Persistence Market Research was gathered and a CAGR of 3,9% was used.

The financial services segment was created to provide BMW's clients services related to financing the purchase of vehicles. Therefore, Revenues of this segment are straightly related to Revenues on the previous two segments. An historical analysis was performed to find how this relationship proved to be right. By doing so, one found that this segment's Revenues represent slightly less than 30% of the Revenues of the two previous segments. By multiplying that rate for the Revenues previously computed, one reached an estimation for financial service's Revenues.

Lastly, two other items needed to be estimated concerning BMW's Revenues. The first item has to do with other Revenues' sources and it was assumed to remain constant as it has presented a residual but somehow constant value in the last few years. The second item represents the eliminations for consolidation purposes. This item proved to be somehow constant in its relation to the Revenues computed for other sources. The eliminations represent on average 16,88% of the Revenues of the company.

Table 5: BMW's revenues by segment historically (in €millions)

Revenues by segment	2012	2013	2014	2015	2016	2017	2Q2018
Automobile	70 208	70 630	75 173	85 536	86 424	88 581	41 518
Motorcycle	1 490	1 504	1 679	1 990	2 069	2 283	1 182
Financial services	19 550	19 874	20 599	23 739	25 681	27 567	13 815
Other	5	6	7	7	6	7	3
Eliminations	(14 405)	(15 955)	(17 057)	(19 097)	(20 017)	(19 760)	(8 801)
Total	76 848	76 059	80 401	92 175	94 163	98 678	47 717

Source: BMW's Annual reports

Table 6: BMW's revenues by segment estimated (in €millions)

Revenues by segment	2018E	2019E	2020E	2021E	2022E	2023E	2024E
Automobile	90 124	92 461	94 435	96 105	97 833	99 945	101 739
Motorcycle	2 372	2 465	2 561	2 661	2 764	2 872	2 984
Financial services	27 262	27 978	28 588	29 110	29 650	30 304	30 866
Other	7	7	7	7	7	7	7
Eliminations	(20 213)	(20 744)	(21 197)	(21 583)	(21 984)	(22 469)	(22 885)
Total	99 552	102 166	104 394	106 299	108 270	110 659	112 711

Source: Own calculations

4.1.1.1.2. Cost of sales

This item represents the direct and indirect costs that the company needs to incur to produce the goods or to provide the services it sells. In the BMW Group, this item includes the cost of raw materials necessary to build the vehicles, the expenditures in Research and Development (R&D) not capitalized as Assets and the expenditures in Depreciation and Amortization. Historically, this item represents a percentage of the total Revenues and has been constant throughout the years, except in 2008 and 2009, the years when the crisis was most strongly felt, as the cost of raw materials increased exponentially. To better understand this item, it was estimated taking into consideration the different segments of the company. As for the Depreciation and Amortization, further details on its calculation are provided in the next subtopics.

In the automobiles segment, the Cost of Sales has been quite constant and averaging 81,46% of Revenues in the past years excluding 2008 and 2009. This was the rate used in the forecast horizon. Furthermore, it is a reasonable value as the company needs to strongly invest in R&D to maintain its leadership position on the market. It means that no disinvestment in this area is expected in the next few years.

The Cost of Sales in the motorcycles segment represent a weight on Revenues very similar to the one found in the automobiles segment. The margins on both segments are similar and therefore a rate of 81,44% was computed based on historical data. No significant changes are expected in this area as the company will continue investing strongly to be one step ahead the competition. Furthermore, the increasingly global presence of the brand hedges BMW for fluctuations in raw materials in a specific market.

In the financial services segment, the Cost of Sales represents a slightly higher weight on Revenues than the previous two segments. This fact may be explained not only by the competitiveness of the market but also by regulatory demands. The network that needs to be settled to provide financial services justifies the slightly lower margins that BMW obtains from this segment. Therefore, a rate of 86,85% over Revenues was used.

Lastly, one should also compute the eliminations in this item. The reasoning used was the same applied for Revenues. This item almost outcomes the effect of the eliminations in Revenues by representing a weight of around 95,84% of the eliminations in Revenues.

Table 7: BMW's COGS by segment historically (in €millions)

COGS by segment	2012	2013	2014	2015	2016	2017	2Q2018
Automobile	(56 525)	(57 778)	(61 221)	(70 399)	(70 973)	(72 266)	(33 959)
Motorcycle	(1 236)	(1 253)	(1 365)	(1 542)	(1 639)	(1 809)	(888)
Financial services	(16 984)	(17 270)	(17 783)	(20 586)	(22 135)	(23 986)	(12 010)
Other	-	-	-	-	-	-	-
Eliminations	13 391	15 510	16 973	18 484	19 305	19 317	9 092
Total	(61 354)	(60 791)	(63 396)	(74 043)	(75 442)	(78 744)	(37 765)

Source: BMW's Annual reports

Table 8: BMW's COGS by segment estimated (in €millions)

COGS by segment	2018E	2019E	2020E	2021E	2022E	2023E	2024E
Automobile	(73 414)	(75 318)	(76 926)	(78 286)	(79 694)	(81 414)	(82 876)
Motorcycle	(1 932)	(2 007)	(2 085)	(2 167)	(2 251)	(2 339)	(2 430)
Financial services	(23 677)	(24 299)	(24 829)	(25 282)	(25 751)	(26 319)	(26 807)
Other	-	-	-	-	-	-	-
Eliminations	19 372	19 881	20 314	20 685	21 069	21 533	21 933
Total	(79 652)	(81 744)	(83 526)	(85 050)	(86 628)	(88 539)	(90 181)

Source: Own calculations

4.1.1.1.3. Selling and administrative expenses

Selling and administrative expenses represent what BMW spends, mostly in marketing, personnel cost, advertising and IT expenses. For its nature, this item is closely linked to the activity of the company and therefore a relation may be found with Revenues. Historically, this item represents around 9,54% with no major fluctuations on the last 10 years. Therefore, this rate was applied to Revenues to compute this item. BMW needs to spend considerable amounts in marketing and advertising due to the intensively competitive market where it operates. Therefore, no major changes from the past few years are expected.

4.1.1.1.4. Other operating income and expenses

Other operating income and Other operating expenses are among the hardest items to estimate as they fluctuate every year depending on internal and external factors. These items comprise mainly exchange rate fluctuations and other non-specified income and expenses. Although these items may vary considerably over time, one may find that in the last few years they have presented similar values with no major fluctuations. It is reasonable to assume that these items will always fluctuate around the same values because changes in exchange rates are unpredictable but BMW hedges itself through natural hedging as they place their production centers worldwide to match the global demand. Therefore, gains in exchange rate fluctuations

should be compensated through losses in the other item as production and sales share the same location. One has assumed that these items will remain constant through the forecast horizon and will average a value equal to the average of the last 10 years.

4.1.1.1.5. Financial result

BMW's Financial result comprises not only interest paid to compensate for the Debt the company holds and interest received to compensate for the investments made but also results of other non-banking investments the company holds. These investments' results are dependent on external factors and therefore are very hard to estimate. To reach the best possible estimation, historical data about these items was computed and analyzed. The first thing one notices by looking at past data is that in 2012 a change in accounting policies resulted in changes in the amounts stated in each account. Therefore, the values stated before 2012 were ignored as they did not present a truly comparable for the items. After this, the values of the last 5 years were carefully analyzed. Although these items present some fluctuations, they have been averaging amounts in the same magnitude. Therefore, an average of the last 5 years was used to compute these items.

4.1.1.1.6. Other Income Statement estimates

To get the Net Income available for BMW's shareholders, one needs further to estimate the taxes and the minority interest. To compute the taxes that BMW is expected to pay over the forecast horizon, the marginal tax rate for 2018, as provided by KPMG, was used. As stated in the Literature Review section, this is the correct tax rate to use as, in the long-run, no major deviations from this rate are expected. Furthermore, no major deviations have taken place between the marginal tax rate in Germany and BMW's effective tax rate. As for the minority interest, one has analyzed the historical data and has reached an average rate over the Net Income of slightly less than 1%. This was the rate used as it is expected that, on average, this item will not fluctuate considerably.

4.1.1.2. Depreciations and amortizations

Depreciations and Amortizations are accounted as COGS in BMW's Income Statement. However, to compute the FCFF, one should separately calculate the expenses on these items. Several methods could be used to compute the values in question but one of them is more intuitive than the others: depreciations and amortizations should be computed as a percentage over the net value of the tangible and intangible Assets of the previous year. Net values were used instead of gross values to avoid computing costs over completely depreciated/amortized

assets. Furthermore, the historical correlation between the cost and the two values previously stated was computed and net values proved to have a better link to the cost than gross values. Depreciations and amortizations represent an opportunity cost over the Assets that a company holds and should account as an expense over their lifetime. An average rate of the last 12 years was computed and was applied to the net amount of the previous year. This rate has proved historically to remain somehow constant. However, due to changes in accounting policies, in 2012 the rate was considerably lower to correct the slightly higher than normal values of the previous years. To dilute this effect on the estimations, all the available historical data was used and a rate of roughly 20% was computed.

4.1.1.3. Provisions

These do not represent cash charges and therefore do not account for the value of the FCFF. To reach the value for the provisions, one computed the expected amount in provisions in the Balance Sheet and then, by difference, reached an amount of expenditure or gain for each year. BMW presents two types of provisions: pension provisions and other provisions. The first is related to the obligations the company holds concerning pension plans to current and former employees. This value is quite unstable as it depends not only on internal factors but also on life expectancy, interest rates, among other external factors. However, BMW has been shutting down most of their pension plans and covering the responsibilities by pension assets and therefore a major reduction in the obligations related to this item is expected in the next few years. Therefore, the decrease rate observed in 2017 (around 29%) is expected to continue and was the one used to compute this item. Furthermore, increases in the interest rates are expected and this will result in lower provisions and higher pension assets, which will likely yield reversals of provisions already stated. The second line relates mainly with warranties over products sold, and others linked to sales. Historically, one may notice that this Balance Sheet item represents roughly 50% of total Revenues within the automobiles and motorcycles segments. Therefore, this item was computed by multiplying that rate for the expected Revenues over the forecast horizon.

4.1.1.4. Capital expenditures

After subtracting all the relevant non-cash items from EBIT, to get the FCFF, one needs to add the cash items that are not related to the Income Statement but still represent investments needed to sustain the company's operations. The first is related to CAPEX. This item represents what the company is spending in tangible and intangible Assets in order to

continue its operations. Historically, CAPEX has been quite related to Revenues and represents roughly 7% of that item. Furthermore, the company has stated in the past that 7% would be their target. Therefore, no major changes are expected in the rate from the previous years and so an average of the available data was used to estimate the CAPEX that the company expects to incur in the forecast horizon.

4.1.1.5. Net working capital

Lastly, the investments or disinvestments in net working capital were computed. The net working capital is roughly the current Assets minus the current Liabilities and represent a company's ability to meet all the short-term responsibilities by means of their short-term Assets. Regarding the BMW Group, the net working capital includes all short-term Liabilities and Assets, exception being made to financial Liabilities and Assets and the item of cash and cash equivalents.

The first item on BMW's current Assets is inventories. Inventories were estimated by computing an historical Days Inventory Held average (roughly 51 days) and then multiplying that rate for the revenues of automobiles and motorcycles. Second, one finds trade receivables. This item was estimated by means of historical Days Sales Outstanding (around 11 days). Receivables from sales financing were computed as an average rate of Revenues from automobiles and motorcycles. Historically, this item averages 6,5% of those Revenues. Current tax was computed as a percentage of total Revenues as it seems to hold such a rate when looking at historical data (roughly 1,8%). Lastly, the item other current Assets which represents mainly prepayments and return rights from future leased products was computed as a percentage of Revenues from automobiles and motorcycles. As a matter of fact, until 2017, this rate was somehow stable around 7%. Changes in accounting procedures led to an increase in this rate to 10%, which is the expected rate to be maintained over the forecast horizon.

As for current Liabilities, provisions were estimated as stated in the previous sub-topics. Then, current tax was estimated, as in the assets, as a percentage of total Revenues (slightly below 2%). Trade payables were estimated by means of historical Days Payable Outstanding (around 44 days). This rate represents how long, on average, the company takes to pay its suppliers. As for the other current Liabilities, this item mainly includes deferred income and other amounts related to sales and therefore was computed as a percentage of total Revenues.

After estimating the required items for the net working capital computation, one calculated the investment or disinvestment needed in this item as follows:

Table 9: Changes in net working capital historically

<i>(amounts in €millions)</i>	2012	2013	2014	2015	2016	2017	2Q2018
Current assets							
Inventories	9 725	9 595	11 089	11 071	11 841	12 707	15 286
Trade Receivable	2 543	2 449	2 153	2 751	2 825	2 663	3 140
Receivables from Sales Financing	20 605	21 501	23 586	28 178	30 228	32 087	32 888
Current Tax	966	1 151	1 906	2 381	1 938	1 566	2 583
Other Current Assets	3 664	4 258	5 038	4 693	5 087	7 485	7 987
Total	37 503	38 954	43 772	49 074	51 919	56 508	61 884
Current liabilities							
Other provisions	3 246	3 412	4 522	5 009	5 879	6 367	6 018
Current tax	1 482	2 319	1 590	1 441	1 074	1 124	984
Trade Payables	6 433	7 485	7 709	7 773	8 512	9 731	10 048
Other liabilities	6 792	7 064	7 775	9 208	10 198	13 443	14 449
Total	17 953	20 280	21 596	23 431	25 663	30 665	31 499
Net working capital	19 550	18 674	22 176	25 643	26 256	25 843	30 385
Changes in net working capital	(1 094)	(876)	3 502	3 467	613	(413)	4 542

Source: BMW's Annual reports

Table 10: Changes in net working capital forecasts

<i>(amounts in €million)</i>	2018E	2019E	2020E	2021E	2022E	2023E	2024E
Current assets							
Inventories	12 896	13 235	13 524	13 771	14 026	14 335	14 601
Trade Receivable	2 860	2 936	3 000	3 054	3 111	3 180	3 239
Receivables from Sales Financing	34 714	37 216	39 773	42 377	45 029	47 739	50 500
Current Tax	1 796	1 843	1 883	1 917	1 953	1 996	2 033
Other Current Assets	7 417	7 612	7 778	7 920	8 067	8 245	8 398
Total	59 684	62 842	65 958	69 040	72 186	75 496	78 771
Current liabilities							
Other provisions	4 902	5 030	5 140	5 234	5 331	5 449	5 550
Current tax	1 752	1 798	1 837	1 871	1 905	1 947	1 984
Trade Payables	9 141	9 381	9 586	9 761	9 942	10 161	10 350
Other liabilities	10 594	10 872	11 109	11 312	11 522	11 776	11 994
Total	26 389	27 082	27 673	28 178	28 700	29 333	29 877
Net working capital	33 295	35 760	38 286	40 862	43 486	46 162	48 894
Changes in networking capital	2 910	2 465	2 525	2 577	2 624	2 676	2 731

Source: Own calculations

4.1.2. Cost of equity

After computing the FCFF throughout the forecast horizon, one needs to find the reasonable discount rate for those CFs. As stated in the Literature Review, WACC will be used. To compute the cost of equity, one used the approach of Damodaran (2002). First the beta for the company was computed using historical data. Weekly data was used as it was the one that provided the highest R^2 . Furthermore, 5 years of historical returns were used by getting the prices from Reuters. The decision to use 5 years was to exclude the crisis period.

Exceptionally harsh times were lived from 2008 to 2011 and therefore data from that period may be biased. A beta of 1,24 was reached. This beta is also in accordance with the one provided by Damodaran for similar companies of around 1,2. To compute the cost of Equity

through CAPM, one also needed to compute an average weekly return for the reference market. As explained before, the reference market used was the Dax and a market premium of 6,216% was computed. As for the risk-free rate, long-term German bunds with a 10-year maturity were used. Following these assumptions, a cost of equity of 8,027% was reached.

4.1.3. Cost of debt

In the BMW Group, it is easy to get data from the current bonds that the company holds and from the latest issues. However, BMW issues bonds in many currencies and the yield for a bond issued in Euros is very different from one issued in US Dollars, for instance. Therefore, to get the most reasonable cost of Debt, one calculated a weighted average of the yields of all the bonds issued in 2018 both in Euros and in other currencies. To do so, one calculated the amounts outstanding of each bond in euros by using the exchange rate at the issue date and then used that value as a weight to reach the used cost of debt. Using data from Reuters, a cost of Debt of 1,694% was computed. The reasonability of this rate may also be tested by looking at the ratings of the company. BMW has proved its liquidity and solidity by being rated at consistently high marks by Moody's and Standard & Poor's (A1 and A+ respectively). Therefore, a low cost of Debt is expected.

4.1.4. WACC

After computing the cost of the different financing sources of the company, one needs to find the correct tax rate to use and then compute the Debt and Equity ratios of the company. As for the tax rate, data from KPMG for the German marginal tax rate was collected and a rate of 30% was used. For the capital structure, and as stated in the Literature Review, one must compute the market values for Debt and Equity. The market values for Equity were computed by multiplying the price of the shares by the number of shares outstanding. Preferred Equity was treated as common Equity as it yields the same returns as the latest with a small increase in dividends. For the Debt market value, one divided the amount of interest paid by the cost of Debt. By doing so, one found a Debt to Assets value of 32,816%. One should also notice that the data until 2011 was excluded from the calculations as it is clearly biased by the crisis and by different costs of Debt. Furthermore, one may notice that this ratio has been maintained constant throughout the years. The final computation for the WACC was as follows:

Table 11: WACC parameters

Cost of debt	1,69%
Marginal tax rate	30,00%
D/V	32,82%
Cost of Equity	8,03%
E/V	67,18%
WACC	5,78%

Source: KPMG tax rates by country and own calculations

4.1.5. Final output

After computing all the necessary items to perform BMW's valuation, all the FCFF were discounted for the date of the valuation as follows:

Table 12: FCFF and Present Value of the FCFF

<i>(amounts in €millions)</i>	2018E	2019E	2020E	2021E	2022E	2023E	2024E
EBIT	4 801	10 553	10 785	10 984	11 190	11 439	11 654
Taxes on Ebit	(1 440)	(3 166)	(3 236)	(3 295)	(3 357)	(3 432)	(3 496)
Depreciations and amortizations	3 085	5 830	6 102	6 351	6 578	6 789	6 992
Provisions	2 324	410	253	147	42	(69)	(85)
Other non-cash items	26	26	26	26	26	26	26
Investment in working capital	(2 910)	(2 465)	(2 525)	(2 577)	(2 624)	(2 676)	(2 731)
CAPEX	(4 828)	(7 399)	(7 560)	(7 698)	(7 841)	(8 014)	(8 163)
FCFF	1 058	3 790	3 845	3 939	4 015	4 063	4 197
PV FCFF	1 029	3 483	3 341	3 235	3 118	2 983	2 912

Source: Own calculations

Attention should be paid to 2018. As the date of the valuation is the 30th of June 2018, all the items used for the computation of the FCFF were considered as the differential between the estimations in the end of the fiscal year and the ones reported by BMW at the date of the valuation.

Furthermore, excess cash was not considered in the calculation because the amount of cash that BMW holds has remained somehow constant and represents a small portion of total Assets or even of Current Liabilities (around 4% and 12%, respectively). It is also expected that no major fluctuations will happen on this item in the foreseen future.

As for deferred taxes, the effect of this item was not taken into consideration because it has remained constant over the years, situation that is expected to remain in the forecasting

period. Also, the effective tax rate that BMW has been paying and the marginal tax rates do not present major differences in the last years.

The last step to reach a final value for the BMW’s shares was to sum all the discounted CFs and then divide the differential between the enterprise value and the Debt market value by the number of outstanding shares.

Table 13: Output of the valuation

WACC	5,78%
Growth rate	1,50%
PV of future CFs (in €million)	20 101
Terminal value (in €million)	69 034
Value (in €million)	89 135
Debt (in €million)	20 625
Equity (in €million)	68 510
Number of outstanding shares	657 600 600
Price per share	104,18

Source: BMW’s 2017 Annual report and own calculations

The number of shares used in this valuation represents the number of shares at the date of the valuation. BMW’s program of incentives includes issuing new preferred shares to current employees and therefore, the number of shares is expected to increase over time. However, the increase will not have a major impact on the valuation. Furthermore, the target price of €104,18 represents an upward potential of roughly 34%. It is believed that BMW’s price on the market is undervalued for several reasons. The first has to do with major concerns over the commercial war between The USA and Europe. This war could lead to major tariffs on exports for the European Union and therefore result in losses for BMW. However, BMW’s global presence should, up to some extent, hedge for this risk. The second reasoning for an undervaluation in the market has to do with the concerns over the discussion about environmental issues. However, once again, BMW has been proving to be one step ahead and has been making considerable investments in electric mobility. Furthermore, by looking at historical prices of the automobiles industry, one may notice that during the first half of 2018, the prices of major car producers has been decreasing. This fact is explained by the concerns stated above. However, recovery is expected within the next few months.

4.2. Sensitivity Analysis

To infer about the reasonability of the reached output, a sensitivity analysis was performed. Although the assumptions made about the growth rate and the WACC were considered as the best to reflect the current positioning of BMW, changes on these items could lead to major fluctuations on values. Therefore, careful analysis should be made to assure that the recommendation issued represents the best effort with the available information at the date of the valuation. Furthermore, the uncertainties that arise from the facts described in the last topic could result in major changes for these two items. Then, a sensitivity analysis was performed by computing the final target price per share for BMW after reflecting changes in the terminal growth rate and in the WACC of up to 15% as follows:

Table 14: Sensitivity analysis on the BMW's target price

		g						
		1,28%	1,35%	1,43%	1,50%	1,58%	1,65%	1,73%
WACC		-15%	-10%	-5%	0%	5%	10%	15%
	4,91%	-15%	130,16	133,00	135,95	139,04	142,26	145,63
5,20%	-10%	118,14	120,53	123,02	125,60	128,30	131,10	134,03
5,49%	-5%	107,76	109,80	111,92	114,12	116,40	118,77	121,23
5,78%	0%	98,72	100,48	102,30	104,18	106,13	108,15	110,25
6,07%	5%	90,77	92,30	93,87	95,50	97,19	98,93	100,73
6,36%	10%	83,72	85,06	86,44	87,86	89,33	90,84	92,40
6,65%	15%	77,43	78,61	79,83	81,08	82,36	83,69	85,05

Source: Own calculations

From the table above, it is clear that even major changes in these two items would not result in another recommendation. In the worst-case scenario, which means an increase of 15% in the WACC and a decrease of the same amount in the growth rate, the BMW's shares are roughly trading at the fair price.

4.3. Relative Valuation

Relative valuation presents a useful tool not to value a company on itself but rather to complement any valuation method. Therefore, relative valuation was performed to assess how BMW is being traded in the market in comparison to other companies.

4.3.1. Peer Group

The first, and trickiest, step on relative valuation is choosing the comparable companies. This choice requires some assumptions about the company being valued and should be performed very carefully. To choose the correct peers for BMW, one started by picking companies within the same industry. Geographical restrictions were not applied as BMW has a global presence and therefore, competes with major car manufacturers worldwide. After, a further restrictive requirement was applied by choosing the 20 companies that presented the closest Revenues to BMW's operations. This way, one is reducing the number of companies and is using Revenues as a comparable item. Two appointments should be made. First, Audi was one of the chosen companies within this analysis. As Audi represents a branch of the Volkswagen Group, the latter was considered for comparison purposes. Second, Toyota was also added to the preliminary peer group as it is a company that has global presence as BMW and represents a major competitor to BMW.

At this point, the need to strict even further appeared. Some data was collected from the 21 companies under analysis and a centroids approach was applied to choose the closest companies to BMW in accordance to 4 indicators: revenue growth as an expectation of future activity, WACC as a measure of risk, equity-to-assets ratio as an indicator of capital structure and ROIC as a profitability measure. A final peer group of six companies was computed as follows:

Table 15: BMW's peer group

Company Name	Revenue Growth	WACC	E/V ratio	ROIC
Bayerische Motoren Werke AG	-0,7%	4,6%	27,4%	13,3%
Daimler AG	3,6%	5,9%	23,3%	7,0%
Honda Motor Co Ltd	5,6%	5,5%	41,2%	7,1%
Hyundai Motor Co	1,5%	6,9%	38,6%	5,7%
Nissan Motor Co Ltd	1,1%	4,5%	28,4%	9,3%
Renault SA	1,4%	3,9%	29,5%	17,1%
Volkswagen AG	4,6%	4,5%	25,8%	9,3%

Source: Reuters

4.3.2. Multiples valuation

After defining the peer group, a decision was taken on what Multiples should better value BMW. Earnings Multiples perform better than any other indicators as stated by Liu et al. (2002). Therefore, three different Multiples were computed based on analysts' expectations for companies' earnings: Price to Earnings, Price to EBIT and Price to EBITDA. All the necessary data to compute these ratios was collected from Reuters and yielded the following results:

Table 16: BMW's peer group's Multiples

	PER	P/EBIT	P/EBITDA
Daimler AG	6,313671	4,107975	2,788197
Honda Motor Co Ltd	8,144095	7,11476	4,350436
Hyundai Motor Co	7,799442	7,196451	4,011285
Nissan Motor Co Ltd	7,265741	7,842677	3,983698
Renault SA	4,701739	5,293109	3,030418
Volkswagen AG	5,262051	3,795567	1,887095

Source: Reuters and own calculations

Then, a harmonic mean of the peer group's ratios was used. Furthermore, the expectations for the value drivers for 2019 were multiplied by the given ratio. The choice between forward and historical earnings had to do with the fact that the past is not the best indicator of future performance. Also, using forward earnings represents the best way to reflect an analyst's expectations on a relative valuation.

Table 17: BMW's relative valuation

	PER	P/EBIT	P/EBITDA
Harmonic Mean	6,317461491	5,440514876	3,078914237
Value Driver (in €millions)	7 413	10 553	16 383
BMW's share price	71,22	87,31	76,71

Source: Own calculations

One may find that Price to Earnings shows an overvaluation of the BMW Group in the market as, at the date of the valuation, shares were traded at €77,63. On the other hand, Price to EBIT seems to show a slight undervaluation. As for Price to EBITDA, it appears to show that BMW is trading at a fair price. The overvaluation may result mainly from the challenges that the market is facing. This industry has suffered major valuation losses in the markets during the first half of 2018. However, one strongly believes that this mispricing will be corrected over time and that the industry as a global is being underpriced. This leads to an undervaluation by means of Multiples. Nevertheless, two appointments should be made. First, the Multiple that shows a bigger overvaluation is the price to earnings Multiple. This Multiple is the most susceptible in what concerns accounting maneuvers and therefore is more easily manipulated. As for the other two Multiples, none of them show overvaluation and one of them even show some undervaluation in the market. It shows that BMW is more likely to be undervalued even when compared to the whole market. Not only BMW is expected to perform well due to recoveries from the automobiles market but also, it is expected to outperform its competitors.

5. Research Report Comparison

The last step within this paper was to compare the results obtained in the DCF and Relative Valuations with the ones obtained by professional analysts. Two different research reports were used: from Morningstar and Morgan Stanley.

Table 18: BMW's price targets and valuation dates

Morgan Stanley	Thesis	Morningstar
90,00	104,18	117,00
17/07/2018	30/06/2018	11/05/2018

Source: Research reports and own calculations

The proximity to the valuation date of this paper was the main criteria used in the research report choice. Nevertheless, results are very different among them.

The Morningstar valuation presents the higher price target. Morningstar's research team performed BMW's valuation through a three-stage model where they explicitly forecast the financial statements for BMW in Stage I, then they consider a Stage II where the company will fade the abnormal returns until the moment when the return on capital equals the cost of capital and then, in Stage III, a perpetuity is computed assuming that abnormal returns will not repeat. In this paper, one only considered two different periods, resulting in the first source of differences among valuations. Furthermore, the average EBITDA margin in the explicit forecast period amounted to 14,3% in the Morningstar's valuation, which came just short of the one this paper found: around 16,3%. Nevertheless, Morningstar's research team consider that BMW's shares have been trading at a discount and therefore they represent a potential upward in the market.

As for Morgan Stanley, they used the Multiples valuation. Morgan Stanley's analysts used an historical average Price to Earnings Multiple of 8,4. Once again, it was found that BMW is trading at a discount and therefore represents an attractive investment in the market. The main difference found between the valuation of Morgan Stanley and the one performed in this paper has to do with how Multiples are computed. In this paper, one used a peer group and computed a PER Multiple by looking at forward earnings. Morgan Stanley decided to use an historical average PER for which BMW has been trading.

The last appointment that should be made is related to both reports. As a matter of fact, none of the reports presents the exact same date of valuation as the one in this paper. Information released between the valuation date within this report and the dates of the reports could have a major influence in the valuation process and lead to different conclusions.

6. Conclusion

Evidences should not be dismissed and the first conclusion one may reach is that a valuation is only as good as the assumptions where it is built on. As a matter of fact, one has proved that different analysts may have different views about the company and those views could lead to different valuations. It is also evident that a relative valuation is always dependent on how good the market is in valuing the peer group. If an entire industry is under or overvalued, it is hard to perform a Multiples valuation.

Through this analysis, a price target of €104,18 was reached for BMW as of the 30th of June 2018, representing an upward potential of roughly 34% over the market price at that date. This was the valuation obtained through DCF and is believed to be the one that best represents the fair value of the company.

As for the Multiples valuation, a lower price was found. Depending on which Multiple is being used, relative valuation may lead to one assuming that BMW is under or overpriced at the valuation date. The Multiples valuation was not completely discarded but careful attention should be made while valuing a company through this method. This method is only valid under the assumption that the market is pricing the peer group correctly. Furthermore, finding the peer group is challenging and this process is only as good as the information available.

Lastly, when comparing the results obtained to the ones obtained by professional analysts, one found that all the reports tend to consider that BMW has been trading at a discount. Nevertheless, the price targets vary widely between €90 and €117, depending on the method used and the assumptions made.

It is then clear that the BMW Group represents a solid investment and it is more likely than not that to occur an upward movement in BMW's shares' price.

7. Appendix

Appendix A – Historical Income Statement

<i>(amounts in €millions)</i>	2012	2013	2014	2015	2016	2017	2Q2018
Revenues	76 848	76 059	80 401	92 175	94 163	98 678	47 717
Cost Of Sales	(61 354)	(60 791)	(63 396)	(74 043)	(75 442)	(78 744)	(37 765)
Gross Profit	15 494	15 268	17 005	18 132	18 721	19 934	9 952
Selling and administrative expenses	(7 032)	(7 257)	(7 892)	(8 633)	(9 158)	(9 560)	(4 514)
Other operating income	829	842	877	914	670	720	312
Other operating expenses	(1 016)	(875)	(872)	(820)	(847)	(1 214)	(271)
EBIT	8 275	7 978	9 118	9 593	9 386	9 880	5 479
Result from equity accounted investments	271	407	655	518	441	738	405
Interest and similar income	224	183	200	185	196	201	74
Interest and similar expenses	(375)	(469)	(519)	(618)	(489)	(412)	(174)
Other financial result	(592)	(206)	(747)	(454)	131	248	254
Net Income Before Taxes	7 803	7 893	8 707	9 224	9 665	10 655	6 038
Income taxes	(2 692)	(2 564)	(2 890)	(2 828)	(2 755)	(1 949)	(1 648)
Profit from continuing operations	5 111	5 329	5 817	6 396	6 910	8 706	4 390
Loss from discontinued operations	-	-	-	-	-	-	(7)
Net Income	5 111	5 329	5 817	6 396	6 910	8 706	4 383
Attributable to minority interest	(26)	(26)	(19)	(27)	(47)	(86)	(45)
Net Income	5 085	5 303	5 798	6 369	6 863	8 620	4 338

Source: BMW's Annual reports

Appendix B – Income Statement forecasts

<i>(amounts in €millions)</i>	2018E	2019E	2020E	2021E	2022E	2023E	2024E
Revenues	99 552	102 166	104 394	106 299	108 270	110 659	112 711
Cost Of Sales	(79 652)	(81 744)	(83 526)	(85 050)	(86 628)	(88 539)	(90 181)
Gross Profit	19 900	20 423	20 868	21 248	21 642	22 120	22 530
Selling and administrative expenses	(9 501)	(9 751)	(9 964)	(10 145)	(10 334)	(10 562)	(10 757)
Other operating income	864	864	864	864	864	864	864
Other operating expenses	(983)	(983)	(983)	(983)	(983)	(983)	(983)
EBIT	10 280	10 553	10 785	10 984	11 190	11 439	11 654
Result from equity accounted investments	552	552	552	552	552	552	552
Interest and similar income	193	193	193	193	193	193	193
Interest and similar expenses	(501)	(501)	(501)	(501)	(501)	(501)	(501)
Other financial result	(206)	(206)	(206)	(206)	(206)	(206)	(206)
Net Income Before Taxes	10 317	10 590	10 823	11 022	11 228	11 477	11 691
Income taxes	(3 095)	(3 177)	(3 247)	(3 307)	(3 368)	(3 443)	(3 507)
Profit from continuing operations	7 222	7 413	7 576	7 715	7 859	8 034	8 184
Loss from discontinued operations	(7)	-	-	-	-	-	-
Net Income	7 215	7 413	7 576	7 715	7 859	8 034	8 184
Attributable to minority interest	(66)	(68)	(69)	(70)	(72)	(73)	(75)
Net Income	7 149	7 346	7 507	7 645	7 788	7 961	8 109

Source: Own calculations

Appendix C – Non-cash items historically

<i>(amounts in €millions)</i>	2012	2013	2014	2015	2016	2017
Reversal of Impairment and Write-Downs	-	13	30	27	51	8
Impairment Losses and Write-Downs	-	(37)	(86)	(76)	(28)	(29)
Total non-cash items	-	(24)	(56)	(49)	23	(21)

Source: BMW's Annual reports

Appendix D – Non-cash items forecasts

<i>(amounts in €millions)</i>	2018E	2019E	2020E	2021E	2022E	2023E	2024E
Reversal of Impairment and Write-Downs	21	21	21	21	21	21	21
Impairment Losses and Write-Downs	(47)	(47)	(47)	(47)	(47)	(47)	(47)
Total non-cash items	(26)	(26)	(26)	(26)	(26)	(26)	(26)

Source: Own calculations

Appendix E – Provisions historically

<i>(amounts in €millions)</i>	2012	2013	2014	2015	2016	2017	2Q2018
Non-current Liabilities							
Pension Provisions	3 813	2 303	4 604	3 000	4 587	3 252	2 709
Other Provisions	3 441	3 828	4 268	4 621	5 039	5 632	5 838
Current Liabilities							
Other provisions	3 246	3 412	4 522	5 009	5 879	6 367	6 018
Total	10 500	9 543	13 394	12 630	15 505	15 251	14 565
Change in provisions	2 064	(957)	3 851	(764)	2 875	(254)	(686)

Source: BMW's Annual reports

Appendix F – Provisions forecasts

<i>(amounts in €millions)</i>	2018E	2019E	2020E	2021E	2022E	2023E	2024E
Non-current Liabilities							
Pension Provisions	2 306	1 635	1 159	822	582	413	293
Other Provisions	5 034	5 166	5 279	5 375	5 475	5 596	5 699
Current Liabilities							
Other provisions	4 902	5 030	5 140	5 234	5 331	5 449	5 550
Total	12 241	11 831	11 578	11 431	11 388	11 457	11 542
Change in provisions	(2 324)	(410)	(253)	(147)	(42)	69	85

Source: Own calculations

Appendix G – BMW’s debt outstanding as of the 30th of June 2018

Maturity Date	Amount Outstanding	Exchange rate	Amount in Euros	Currency	Issue Date	Yield
28/09/2018	111 893 076	0,8844	126 518 630	Great Britain Pound	29/06/2018	0,000%
28/09/2018	111 893 076	0,8844	126 518 630	Great Britain Pound	29/06/2018	0,000%
05/10/2018	95 109 115	0,8844	107 540 836	Great Britain Pound	29/06/2018	0,783%
29/10/2018	212 596 845	0,8844	240 385 397	Great Britain Pound	29/06/2018	0,827%
29/10/2018	83 919 807	0,8844	94 888 972	Great Britain Pound	29/06/2018	0,827%
29/06/2020	23 089 395	1,1683	19 763 241	U.S. Dollar	29/06/2018	2,820%
29/06/2021	20 076 249	1,1683	17 184 156	U.S. Dollar	29/06/2018	3,114%
29/06/2022	8 977 213	1,1683	7 683 996	U.S. Dollar	29/06/2018	0,000%
29/06/2023	15 005 259	1,1683	12 843 669	U.S. Dollar	29/06/2018	0,000%
28/09/2018	307 705 960	0,8844	347 926 232	Great Britain Pound	28/06/2018	0,000%
28/09/2018	55 946 538	0,8844	63 259 315	Great Britain Pound	28/06/2018	0,000%
27/12/2019	100 000 000	1	100 000 000	Euro	27/06/2018	-0,202%
25/06/2020	250 000 000	1	250 000 000	Euro	25/06/2018	0,027%
22/06/2020	8 376 862	1,1655	7 187 355	U.S. Dollar	22/06/2018	2,820%
22/06/2021	1 571 429	1,1655	1 348 287	U.S. Dollar	22/06/2018	3,200%
22/06/2022	1 956 179	1,1655	1 678 403	U.S. Dollar	22/06/2018	0,000%
22/06/2023	1 322 524	1,1655	1 134 727	U.S. Dollar	22/06/2018	3,420%
20/12/2018	15 000 000	1	15 000 000	Euro	20/06/2018	0,000%
15/06/2020	45 939 527	1,1607	39 579 157	U.S. Dollar	15/06/2018	2,810%
15/06/2021	48 449 606	1,1607	41 741 713	U.S. Dollar	15/06/2018	3,104%
15/06/2022	16 943 032	1,1607	14 597 253	U.S. Dollar	15/06/2018	3,270%
15/06/2023	20 901 840	1,1607	18 007 961	U.S. Dollar	15/06/2018	3,420%
12/06/2020	300 000 000	1	300 000 000	Euro	12/06/2018	0,027%
22/11/2022	1 000 000 000	1	1 000 000 000	Euro	22/05/2018	0,325%
22/05/2026	750 000 000	1	750 000 000	Euro	22/05/2018	1,028%
19/04/2022	279 732 691	0,8763	319 220 234	Great Britain Pound	19/04/2018	1,614%
13/04/2022	12 460 123	1,2329	10 106 353	U.S. Dollar	13/04/2018	3,240%
13/04/2023	10 995 618	1,2329	8 918 499	U.S. Dollar	13/04/2018	3,390%
12/04/2021	876 424 189	1,2325	711 094 677	U.S. Dollar	12/04/2018	3,234%
12/04/2021	876 424 189	1,2325	711 094 677	U.S. Dollar	12/04/2018	3,337%
12/04/2021	657 318 142	1,2325	533 321 008	U.S. Dollar	12/04/2018	2,665%
12/04/2021	657 318 142	1,2325	533 321 008	U.S. Dollar	12/04/2018	2,665%
12/04/2023	876 424 189	1,2325	711 094 677	U.S. Dollar	12/04/2018	3,598%
12/04/2023	876 424 189	1,2325	711 094 677	U.S. Dollar	12/04/2018	3,580%
12/04/2028	657 318 142	1,2325	533 321 008	U.S. Dollar	12/04/2018	3,895%
12/04/2028	657 318 142	1,2325	533 321 008	U.S. Dollar	12/04/2018	3,879%
12/04/2021	384 070 900	7,7473	49 574 807	Chinese Yuan	10/04/2018	4,364%
30/03/2020	24 553 900	1,2301	19 960 897	U.S. Dollar	29/03/2018	2,720%
29/03/2021	22 391 762	1,2301	18 203 205	U.S. Dollar	29/03/2018	3,130%
29/03/2022	20 672 217	1,2301	16 805 314	U.S. Dollar	29/03/2018	3,240%
29/03/2023	28 334 794	1,2301	23 034 545	U.S. Dollar	29/03/2018	3,390%
27/03/2020	250 000 000	1	250 000 000	Euro	27/03/2018	-0,105%
23/03/2020	34 615 250	1,2351	28 026 273	U.S. Dollar	23/03/2018	2,710%
23/03/2021	36 718 668	1,2351	29 729 308	U.S. Dollar	23/03/2018	3,034%
23/03/2022	12 633 655	1,2351	10 228 852	U.S. Dollar	23/03/2018	3,230%
23/03/2023	9 078 878	1,2351	7 350 723	U.S. Dollar	23/03/2018	3,380%
16/03/2021	16 033 304	1,2287	13 048 998	U.S. Dollar	16/03/2018	3,130%
16/03/2023	5 333 918	1,2287	4 341 107	U.S. Dollar	16/03/2018	0,000%
09/03/2021	16 543 383	1,2305	13 444 440	U.S. Dollar	09/03/2018	3,130%
09/03/2022	12 505 697	1,2305	10 163 102	U.S. Dollar	09/03/2018	0,000%
06/03/2020	200 000 000	1	200 000 000	Euro	06/03/2018	-0,116%
23/02/2021	55 946 538	0,8799	63 582 837	Great Britain Pound	23/02/2018	1,220%
12/02/2020	223 786 152	0,8881	251 983 056	Great Britain Pound	12/02/2018	1,119%
06/02/2020	150 000 000	1	150 000 000	Euro	08/02/2018	0,000%
06/02/2020	150 000 000	1	150 000 000	Euro	08/02/2018	-0,158%
07/08/2019	100 000 000	1	100 000 000	Euro	07/02/2018	-0,071%
07/02/2020	300 000 000	1	300 000 000	Euro	07/02/2018	-0,187%

06/02/2020	133 367 449	1,5458	86 277 299	Canadian Dollar	06/02/2018	2,628%
06/08/2021	200 051 173	1,5458	129 415 948	Canadian Dollar	06/02/2018	2,920%
24/01/2020	250 000 000	1	250 000 000	Euro	24/01/2018	-0,212%
10/07/2023	1 250 000 000	1	1 250 000 000	Euro	10/01/2018	0,442%
10/01/2028	750 000 000	1	750 000 000	Euro	10/01/2018	1,308%

Source: Reuters

Appendix H – Beta forecasts

<i>Beta</i>	Beta	R2
Daily	1,125	66,964%
Weekly	1,242	69,598%
Monthly	1,389	68,610%

Source: Own calculations

Appendix I – Peer Group definitions parameters

Company Name	Revenue Growth	WACC	E/V ratio	ROIC
Bayerische Motoren Werke AG	-0,67%	4,62%	27,43%	13,32%
BAIC Motor Corp Ltd	11,63%	10,78%	24,39%	21,55%
Daimler AG	3,56%	5,91%	23,31%	7,00%
Dongfeng Motor Group Co Ltd	5,03%	8,67%	50,92%	6,73%
Fiat Chrysler Automobiles NV	4,30%	7,45%	22,59%	17,36%
Ford Motor Co	7,15%	4,29%	14,12%	6,50%
General Motors Co	5,96%	6,02%	16,55%	15,10%
Honda Motor Co Ltd	5,64%	5,46%	41,21%	7,10%
Hyundai Motor Co	1,49%	6,89%	38,62%	5,71%
Isuzu Motors Ltd	7,16%	7,27%	45,20%	0,00%
Kia Motors Corp	0,61%	8,31%	51,66%	6,89%
Mazda Motor Corp	6,77%	7,49%	43,05%	5,90%
Mitsubishi Motors Corp	12,54%	8,63%	43,28%	0,00%
Nissan Motor Co Ltd	1,08%	4,50%	28,40%	9,30%
Peugeot SA	17,35%	8,70%	24,88%	19,82%
Renault SA	1,36%	3,86%	29,51%	17,08%
SAIC Motor Corp Ltd	10,76%	6,58%	31,45%	-52,60%
Subaru Corp	0,39%	8,19%	54,44%	0,00%
Suzuki Motor Corp	6,44%	6,19%	39,99%	17,30%
Tata Motors Ltd	13,03%	10,53%	28,95%	8,16%
Toyota Motor Corp	2,06%	5,06%	38,08%	9,03%
Volkswagen AG	4,60%	4,45%	25,76%	9,28%

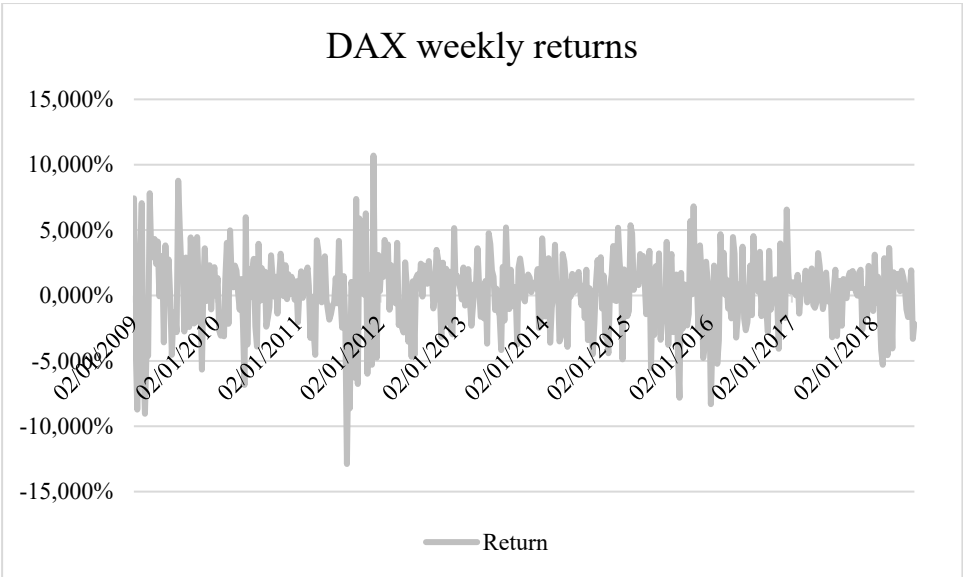
Source: Reuters

Appendix J – 10-Year German bunds rate



Source: Reuters

Appendix K – DAX weekly returns



Source: Reuters

8. Bibliography

➤ Books

Brealey, R.A. and Myers, S.C. (1996), “Principles of corporate finance”, Fifth Edition, McGraw-Hill

Damodaran, A. (2002), “Investment valuation: tools and techniques for determining the value of any asset”, Second University Edition, New York: John Wiley & Sons Inc.

Koller, T., Copeland, T. and Murrin, J. (2000), “Valuation: measuring and managing the value of companies”, Third Edition, John Wiley & Sons Inc.

➤ Papers

Fernandez, P. (2007), “A more realistic valuation: adjusted present value and WACC with constant book leverage ratio”, Journal of Applied Science, p14-20

Goedhart, M., Koller, T., Wessels, D. (2005), “The right role for multiples in valuation”, McKinsey on Finance, p7-11.

Liu, J., Nissim, D., Thomas, J. (2002), “Equity valuation using multiples”, Journal of Accounting Research, p.135-172

Luehrman, T.A. (1997), “What’s it Worth? A General Manager’s Guide to Valuation, Harvard Business Review, p132-142

Luehrman, T. A. (1997), “Using APV: A Better Tool for Valuing Operations”, Harvard Business Review, p145-154

Young, M., Sullivan, P., Holt, W. and Nokhasteh, A. (1999), “All roads lead to Rome: an integrated approach to valuation models”, Goldman Sachs investment research

➤ **Websites**

Damodaran, A. (2018), <http://pages.stern.nyu.edu/~adamodar/>

IHS, https://ihsmarkit.com/pdf/Automotive-LV-Sales-sample-Oct-2017_144792110915583632.pdf

KPMG, <https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html>

OECD, <https://data.oecd.org/gdp/real-gdp-long-term-forecast.htm>

Persistence Market Share, <https://www.persistencemarketresearch.com/market-research/motorcycle-market.asp>

The BMW Group, <https://www.bmwgroup.com/>

➤ **Other Resources**

Thomson Reuters Eikon Platform (2018)

Tudela Martins, J.C., “Equity Valuation dissertation seminar”, Católica-Lisbon School of Business and Economics

Tudela Martins, J.C., “Firm Valuation”, Católica-Lisbon School of Business and Economics