BMW AG – Equity Valuation

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Research Report

BMW Automotive Group

Bayerische Motoren Werke (BMW) is the leading company in the premium car and motorcycles manufacturing industry. It has been showing profitable and sustainable operations throughout the years, mostly as a result of good management decisions, like the implementation of Strategy NUMBER ONE, and constant efforts to keep technology and innovation at its best.

With such sensitivity to macroeconomic effects, represented by a correlation of 0,93 with world's GDP behavior, BMW is inserted in a highly competitive and volatile industry. Nevertheless, its constant product restructuration and the creation of new models, together with the powerful brand name, have been helpful for overcoming such obstacles like the latest financial crisis.

By presenting CAGR of 9,7% from 2009 to 2014, the company showed an outstanding ability to adapt to adverse situations, making one believe on its future success. The expectation of world's economy stabilization and continuous growth in china, albeit no longer in double digits, provides BMW to keep growing in more moderate level, much like what is to happen with the industry itself, than what was registered in 2014, while still guaranteeing its leading position among its peers.

Valuation Methods

Discounted Cash Flows: DCF discounted at WACC is the main method used to value BMW's common stock. An explicit period of five years was created, as a way to reflect the impact of economic stabilization in one's projections. A CAGR of 5,8% was applied between 2014 and 2019, together with a perpetuity growth of 1%. WACC was computed as a function of cost of debt, equity and capital structure, that is to keep constant over the projection period, resulting in a value of 3,23%.

Multiples Approach: Used as a benchmark for DCF. A peer group was defined, taking into account growth, capital structure, profitability and risk. Two multiples were used, the EV/EBITDA and the P/E.

Recommendation: BUY

BMW AG, GR Equity

Date: 31st December 2014

Price: 89,77€

Target Price: 108,77€

 # Shares: 656,50 million

Performance

Financials	2015E	2016E	2017E
EBIT Margin	0,112	0,112	0,112
Growth rate	0,087	0,073	0,063
EPS	9,760	10,514	11,214

Multiples	Ratio	Po
P/E	9,91	104,19
EV/EBITDA	8,83	118,66

DCF	
Firm Value	139 028,20
Market Cap	71 409,21
Po	108,77

Credit Rating

Moody's: A+

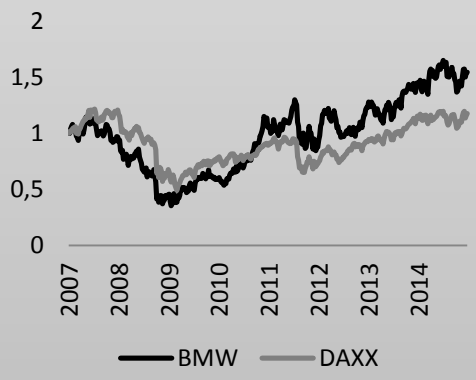
Standard & Poor's: A-

NATIXIS Valuation

Date: 15th December 2014

Target Price: 90€

Stock Price historical performance



Financials

The automotive segment has been and will keep on being the most important business area for the group in what sales are concerned. Assumptions about this account are undoubtedly the most relevant and with most impact on the final price.

Table 1 - Financials analysis and forecast

INCOME STATEMENT (Million €)	**2014**	**2015E**	**2016E**	**2017E**	**2018E**	**2019E**	**CAGR (%)**
Revenues	**80 401,00**	**88 072,97**	**94 527,64**	**100 526,61**	**105 917,27**	**110 554,16**	***0,066***
Automotive	75 173,00	81 224,66	86 950,77	92 210,56	96 865,88	100 787,01	***0,060***
Motorcycles	1 679,00	1 747,25	1 818,27	1 892,18	1 969,10	2 049,14	***0,041***
Financial Services	20 599,00	22 576,99	24 515,65	26 371,62	28 099,99	29 656,05	***0,076***
Gross profit	**17 005,00**	**18 274,54**	**19 613,84**	**20 858,59**	**21 977,11**	**22 939,24**	***0,062***
Automotive	13 952,00	13 820,88	14 607,13	15 275,80	15 805,55	16 177,99	***0,030***
Motorcycles	314,00	244,40	205,28	176,83	161,76	162,68	***- 0,123***
Financial Services	2 816,00	2 998,07	3 501,83	4 024,21	4 554,22	5 079,48	***0,125***
EBITDA	**13 287,00**	**14 672,15**	**15 958,72**	**17 196,18**	**18 355,04**	**19 405,69**	***0,079***
% of Sales	*0,165*	*0,167*	*0,169*	*0,171*	*0,173*	*0,176*	
Depreciation & Amortization	4 170,00	4 765,63	5 327,11	5 890,87	6 444,54	6 974,87	*0,108*
% of sales	*0,052*	*0,054*	*0,056*	*0,059*	*0,061*	*0,063*	
EBIT	**9 117,00**	**9 906,52**	**10 631,61**	**11 305,31**	**11 910,50**	**12 430,82**	***0,064***
% of Sales	*0,113*	*0,112*	*0,112*	*0,112*	*0,112*	*0,112*	
Net profit	**5 816,00**	**6 407,39**	**6 902,27**	**7 362,08**	**7 775,12**	**8 130,25**	***0,069***
Total Investments	13 594,00	6 870,17	12 973,97	12 433,79	12 486,05	12 359,49	
Variation NWC	7 495,00	465,01	6 267,47	5 260,92	4 889,50	4 393,69	
Capex	6 099,00	6 405,16	6 706,50	7 172,87	7 596,55	7 965,79	*0,055*
% of sales	*0,076*	*0,073*	*0,071*	*0,071*	*0,072*	*0,072*	
FCFF	***- 3 138,43***	***4 880,23***	***- 167,21***	***1 396,54***	***2 311,00***	***3 323,01***	
PV FCFF	*10 709,53*						
Terminal Value	*128 318,66*						
FIRM VALUE	***139 028,20***						
MV Debt	*70 702,98*						
Cash	*7 688,00*						
Pension Provisions	*4 604,00*						
Equity	***71 409,21***						
# shares	*656,50*						
Po	***108,77***						

WACC	**0,03231**
D/V	0,55
Rd	0,011
E/V	0,45
Re	0,063
Rm-Rf	0,058
Be	1,01

It is assumed that product life cycle will keep on increasing sales for the next year, given the most recent model lines created and product restructuration in late 2013. Sales are to increase by 8% in 2015 and smoothed until GDP values in 2019. Furthermore, it is believed that further restructuration is to be kept, reason why capital expenditures are to represent around 7% of sales, as expected by the group. As a consequence, Depreciation and Amortization are to follow the same trend.

Table 2 - Peer Group

Company	EV/EBITDA	P/E Ratio
VOLKSWAGEN AG	6,44	8,25
TOYOTA MOTOR CORP	8,83	10,13
DAIMLER AG-REGISTERED SHARES	10,62	10,59
NISSAN MOTOR CO LTD	7,65	9,91
RENAULT SA	9,74	8,75
Peer Group Median	**8,83**	**9,91**

Table 3 - Multiples Valuation Output

BAYERISCHE MOTOREN WERKE AG	EV/EBITDA	2Yr Forward EV/EBITDA	P/E Ratio	2Yr Forward P/E Ratio
Peer Ratio	8,83	8,83	9,91	9,91
Critical Factor	13 287,00	15 958,72	5 816,00	6 902,27
# Shares	656,50	656,50	656,50	656,50
Price	**82,73€**	**118,66€**	**87,79€**	**104,19€**

Peer group was computed by the application of five different approximations: top twenty companies by sales volume according to Bloomberg, Return on Invested Capital to control for profitability, Capital Structure, EBITDA growth and Raw Beta to account for risk. Two year forward multiples are used as a way to cut the error from the median of the peer group by 16%.

This valuation model, which yields an average price of 111,43€, supports the result from the DCF valuation and the statement that the market has been undervaluing BMW's stocks.

Abstract

Title: Bayerische Motoren Werke's Valuation

Author: João António Ferro da Costa

The main goal of this master thesis to is compute the most accurate common share price for Bayerische Motoren Werke (BMW) at the date of 31st December 2014. For that, a review of relevant literature was done to find the Discounted Cash Flows valuation model, with the Weighted Average Cost of Capital (WACC) as the discount rate, as the most commonly used and appropriate to be applied for such purpose.

With a WACC of 3,23%, the result was market capitalization of 71 409,21 million Euros and price per share of 108,77€. The multiples approach was also used both as a benchmark that confirmed the results of the mentioned valuation and as a means of proving the group's over performance when compared to its most relevant peers.

This makes one believe that BMW is being undervalued by the market, given a price at time of valuation of 89,77€, making it a good investment opportunity. A "BUY" recommendation is the result of this master thesis, taking into consideration that macroeconomic effects may have significant influence. Nevertheless, it is expected that only with either a decrease in perpetuity growth rate of 18,5% or an increase in WACC of 7,7% will the above statement not hold. Also, it is believed that with a 95% confidence level, price per share of BMW will not go below 100,39€.

Acknowledgments

The execution of this Master thesis has been of greatest importance to me, as it enabled me to improve my knowledge and expertise in the field of Equity Valuation.

For that, I would first like to thank Professor José Carlos Tudela Martins for all his help, availability and guidance throughout the process.

Finally, I would like to dedicate this dissertation to all my friends and family, who were always available to support and motivate me in every step and stage of such important project.

Contents

Introduction

Valuation is known as the action of determining the economic value of a specific asset or company. The perception of value is acknowledged as a relevant management technique and is becoming more and more important. For that, the purpose of this Master Thesis is to find the value per share of the BMW group, at the 31st of December 2014.

As there is no common consensus on what is the best valuation technique to be used to value such company, a presentation of relevant literature is initially done to review the different approaches and its advantages. Valuable inputs are considered from several public and leading articles on the subject to help one choosing the best model to be used.

There is also the need to understand what the conditions of the surrounding environment of BMW are. Whilst having recovered from the past financial crisis and keeping to break new sales records all over the world, the company is competing in the very competitive market of premium cars and motorcycles, with several players and threats that need to be taken into account. Factors like the uncertainty of emerging markets, economic conditions and raw materials are drivers for the performance of the industry and are further explained by an industry analysis and presentation of the company.

After choosing the DCF method discounted at the rate of WACC and the multiples approach as the most suitable, the result is a target stock price that one believes to reflect future expectations about the company. Nevertheless, a sensitivity analysis is done, in order to find a suitable range of values between which the price is expected to fluctuate and the Value at Risk approach is applied to find the maximum weekly loss for one that is considering BMW as a possible investment.

The last step is a comparison to the valuation of a leading investment bank, NATIXIS, is done, where the most relevant differences in valuation models, assumptions and results are discussed.

Research question and sub-research questions

"By applying a fundamental analysis to BMW, what is the fair value of its stock as of 31st December 2014 and how is it compared to the value perceived by the market?"

To find the correct answer to the presented research question, three defined sub-questions are presented and answered in different sections throughout this dissertation, as a way to better structure the ideas behind the valuation.

a) What are the main macroeconomic effect and external drivers for BMW and its industry?
b) What are the future expectations for the industry and how will BMW perform financially?
c) What are the most suitable valuation approaches and their sensitivity to changes on main assumptions?

Literature Review

The valuation of a project, a strategic partnership or, as in the case of this dissertation, of a company, has not only become a prerequisite for any manager who wants to have significant impact in a company, but also the financial competency that today's managers want to learn and master.

(Luehrman, 1997a) states that the way a company makes its estimations on the value of any decision process is of most importance to how it allocates its resources, which makes it a key driver for the overall performance of the business. In that sense, the way it distributes its resources has, as its foundation, a set of calculations to compute the value added from each move.

However, according to (Young et al., 1999), there are a whole lot of new methods and theories coming every year that is converging to a point of overload. This constitutes a problem, as the more approaches we use on our assets, the weaker the result of our analysis will be. By having different mathematical basis, they may very likely produce different or even contradictory valuations.

(Luehrman, 1997a) states that in order to value their opportunities all managers now tend to apply the same basic models to all problems. Also, their valuation and assumptions should be based on three main principles: risk, timing and cash. Furthermore, if we take into consideration that the existing models are just a different approach to value the same underlying, it should be safe to say that, using similar assumptions, we should be able express one in terms of any other (Young et al., 1999).

(Damodaran, 2002) uses a much more practical approach to this topic, by stating that there are three different ways to valuation: Discounted Cash Flows (DCF), that expresses the value of an asset as a function of the present value (PV) of the future expected cash flows; Relative Valuation, that tries to make an estimation to the value of an underlying, by using the price of similar assets in the active market using analogous variables such as earnings, cash flows book values or sales; and Contingent Claim that is focused on assets that share option characteristics and uses option pricing models.

This section tries to summarize the most well-known models that are to be used for valuing the BMW group. More relevant literature can be found referenced in appendix 1.

Discounted Cash Flows Model

The DCF valuation, invented in the 1970's, came as the model to be used in any corporate asset valuation process (Luehrman, 1997a). According to (Goedhart et al., 2005), managers gravitate toward DCF analysis as the most accurate and flexible valuation method for any project, division or company. The DCF model is a valuation used to estimate the attractiveness of any investment opportunity. It is based on the PV of the future expected cash flows that will flow to the entity by a specific project (Luehrman, 1997a). The computation of these values goes according to the formula:

Equation 1 – Discounted Cash Flows

$$Value = \sum_{t=1}^{t=n} \frac{CFt}{(1+r)^t}$$

Where:

n = life of the asset

CFt = Cash Flow in period t

r = Discount rate that reflects the risk of the estimated cash flows

(Luehrman, 1997a) also explains that one specific version of the DCF model came to be the standard. In order to get to the market value of a business one should discount the future expected cash flows, more specifically the free cash flows to the firm (FCFF) using the weighted average cost of capital (WACC). This should be the same as saying that it is the value of debt plus the one of shareholder's equity (Fernandez, 2013).

Herewith, we should get to an approximation (or exact, if the calculations are done with extreme precision) of the market value of the firm. Because we are talking about forecasting expected cash flows, it is also safe to say that we cannot estimate all the values until infinity, meaning that we will have to consider two different growth stages. That is why one needs to add the terminal value to the formula, which is going to be explained below and as shown in the formula.

Equation 2 - Firm Value by Discounted Cash Flows

$$Value\ of\ the\ Firm = \sum_{t=1}^{t=n} \frac{FCFFt}{(1+WACC)^t} + \frac{Terminal\ Value}{(1+WACC)^t}$$

(Damodaran, 2002) states that the FCFF represent the remaining cash flows after considering all operating expenses, reinvestment needs and taxes, but excluding both the impacts of equity and debt holders.

The DCF valuation represents only one of the three most used methods and it is on the basis for any other model used for valuation, being the most used one in the real world the ones based in Relative Valuation. In this valuation, the objective is to try to find the intrinsic value of an asset, based on its fundamentals. This can be defined as the actual value of a company or an asset based on the causal perception of its true value that includes all features of the business.

It is the correct estimation of the future expected cash flows but also considering the correct discount rate associated with them with absolute precision. Furthermore, it can be expected that the result determined by these computations will differ from the prices in the market, as the markets tend to make mistakes. However, it is also safe to assume that sooner or later both values will converge (Damodaran, 2002).

Free Cash Flows

FCFF can be defined as a measure of performance that is based on the net amount of cash generated by a company, including expenses, taxes and variations of working capital and investments for the year.

Equation 3 – Free Cash Flows to the Firm

$$FCFF = EBIT(1-t) + Depreciation - CAPEX - \Delta WCN$$

Depreciation is considered to be a cost and is included in the financial statements of a company, but it is not a cash expense. However, its value still needs to be considered for tax purposes. This is why we use EBIT (1 - t) and add up the value of depreciation again. This is

also valid for all other non-cash expenses that the company might have. FCFF can also be described as the cash available to pay the company's suppliers (Pinto, 2010), thus all the expenditures that are crucial to keep the business running in a productive manner need to be deducted, even if they are not considered as core activities, again because they do not represent available cash. As an example we have the impact of accounts receivable/payable.

(Pinto, 2010) also states that Free Cash Flows to the Equity (FCFE) are another type of free cash flow. It is the cash available to pay all the common equity holders after interest, principal payments and expenses have been paid and necessary investments in working capital (WC) and fixed capital have been made. It is also possible to get to FCFE from FCFF:

Equation 4 – Free Cash Flows to the Equity

$$FCFE = FCFF - Interest(1 - T) + Net\ Borrowings$$

The advantage of using one of these two types of free cash flows is that they are a possibility for DCF models when one is trying to analyze either the market value of a company, with FCFF discounted at WACC, or the market value of Equity, with FCFE discounted at the required rate of return on equity.

The author also states that there can be reasons for preferring one kind of cash flow over the other. If we are talking about a relatively stable capital structure, FCFE is more direct and simpler to use. If we are facing a levered company with a negative FCFE, however, FCFF should be more effective on valuing the entire company or its equity. Furthermore, if talking about a company with a history of leverage changes, it is easier to accept a growth rate applied to FCFF than to FCFE.

Weighted Average Cost of Capital

According to (Luehrman, 1997a), WACC is nothing more than an opportunity cost that represents the return that any company could expect to get from other investments with the same risk characteristics. Opportunity cost is based on time value, the return on a nominal risk-free investment for not using your money in other riskier moves. It also includes a risk premium effect, which reflects the extra risk we are referring to and that the user might be willing to bear, according to its profile. Also, WACC tries to get the effect of tax advantages

related to borrowing money. It is a tax-adjusted discount rate that adds this effect by picking up the value of interest tax shields (ITS) associated with the debt level of the user.

(Damodaran, 2002) states WACC is the cost of capital resulting from the different ways of financing used by the firm, weighted by their market value proportions. Being the result of a combination between the cost of capital and the required rate of return on capital, referring to this measure as a "cost of capital" can be misleading, as it is not just a cost (Fernandez, 2013).

(Luehrman, 1997a) explains that both cost of debt and cost of equity are opportunity costs that include time value and its own risk premium. However, WACC also considers the capital structure of the company and the adjustment for the tax effect, by deducting its absolute value. Needless to say that this assumption contributes for reducing the value of WACC, increasing the PV of future expected cash flows, when compared with a non-tax adjusted opportunity cost.

Equation 5 – Weighted Average Cost of Capital

$$WACC = \frac{D}{V} * Rd * (1 - T) + \frac{E}{V} * Re$$

As we can see, the cost of debt, Rd, is weighted by its respective level of debt on the overall market value of the company, D/V, and deducted by the effect of taxes. This feature of WACC is based on the restrictive assumption that the values of the ITS are computed with precision (Fernandez, 2013). The same happens with the required return of equity, Re, that is weighted by its level of equity on the overall market value of the company.

Finally, according to (Goedhart et al., 2010), the weight of cost of debt and cost of equity, for mature companies, should be computed using the company's current debt-to-value ratio, with market values of debt and equity, as this represents an approximation of its target capital structure.

Cost of Equity

The cost of equity represents, in financial theory, the return that the stockholders require for a company. According to (Goedhart et al., 2010) it can be computed having in mind three main factors, that go accordingly to the foundations of the Capital Asset Pricing Model (CAPM), which represents the most commonly used model for the estimation of this cost. It has been

the most commonly used and has become the standard in real-world analyses of risk and return (Damodaran, 2002).

The CAPM differs from other models, like the Fama-French three-factor model or the Arbitrage Pricing Theory model (APT), for the way it defines risk. The model tries to define risk having in mind its sensitivity to the stock market. It takes into consideration the risk-free return rate (*rf*), the market risk premium, that represents the difference between the expected return on a market portfolio (*Rm*) and the return on riskless bonds and is common to all companies, and the risk of each company relative to the average company (βi) (Goedhart et al., 2010).

CAPM can be expressed according to the following equation:

Equation 6 – Capital Asset Pricing Model

$$E(Ri) = rf + \beta i[E(Rm) - rf]$$

There are also four assumptions that need to be taken into account: first, the existence of transaction costs is excluded. Second, every underlying can be traded. Then, investments are infinitely divisible, meaning that anyone can purchase a small fraction of a unit of the underlying. Finally, it is assumed that the market is perfect and that there is no asymmetry of information, thus investors are not able to find any under or overvalued assets in the marketplace (Damodaran, 2002).

The presence of beta in the equation is what enables the model to adjust for the company-specific risk, measuring asset's price movement relative to the market and representing to what extent the portfolio of the investor is diversified. This means that companies with a high risk relative to the market will present excess returns that exceed the market risk premium and that companies with low betas will present the opposite effect (Goedhart et al., 2010). Also, when computing values like β, a critical analysis must be made when results are presented. As an example, both the industry average and historical data are many times used to compute this parameter. However, the value presented can be so big or so small, due to the high variation that can happen driven by the different time period used for the computation, that goes against common sense (Fernandez, 2004).

Cost of Debt

Cost of debt represents the effective rate that a company has to pay for its current debt. However, it is normally computed in after-tax basis, since the interest payments represent a tax-deductible expense. Also, for the computation of WACC, we need to take into consideration de after-tax cost of debt. (Goedhart et al., 2010) states that there are different ways of computing this cost, according to the different types and stages of companies we are analyzing.

When analyzing firms with publicly traded debt, one should consider the cost of debt to be equal to the Yield to Maturity (YTM), computed by the PV of the bond's price and the promised future cash flows (Goedhart et al., 2010). If considering a company that does not trade its debt very often, the company's debt rating should be used to make a more accurate estimation of the YTM, using the company's marginal tax rate to keep cost of debt in an after-tax basis.

Also, if analyzing an investment-grade firm, which represents a company with relatively low probability of default, one should consider the YTM of the long-term, option-free bonds as its cost of debt, again using an after-tax basis. Finally, if the firm is not rated, a good estimate should be the computation of the interest coverage ratio, which gives more emphasis on the borrowings incurred in a recent past (Damodaran, 2001).

Equation 7 – Interest Coverage Ratio

$$Interest\ Coverage\ Ratio = \frac{Earnings\ Before\ Interests\ and\ Taxes}{Interest\ Expense}$$

The YTM, however, can lead to an inconsistent enterprise valuation, as we are using a promised rate of return for a company's debt, assuming that all coupons and debt are fully paid and on time. Thus, while considering expected future cash flows one should also use an expected rate of return as the discount rate. YTM then represents only a good proxy for the cost of debt.

Terminal Value

The terminal value represents an expectation for how the growth of a company will be in perpetuity. In a DCF valuation, analysts normally consider a specific amount of years at their choice for individual annual forecasts and the terminal value (Young et al., 1999).

As the years go by, it becomes harder and harder to predict the growth of a company. Will it maintain high growth? Will it start growing at a slower rate that will match the one in which the economy will operate? This second possibility is what is called as stable growth that can be sustained in perpetuity, allowing for an estimation of all the future cash flows beyond the point where the computation of the terminal value begins (Damodaran, 2002).

The author also states that there are three different ways of computing the terminal value: Assuming a liquidation value for the firm's assets in the terminal value and determining what would be the potential payment from other for those assets; applying a multiple to earnings, revenues or book value to estimate the terminal value; and assuming that the FCFF will grow at a constant rate in perpetuity, as stated earlier. According to (Young et al., 1999), this specific method of computing the terminal value goes as follows:

Equation 8 – Terminal Value

$$Terminal\ Value = \frac{FCF(n+1)}{WACC - g}$$

The author also states that these two last methods are more focused in valuing the firm on a going concern basis at the time of estimation of the terminal value.

Limitations of the DCF model

Despite being the most used and well know firm valuation method, the DCF also comes with limitations, mainly about its assumptions and potential for errors in its computation.

(Damodaran, 2002) explains that DCF valuation is much based on expected cash flows and discount rates. Having this in mind, the approach becomes the easiest to use for companies that present positive cash flow, which can be forecasted with reliability. As we get further from this idealized setting, the harder the valuation becomes.

Also, the author believes that there is a lot of information about a company's assets that is not shared with analysts and assumptions need to be made. This means that the intrinsic value we are computing by using DCF might not be the true intrinsic value needed for a precise valuation. (Luehrman, 1997a) complements that the problem increases with the presence of WACC in the equation. This type of discount factor is only suitable for companies with

simple and static capital structures. The more complicated the capital structure, tax position or funding policy, the more likely it is for mistakes to happen.

One of the precautions we must have is to carefully make adjustments not only project by project, but also period by period. Furthermore, (Luehrman, 1997b) argues that WACC has never been the best at introducing financial effects into the equation, unless when considering simple capital structures.

Finally, (Fernandez, 2013) also states that there is a set of variables, misconceptions and errors that come with the use of WACC. One example is the fact that the computation of this discount factor is fairly dependent on a correct valuation of tax shields, which are highly dependent on the debt policy of the company and, consequently, its capital structure. Unless it is fixed, harder will it become to forecast the appropriate discount rate and its impact on the accounts of the company.

Relative Valuation Models

As it has been explained, the concept of valuation is much reliant on estimating key ingredients of firm value, such as Return on Invested Capital (ROIC), growth and WACC, that if misinterpreted can lead to errors in valuation or strategic moves. It is then believed that Multiples can be helpful in creating a fair proxy to such forecasts (Goedhart et al., 2005).

Relative Valuation provides an opportunity to value the overall company or its assets upon the similarity to others priced in the market (Damodaran, 2005). It is of course necessary to only take into consideration companies with similar expectations for the key components used. If done right, the valuation can even make one conclude about the expectations of the market or industry the asset is in (Goedhart et al., 2005). Additionally, if markets are pricing assets right, both DCF and Multiples valuation should congregate to the same values. The opposite can happen as well, if the market is overpricing or underpricing assets of a given industry (Damodaran, 2005).

(Damodaran, 2005) also states that there are three main steps to be followed when using relative valuation models: The first is to find comparable assets, also called peer group, that are priced in the market. Companies that are from the same sector as the one being analyzed are many times considered as a comparable, but that doesn't mean they are appropriate. The underlying assumption here made is that companies from the same industry are similar in terms of risk, growth and cash flows, meaning that they can be compared. (Liu et al., 2002)

agrees with this idea, by stating that having a peer group composed by companies from the same sector should result in a more reliable valuation.

However, it becomes difficult to implement when there is a relatively small amount of firms in the same sector. Then, as assets tend to be different in terms of size or units, the need for standardization arises. It is the process of turning market prices into variables that can be compared. In the case of stocks, the process normally means turning market values of equity or firm to multiples like earnings, revenues or book value or to measures that are a particular attribute of firms in the same industry. The last step is to analyze and validate data. Again, the different attributes in comparable companies should yield different multiples. As an example, a company with a higher growth rate should return higher multiples than one with a lower rate in the same sector.

Moreover, (Goedhart et al., 2005) supports that, based on empirical evidence, multiples should have in their foundation forecasts, rather than historical values or, if not possible, to be based in the latest values available, in order to exclude one-time events.

Another characteristic of this valuation model in question is that different sectors should be more effectively valued by different multiples. (Fernandez, 2001) has come to the conclusion that in the sector of investment banking, P/E and EV/EBITDA ratios are the most common and effective employed. (Damodaran, 2005), on the other hand considers that EV/EBITDA is most suitable to companies with heavy infrastructure, like cable or telecom, and price to book ratios more common in financial services.

As a complement, we shall present and describe the most commonly used multiples.

Price to Earnings Ratio

The Price to Earnings Ratio (PER), is considered to be the most commonly used multiple. Its attractiveness comes from its simplicity on relative valuations or even on pricing initial public offerings (IPO) (Damodaran, 2002). However, the author also states that there are some complications relating to its proximity to the company's financial structure and variations on earnings. (Goedhart et al., 2005) complements this statement, by identifying two main flaws to the ratio: First, the fact that it is dependent on capital structure, meaning that given the impact of leverage, managers can intentionally increase PER, by replacing debt with equity. Then, the fact that it is based on earnings, which means it may be including one-time events such as write-offs, and other non-operating items. PER can be computed by:

Equation 9 - Price to Earnings Ratio

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

(Koller et al., 2012) summarizes that a company that is fully financed by equity should show different PER results than one financed partially with debt. The one with higher debt should show lower PER, having in mind the *ceteris paribus* assumption.

One also needs to take into account that PER is not suitable for companies with negative earnings. Thus, seasonable companies should not be valued according to this ratio (Damodaran, 2002).

Price to Book Ratio

Many investors have taken their time to better analyze the Price to Book Ratio (PBR). It is believed that stocks that are being traded at a lower price than the book value of equity can be considered as great candidates for undervalued portfolios and vice-versa (Damodaran, 2002). The author also presents many reasons why the ratio has been so useful. First, looking at book values gives a more stable and intuitive perspective of the company that can then be compared with market values. Second, given the consistency and effort of the accounting standards to ensure comparability across firms, a better proxy is provided for signs of under or over valuation. Third, as there are far fewer companies that present negative book values than firms that present negative earnings, the PBR can be used more often, including to value firms that cannot be valued by the PER. The computation of the ratio goes as follows:

Equation 10 - Price to Book Ratio

$$PBR = \frac{Market\ Value\ of\ Equity}{Book\ Value\ of\ Equity}$$

There are also some disadvantages that need to be considered, according to (Damodaran, 2002). To begin, some book values, as the example of earnings, can also be affected by accounting rules, such as the ones for depreciation or other measures. When the accounting standards used are different across companies, or even across countries, PBR can become insignificant. Then, PBR also becomes useless when comparing companies that do not have significant tangible assets, as the example of services or technology firms. Finally, reporting

negative earnings over many years, can also lead to negative book values of equity and consequent negative values of PBR.

Revenue Multiples

The basic concept about revenue multiples is to translate the relation between the value of a business and the revenues it provides. In this case, firms with higher value for revenue ratio should be better priced in the market than companies with lower ratio.

(Damodaran, 2002) presents three reasons why sales multiples are attractive to investors as proxies for valuation: They can never be negative, even for young or distressed firms, as it happens with both ratios presented above. This way, it may not be needed to eliminate companies from the sample of comparable companies; they are hardly manipulated, as they are not so dependent on accounting rules and decisions; when talking about cyclical firms, for example, revenue multiples are much more effective, as they are less affected by changes in the economy than earnings multiples.

(Damodaran, 2002) also states that there are two main multiples presented in this category. The first is the most simple and popular that establishes the relationship between market value of equity and revenues of a firm and is called price to sales ratio.

Equation 11 - Price to Sales Ratio

$$Price\ to\ Sales\ Ratio = \frac{Market\ Value\ of\ Equity}{Total\ Sales}$$

The second is seen as more robust and relates the enterprise value of a firm, which includes debt and equity in market values, and revenues.

Equation 12 - Enterprise Value to Sales Ratio

$$EV\ to\ Sales\ Ratio = \frac{Enterprise\ Value}{Total\ Sales}$$

Again, there are some disadvantages to these multiples. Even though accounting principles for revenues are much similar across different industries, there have been cases of companies that

use questionable methods for reporting sales, in order to increase their ratios. Likewise, using revenue multiples can lead to misleading and incorrect conclusions.

Assessing high values because revenues are high can mean excluding many other important measures of performance like costs and profit margins. Eventually, companies can be generating negative earnings and cash flows, that are of most importance when valuing a company (Damodaran, 2002).

Enterprise Value Multiples

Enterprise value multiples are seen as valuable solution for firm valuation, as they are not troubled by the same biases as the ones presented for earnings multiples (Koller et al., 2012). The author also states that they represent a viable solution especially for investors and bankers that want to compare companies in the same sector.

Enterprise Value to EBITDA has been the most used alternative as a multiple and can be computed as follows:

Equation 13 - Enterprise Value to EBITDA ratio

$$EV\ to\ EBITDA = \frac{Enterprise\ Value}{EBITDA}$$

As Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) represent a flow to debt and equity all together (Pinto, 2010), it is less vulnerable to changes in the capital structure of the company, unless big changes lead also to changes in the cost of capital (Goedhart et al., 2005).

Furthermore, a multiple using the enterprise value as the numerator can only be suitable for the valuation of a firm, as it is not only considering but also an indicator for the overall value of the company. With the assumption that the market value of debt can be priced with reliability, one can even assess the correct value for equity by this multiple (Pinto, 2010).

However, enterprise multiples have two big flaws, by not including or reflecting variations that can happen either by changes in WC requirements or capital expenditures (Fernandez, 2001).

Conclusion

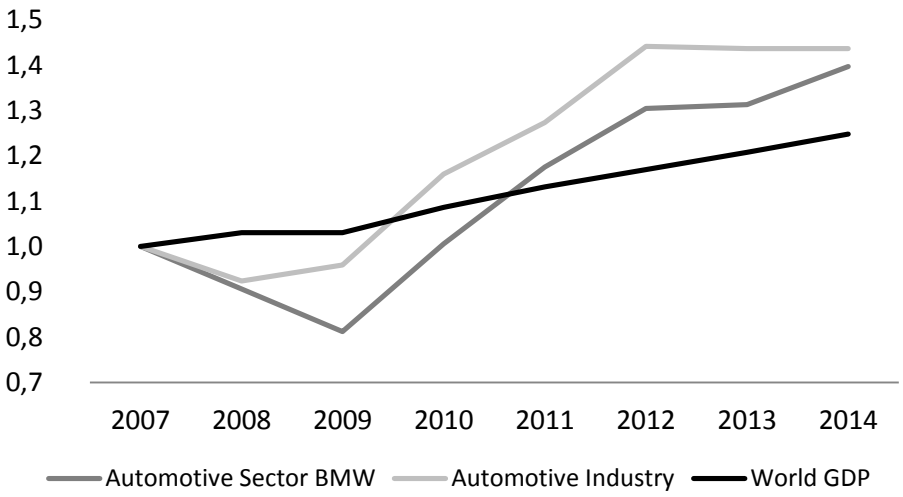
The DCF and multiples approach are then the ones to be used on this valuation. The first method was chosen for its importance and for being the most commonly used in the field of equity valuation. Also, it is the one that provides the most detailed analysis of the company, by allowing one to evaluate the evolution of all the relevant accounts for its operation. The second approach is used not only as a proxy for the DCF valuation and to check its validity, but also to compare the performance of BMW to its peers and industry.

The Industry

For a proper valuation of the BMW group, it becomes important to get to know the environment where it is competing and what the main behaviors, drivers and trends are, that need to be taken into account.

One should start by stating the importance of macroeconomic factors on the performance of the overall industry. Even though today's society has embraced automobiles and motorcycles as part of their basic needs, they are still to be considered as luxury goods. Past behavior of the automotive industry is one of the best examples to illustrate this idea.

Figure 1 – Historical Growth correlation between World GDP, Automotive Industry and BMW



Source: Bloomberg, annual reports and own calculations

The automotive industry has been displaying considerable growth throughout the past years and has been one of the main drivers for industrial revolution, which was only possible by an outstanding effort from all its players to satisfy the needs for constant innovation while meeting demanding regulations.

However, it has shown to be not only one of the most important and with highest impact in today's economy, but also one that is highly dependent on the world economy's performance, with a degree of correlation of 0,952, according to own calculations. For the computation of total Industry sales, one found the most relevant companies in the sector that are considered as

peers for BMW, as shown in appendix 10. This means that a shock in the global economy will have a directly proportional impact, as the example of the financial crisis of 2009.

The industry appears, though, to be significantly recovering from the past shock by being able to successfully penetrate different countries and spread all over the world, even in new and emerging markets with special emphasis to China, which may also be the reason why the industry was not as affected as expected during the Global Financial Crisis.

This also means that a broader perspective of the economy needs to be taken into account, as high levels of public debt in Europe, USA and Japan, together with over-capacities in China and conflicts in the middle east, could definitely have considerable impact on the general outlook of the economy and, consequently, across the entire industry. Likewise, one can consider that the risks associated with the operation in emerging markets can be offset by this global presence of BMW, meaning that if any shock is to happen, the company is well diversified and established to counter that effect and better exploit new growth opportunities.

The motorcycle industry has also seen high levels of growth, especially in the turn of the new millennium. Nonetheless, this upwards trend was heavily hit in 2007. Albeit in recovery, it is not expected to grow at the same pace as it was before. One needs to consider demographic and environmental conditions that are affecting the industry much like the economic factor that the world is facing. Nevertheless, the fact that it is a global industry, that emerging markets are considering motorcycles as a basic need of transportation and that the needs of the consumer are always changing and new markets are appearing, makes one believe that there are a lot of new opportunities to be found with high growth potential.

The financial services industry, being much related and going side by side with sales of automobiles and motorcycles, has also been showing signs of improvement. It has been benefiting much with the general stabilization of the world's car and financial markets. Good examples of this statement are the lift on the public debt ceiling in the USA, the continuous expansionary monetary policy kept by the Japanese Reserve Bank and a more stable situation in the Eurozone, leading to a decrease in reference interest rates.

Finally, it is also important to care that the volatility of exchange rates, raw materials and interest rates as main drivers across all the industries under analysis. The availability of basic materials, being the most relevant the crude oil, and its price volatility need to be taken into

account and monitored constantly with well-defined management techniques. The way the BMW group offsets these effects will be explained in the section bellow.

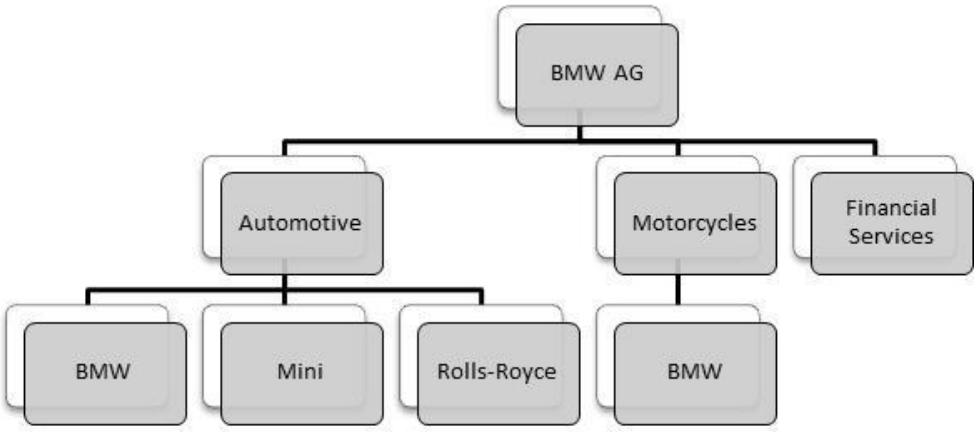
Presentation of BMW AG

This section aims to make the reader acquainted with the BMW group, by making a brief summary of its history, structure and share and overall performance.

BMW is a German company based in Munich and was founded in 1917. It was initially focused on the production of aircrafts under the name Bayerische Flugzeug Werke AG (BFW). However, at the end of World War I, the group was prohibited to continue its current production and forced to restructure its business. Its first solution was to start the assembly of railway brakes and then turned to the manufacturing of motorcycles in 1923. Only in 1928 did BMW got to be as we know it today, with the production of its first automotive line.

Nowadays, it is considered as one of the greatest industrial companies in the world with its focus on premium car and motorcycle manufacturing. Albeit competing in such a demanding market, the group is proving to be providing innovative and successful strategic solutions that make them a major player and leading company in its core segments. The group's structure goes as follows:

Figure 2 – BMW's Business Structure



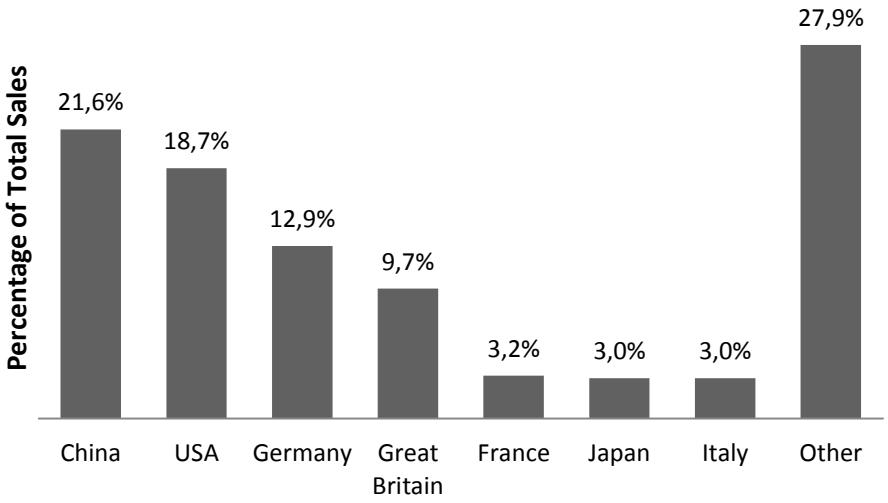
Source: Annual report BMW 2014

Automotive Sector

The automotive business is definitely the most relevant for BMW's operations. It has been representing, on average and throughout the past 5 years, 92% of total revenues registered by the group. Much like the entire industry, one can notice considerable recovery from the past crisis with sustained and consistent growth from 2009 until today. In fact, BMW has been

showing record sales volumes, with a total of 2 117 965 cars sold in 2014 for all its brands: BMW, MINI and Rolls-Royce, thus surpassing the two-million mark for the first time in its history. As a consequence, the group has been able to keep its pole position in the premium segment worldwide, despite the high volatility of many markets. The company's distribution of sales can be seen on the figure below.

Figure 3 – BMW's automotive global distribution for the year 2014



Source: Annual report 2014 and own calculations

China is clearly taking the lead on sales contribution for the group with a total amount of almost 22%, represented by an increase of +13,8% in units sold, when compared with the previous year 2013. EUA has also been performing quite well with an increase in units sold of +5,8%. Europe, thanks to a more stable environment, has been able to keep up with reasonable levels of units sold and confirmed an increase of +6,4%. Germany and Great Britain are also contributing to the healthy growth of the group with an increase of +5,1% and +8,4%, respectively, in units sold.

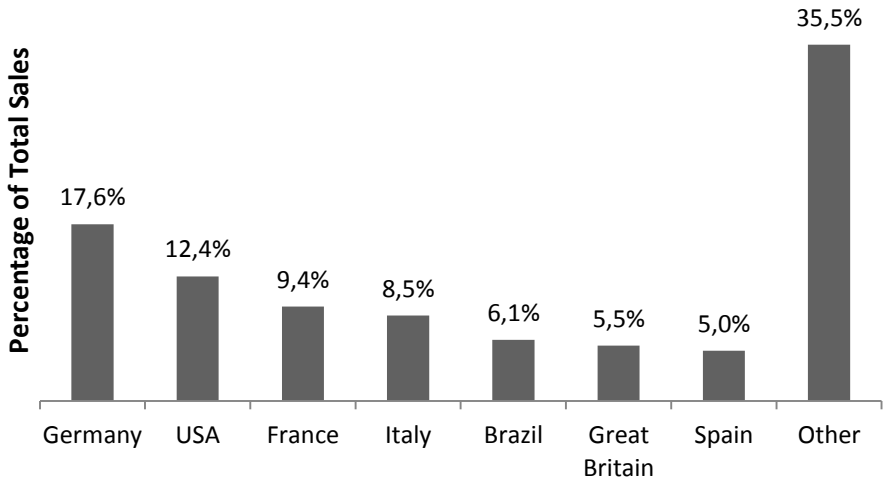
Motorcycles Sector

BMW's motorcycles industry was no exception to the global financial crisis. From 2007 to 2009, the company saw their revenues decrease by 14%. Recovery from that event is noticeable and BMW seems to be on the right track, finding new profitable opportunities in the premium motorcycle segment.

By having one of its brands, Husqvarna, bought by one of its competitors in 2014, BMW seems to be focusing all its attention to the BMW Motorrad brand, together with the new

motto “MAKE LIFE A RIDE” and raising enthusiasm worldwide for motorcycle riding. This has shown signs of great improvement for the 500cc plus class, also as a result of the implementation of new models in the market. Together with entry in the world of electromobility, which is seen as the beginning of a new chapter in urban mobility, sales are spreading and increasing all over the world, therefore outperforming the market as a whole. The highest improvement can be seen in France, with +11,5% when compared to 2013, followed by USA and Europe with +8,5% and +6,7% respectively.

Figure 4 - BMW's motorcycle global distribution



Source: Annual report 2014 and own calculations

Financial Services Sector

For BMW, financial services turned to be the second most relevant account, in what revenues are concerned, accounting on average for 27% of total revenues for the group. It comprises areas of business such as leasing, fleet business, retail customer and dealer financing, customer deposit and insurance activities. Credit financing and leasing of motorcycles and cars to retail and business clients are clearly the most significant of them all.

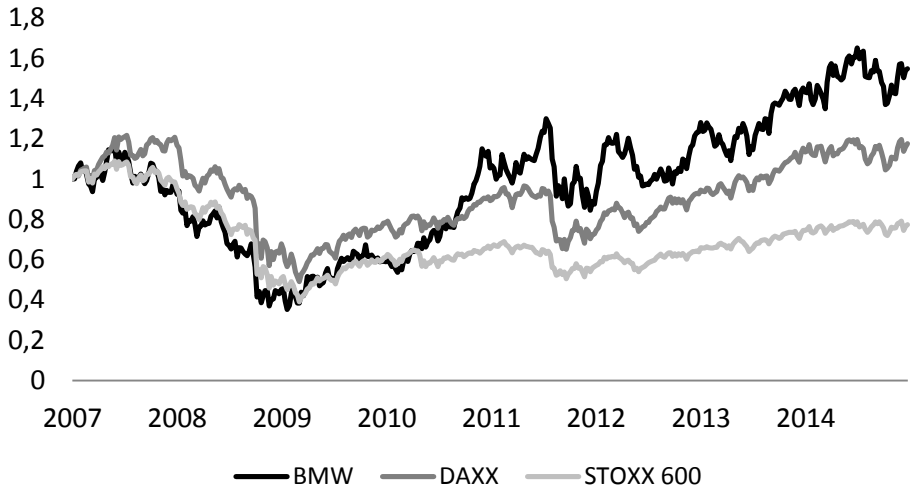
Being so related to the two other main business areas, one can notice that the attractiveness of the new product portfolio that the company has been developing also had a positive impact in the financial services area. Furthermore, alongside the sales record previously stated for both automobiles and motorcycles, the financial services segment is operating in over 50 countries and retail customers and dealers have placed 4 359 572 lease and credit financing contracts representing an increase of +5,6%.

Finally, there is also a risk profile that needs to be associated with this segment, given its correlation with macroeconomic factors. Yet, the positive trend in the global economy and a more stable environment post to the euro crisis also enables it to improve in 2014.

The stock markets

The BMW group has been trading in the German stock exchange market, DAX, since 1918 and in the EURO STOXX 600 with a price at the date of valuation of 89,77€ per share. Its historical performance and comparison with both stock markets can be seen below.

Figure 5 – Historical price performance for BMW, DAX and SXXP 600.

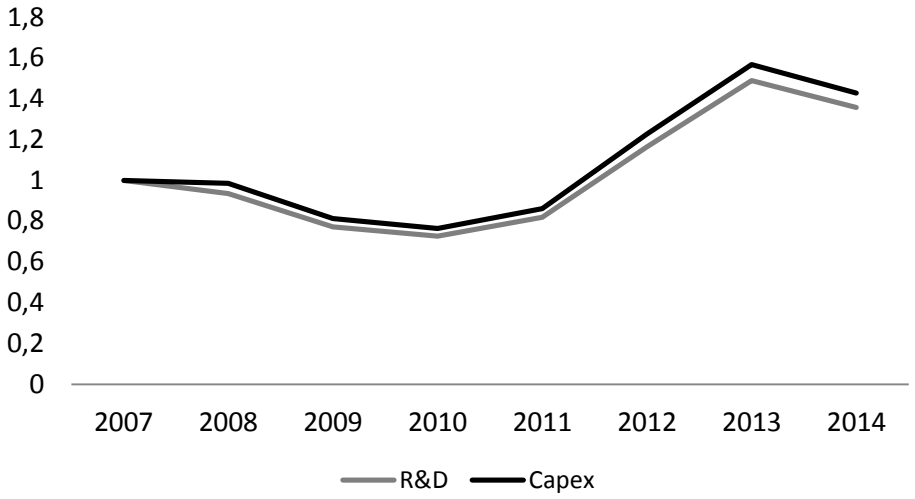


Source: Bloomberg

Again, one can see that the BMW group was no exception to shocks in the economy, as it also saw its price decline to half during the most recent financial crisis. However, one can also observe a fast and strong recovery during the year's right after. This was only possible with the so called S*trategy Number One* that tries to set the course for a bright future. The strategy has as its foundation profitability and constant long-term added value.

Also, the group means to be the leading provider of premium products and services for individual mobility worldwide, as a consequence of a long term strategy and constant innovation that have on their foundation the manufacturing of premium brands that set the highest standards for esthetics, dynamics, technology and quality. Nonetheless, this constant effort and success is also highly correlated with increases in expenditure, as it can be seen below.

Figure 6 - Revenues and expenditures over the years



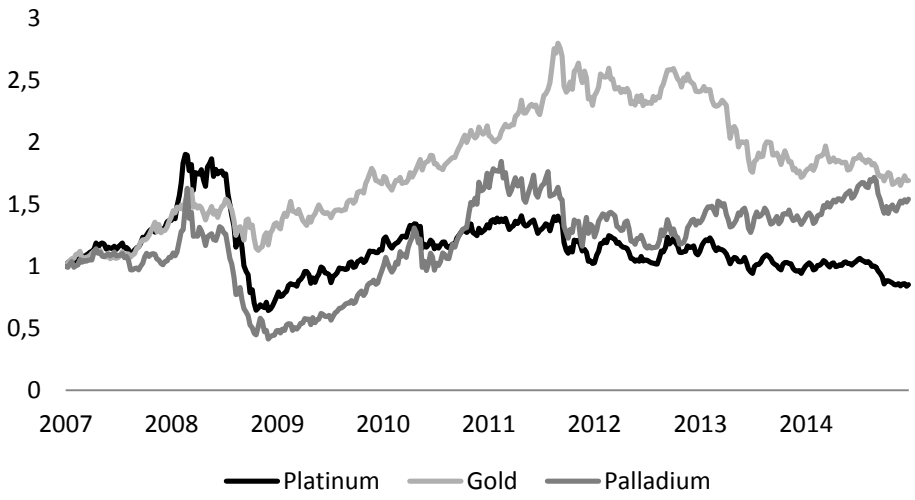
Source: Annual reports and own calculations

BMW has been showing record values for capital expenditures and research and development costs (R&D). However, this steep increase for both expenditures is derived from the fact that the group has been investing in new model start-ups and launches across all its brands, automotive and motorcycles, especially with the new BMW i3 and BMW i8, that are being able to disrupt the market with new opportunities in the field of electromobility; and the development of their connected mobility and efficient dynamics features, that provide more efficient navigation systems, aerodynamic characteristics and, most importantly, engines that manage to keep up with EU emission standards.

Commodity risk

The volatility of raw materials, as mentioned before, is of great importance for BMW and are monitored on the basis of a set of well-defined management procedures. The most significant is undoubtedly the price of crude oil. Not only is it an important basic material in the manufacturing process, having an impact in production costs, but also does it change the purchasing behavior for new cars, by having direct effect in fuel prices. Likewise, the prices for steel, non-ferrous metals, precious metals, like aluminum and copper, and energy sources also have great impact in the manufacturing process for both cars and motorcycles. Performance for some of the above mentioned materials are presented on the following chart.

Figure 7 - Historical Commodity performance



Source: Bloomberg

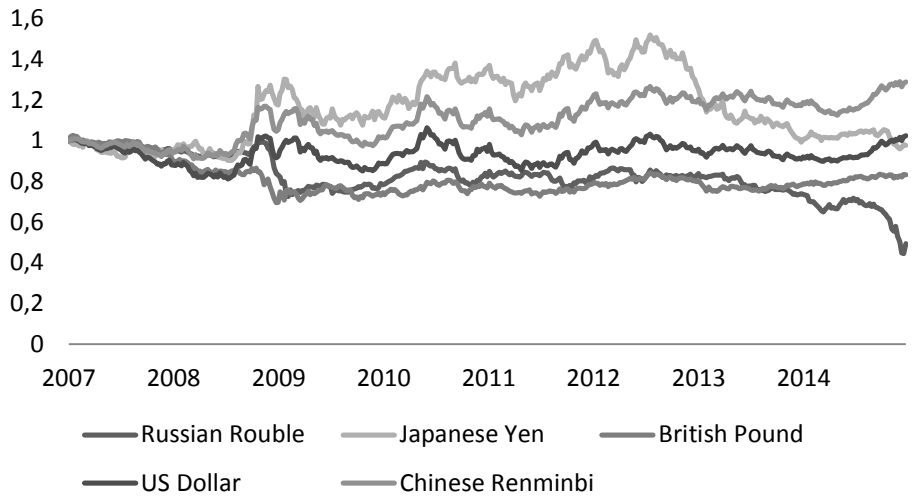
The Group uses financial hedging through the use of financial derivatives and/or supply of contracts with fixed pricing arrangements to counter the present adversities. If the risks of raw materials are to be materialized, medium impact should be expected. Conversely, it can also present significant opportunities if they are to develop favorably for the group.

For the case of Crude oil, BMW also invests on the development and manufacturing of highly efficient, low-consumption engines and alternative drive technologies, as a way to reduce its dependency from both the manufacturer and the customer.

Currency risk

Being such a global company, BMW is constantly facing exchange rate risks that can have great impact on its results. The Group pays special attention to the US Dollar and the Chinese Renminbi when compared to the Euro. Both of them have shown quite pronounced variations over the years, much like the Russian Rouble, as shown below.

Figure 8 - Historical Currency performance



Source: Bloomberg

Given this, there is some uncertainty that BMW counters by the use of two different types of hedging. On the one hand, it uses financial hedging, much like the one that is used to offset the effect of raw material volatility. On the other hand, and most importantly, it uses natural hedging by increasing the volume of local production and purchases and, consequently, reducing its currency exposure.

Valuation

This section is meant to present the output and valuation of the BMW group and the resulting price per share, much like all the assumptions that are related. Two methods are used: The Discounted Cash Flow and the Multiples method. The date of valuation is the 31st of December 2014.

Forecasting the Income Statement

The preceding analysis is meant to be used as a basis for the projection of all the accounts present on the Income Statement of BMW. Forecasts (appendix 2 and 3) are to be made as a way to facilitate the valuation through cash flow discounting and are divided between the explicit period, composed of 5 years where it is assumed that the world's economy is to become stabilized, especially in the Eurozone and China, and a more detailed analysis of all the accounts is done; and the terminal value.

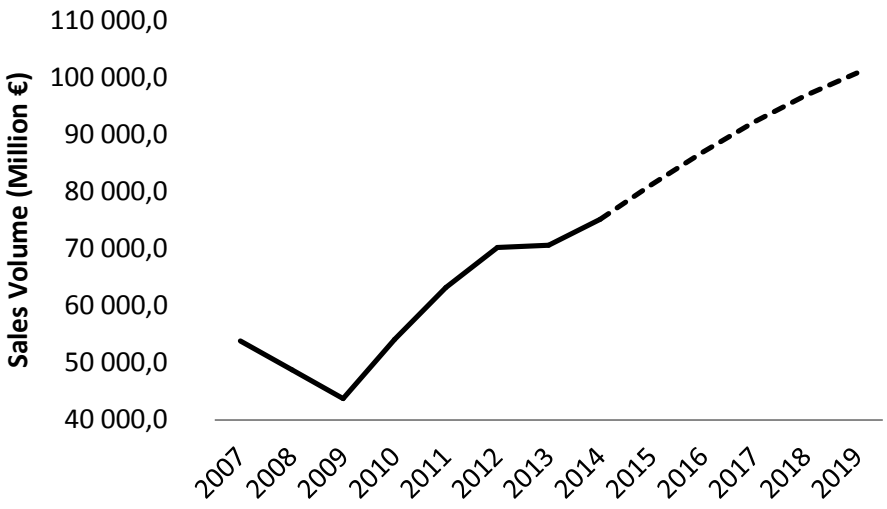
Automotive Revenues

Revenues are undoubtedly the most relevant items for the correct valuation of the BMW Group, due to the fact that many things are held up against it. (Goedhart et al., 2010) suggests two methods for valuing the behaviour of revenues. The top-down approach was used, as there seems to be a huge influence of macroeconomic factors on its behaviour. One should depart from these deeds to extrapolate a specific behaviour for revenues.

With a high correlation degree of 0,93 with the world's GDP and BMW's global presence, the next step is to analyse how the world GDP is to perform. According to the IMF database, projections for growth are to be stable at a level of 4% until 2019 (appendix 9).

Nevertheless, it is still needed to take into account past performance and beliefs about future behaviours of the market and BMW. Previous product restructuration is having a great impact on the customer's willingness to buy, which makes one trust that BMW will keep performing well for the next years and with significant values of growth, assuming that economic conditions remain stable, enabling to keep its position as the world's foremost premium car manufacturer.

Figure 9 - Automotive revenues performance



Source: Annual Report and own calculations

Additionally, it is stated by the Group that new models for cars are also target of product life cycles theories. In the specific case, cars are supposed to sell most after 18-24 months and tend to slow down after four to five years. Given that the most recent product restructuration in 2013 has been the most relevant for the past years, one is to give special emphasis to this statement.

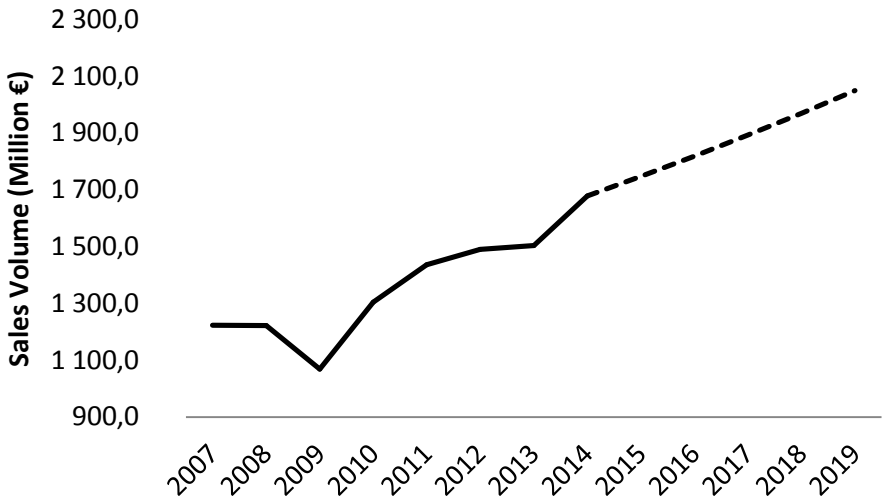
With a growth rate of 6% from 2013 to 2014, one is to increase revenues to 8% in 2015, value that is equal to the average of the past five years that include periods of high and low growth. With that, it is also intended a more conservative view than other existing reports that forecast an increase of 9% for vehicle production in 2015, and to keep with BMW's expectations for growth in 2015 of between 5% and 10%. From then on, it was decided to smooth the growth rate to values similar to the ones of GDP in 2019. This way, one is hopefully representing the expected leading position in the premium car market from BMW over the years.

Motorcycle Revenues

For the case of motorcycles, one is to apply the same reasoning as the one for the automotive industry. According to the forecasts of the group, the market for the 500cc plus motorcycle is expected to keep growing in the future, although at a lower rate than the one registered until now, still translating an increase in almost every market. For that matter, one is again to include in the calculations periods of high and low growth to take assumptions about future

developments. The rate of about 4,1% was calculated and assumed to be constant throughout the explicit period.

Figure 10 - Motorcycle revenues performance



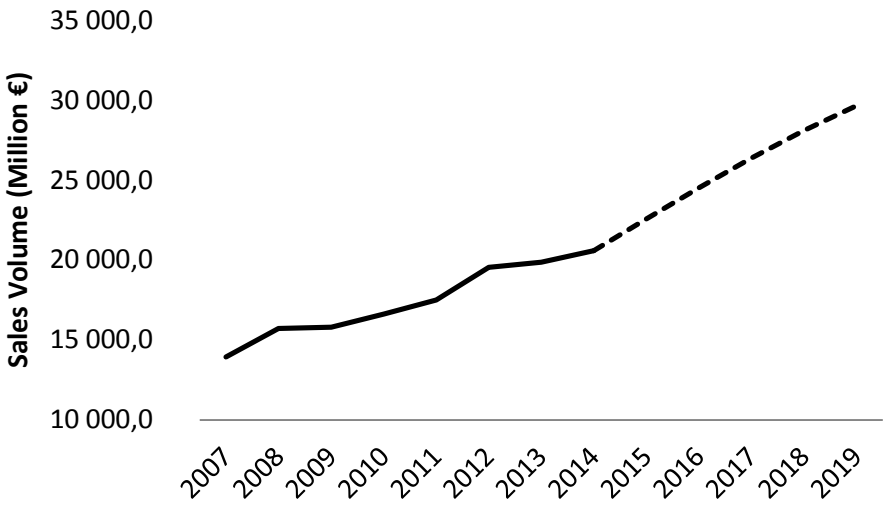
Source: Annual Report and own calculations

Financial Services

As previously stated, the financial services segment is mainly composed by credit financing and lease contracts for both cars and motorcycles and is expected by the group to keep performing well in future years. Thus, one is to assume that those are the relevant aspects to take into consideration when forecasting this account. Also, it is safe to say that, as a consequence, the growth rate of the segment will most likely follow the one presented by the other two business areas.

By historical analysis, it can be seen that financial services have been representing, on average, 29% of total revenues coming from automobiles and motorcycles, between 2007 and 2014, meaning that it also takes into consideration periods of high growth and decline, giving a more balanced and conservative view of what future performance may be. Given this, financial services' revenues are to assume the presented ratio in 2019, being smoothed to that value during the following five projection years, as presented below.

Figure 11 - Financial Services revenues performance

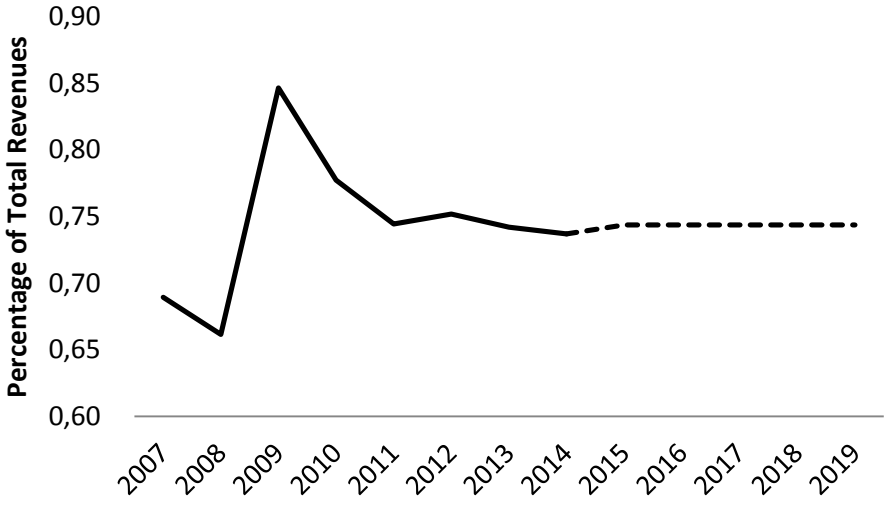


Source: Annual Report and own calculations

Cost of Goods Sold

(Goedhart et al., 2010) recommends that operating expenses, such as Cost of Goods Sold (COGS), Sales and Administrative Expenses and Other operating Expenses should be forecasted as a percentage of revenues. This argument becomes even stronger, when one can notice by the analysis of the annual report that all the items are, indeed, highly correlated with the operations of the Group.

Figure 12 - COGS performance over Revenues



Source: Annual Report and own calculations

For the specific case of COGS, they have been adjusted to exclude the effect of R&D costs. For the past seven years, BMW has shown a ratio of COGS over sales of between 69% and 85%. However, this value seems to have been stabilizing from 2009 onwards to 74%, hence being the percentage of revenues assumed for the projections.

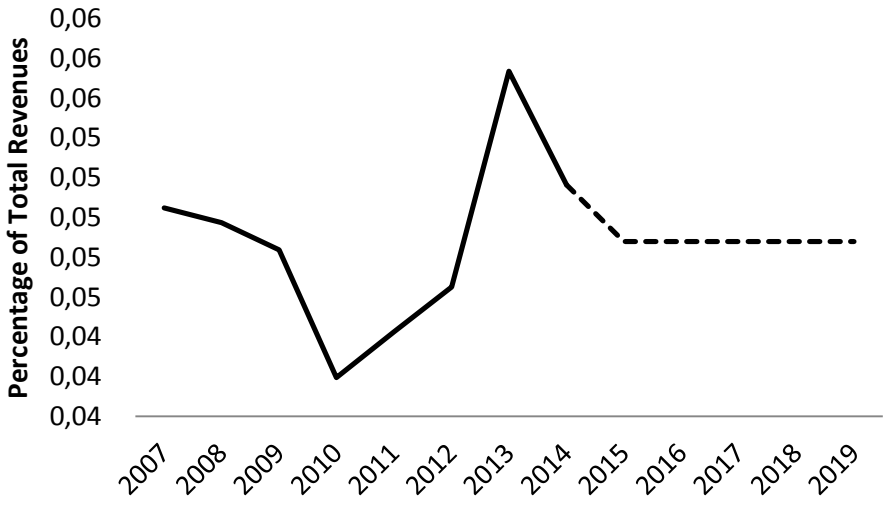
Research and Development

In a company like BMW with constant requirements for new and innovative technologies, especially in such a competitive market as the one of premium manufacturers, R&D pays one of the most important roles for future success and are analysed separately.

The company has been registering record values for this account over the past two years, mainly as a result of new vehicle models, drive systems and innovative technologies. Still, this peak should not be seen as a one-time event, given that BMW has planned further developments not only in existing car series, but also for new models and expansion of existing facilities.

One can then consider that there was, in fact, a peak on the R&D over sales ratio and that it is to decrease in 2015 to the average of the past five years' average. From then on, one is to consider the ratio constant, as a way to increase R&D expenses proportionately to revenues, considering both scenarios of higher and lower investment needs.

Figure 13 - R&D performance over Revenues

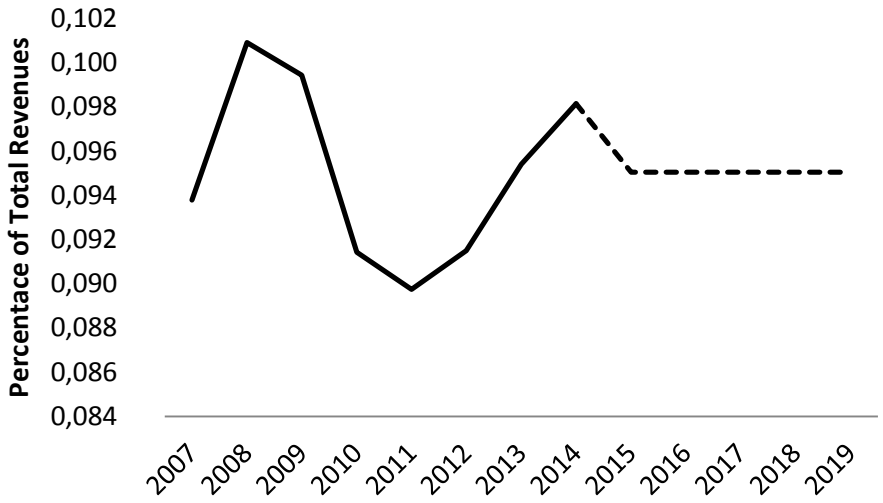


Source: Annual Report and own calculations

Selling and administrative costs

Selling and administrative costs are mainly related to marketing, advertising and sales personnel costs, showing to have high correlation to sales. It is then expected that if the business is to expand, these costs will follow the same trend. Also, the ratio over sales has been proving to be quite stable over time, with variations between 9% and 10% of sales. Given this, Selling and Administrative costs should be expected to keep that trend. For that, one may assume an historical average over the period of estimation equal to 9,5% of revenues.

Figure 14 – Selling and Administrative Costs performance over Revenues

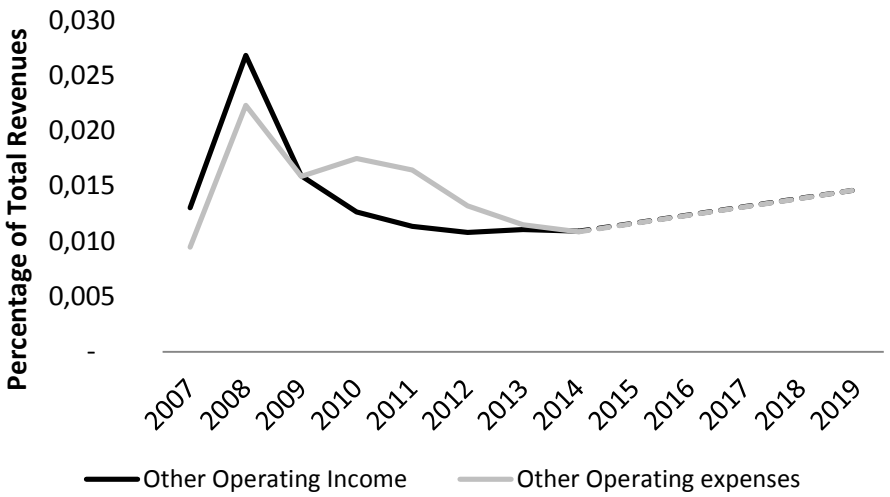


Source: Annual Report and own calculations

Other Operating Income and expenses

Other operating income and expenses refer mainly to the existence of public-sector grants, exchange gains, changes in reversal of provisions and impairments and disposal of assets, making it harder to predict. Still, by presenting very close values over the years, one may assume that both income and expenses can converge to the same value, as a percentage of revenues in 2019. Since the ratio has been slightly varying between 1% and 2,5%, the value used will be the average from 2007 to 2014.

Figure 15 - Other Operating Income and Expenses performance over Revenues



Source: Annual Report and own calculations

Taxes

For the computation of taxes, it was decided to use the effective tax rate on EBIT. This method is the representation of the average rate at which the company's pre-tax profits are taxed and is analysed on a cash basis. This ratio seems to have been stable on values between 31% and 33%, so an effective tax rate of 32% is to be applied for future projections.

Discounted Cash Flows

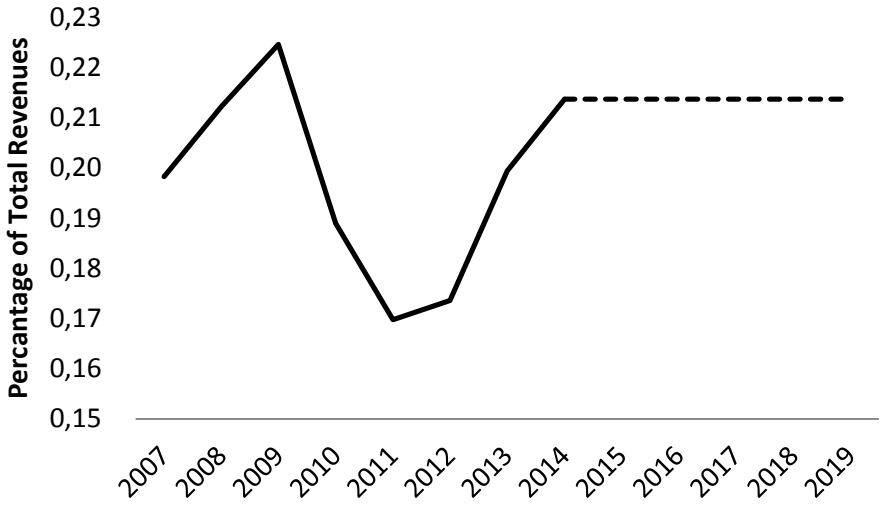
In this section, the various items that were previously referred to as essential for the computation of FCFF are to be separately analysed and explained. By discounting future values at the rate of WACC, the output of the valuation should be an accurate price for BMW's shares and value of the company.

Capital Expenditures, PP&E and Depreciation and Amortization

According to (Pinto, 2010), capex is a result of two different components: the first, related to the necessary capital to keep up with regular operations of the company, which is also known as fixed capital replacement, and the second correlated with the forecasted growth rate. It can be said that the best way to account for both effects is to analyse capital expenditures over sales historically and take assumptions about future performance. However, (Goedhart et al., 2010) disagrees by stating that this assumption may lead to unintended variations on the capital turnover ratio. As a solution, it is suggested that both capex and depreciations and amortizations are derived from future projections of PP&E, as this account tends to become very stable over long periods of time. For that, one is to first analyse net PP&E as a

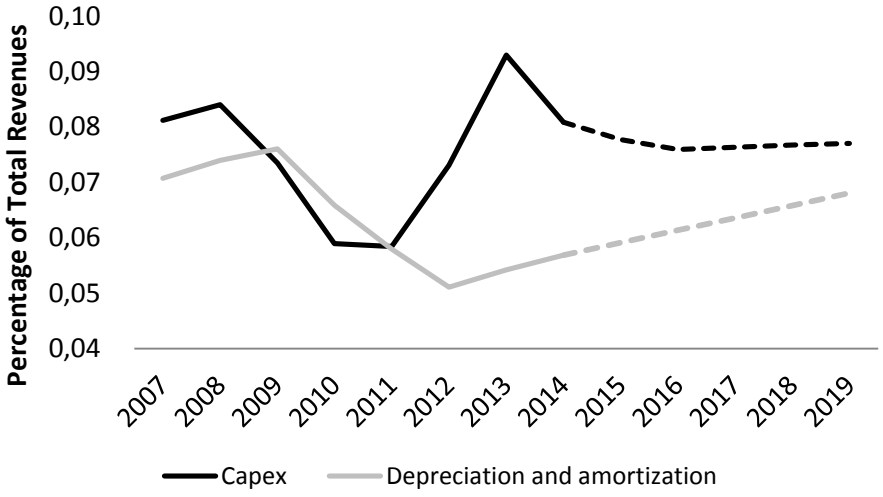
percentage of revenues (Capital Turnover) historically and take assumptions for its future developments. This development is shown in figure 16.

Figure 16 - Historical Capital Turnover



Source: Annual Report and own calculations

Figure 17 – Capex and Depreciation and Amortization performance over Revenues



Source: Annual Report and own calculations

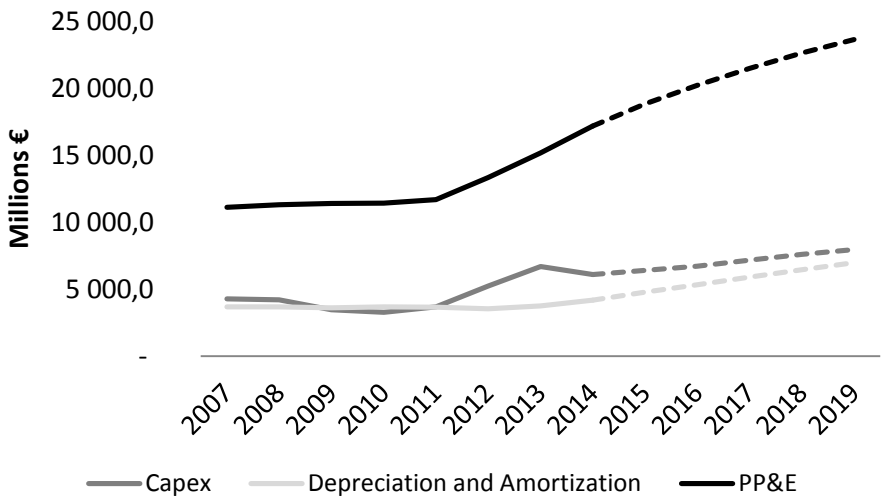
Comparing both figure 16 and 17, one can also state that there is a high historical correlation between all the three presented elements. As an example, the reduction in capital expenditure ratio right after the financial crisis is also translated in a decrease in capital turnover.

Likewise, it can be seen that depreciation ratio has been lower than usual for the past years. This is a result of the decrease in capex from 2008 to 2011. Conversely, as capex has been

showing record values for the past two years, given the latest development of new car models and product restructuration, it is assumed that this trend will continue, meaning that the same effect can be expected for PP&E. As a result, it is also expected that depreciation will go back to similar levels as the ones registered before 2009, both as a percentage of revenues and PP&E.

The methodology to be used is then the one presented by (Goedhart et al., 2010), to keep the capital turnover ratio constant for the forecasting period, at the level of about 21%, same level as in 2014, and compute depreciations as a percentage of the forecasted values for PP&E. The assumption is that depreciation will be constantly increased until it represents 30% in 2019, average of the latest eight historical years, allowing to also cope with the Group's expectations that capex ratio over sales is to keep at close values to 7%, given that capex is going to result from the sum of depreciation and the annual increase in PP&E.

Figure 18 - Capex, Depreciation and Amortisation and PP&E performance



Source: Annual Report and own calculations

(Fernandez, 2004) states that it is not correct to assume a value for depreciation, as a percentage of revenues, much different than the one of capital expenditures. If this is to happen, the result will be a value for net fixed assets either negative or converging to infinity. Still, one believes that the presented difference should be close enough to meet this statement.

Net Working Capital Changes

One common way to compute net working capital is to simply figure the difference between current assets and liabilities. However, there are some non-current accounts that also need to

be considered in the equation, as they are related to the operations of the company. For the specific case of BMW, deferred taxes and receivables from sales financing were also taken into account.

Also, operational provisions (obligations for personnel and social expenses and Obligations for ongoing operational expenses) have two ways to be accounted for. First, one can reflect its impact on the FCFF. For that, the difference between use and reversal of provisions needs to be computed. Assuming that value is going to be the one with tax implications, one should add that value back to the FCFF, much like how it is done with depreciation and amortization. However, for being hard to predict how those values are to vary in the future, one is to opt for a second method.

This way, it is to be assumed that BMW is able to correctly compute the value of these provisions and to consider them as operational liabilities, given the fact that they are expected to be used with high probability.

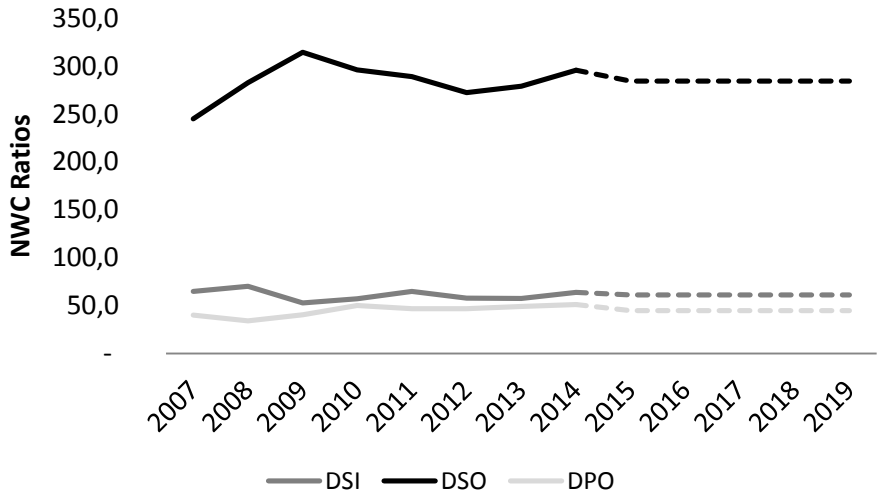
For this reason, one has decided to use the ratios Days Sales of Inventory (DSI), Days Payable Outstanding (DPO) and Days Sales Outstanding (DSO). After reaching historical values for all three ratios, it has been considered that for future years they are to keep the same value as the average between 2007 and 2014. The rationale behind this idea is that all of them have been presenting quite unstable tendencies over the years, making it hard to predict its future behaviour. By applying the average, periods of stability, recession and recovery are being taken into account, providing a reasonable indicator of performance.

Table 4 - Historical Net Working Capital Changes

	2009	2010	2011	2012	2013	2014
Inventories	6 555,00	7 766,00	9 638,00	9 725,00	9 585,00	11 089,00
COGS	45 356,00	49 545,00	54 276,00	61 354,00	60 791,00	63 396,00
DSI	**52,75**	**57,21**	**64,81**	**57,85**	**57,55**	**63,84**
Accounts Receivable	1 857,00	2 329,00	3 286,00	2 543,00	2 449,00	2 153,00
Sales financing	17 116,00	18 239,00	20 014,00	20 605,00	21 501,00	23 586,00
LT Sales Financing	23 478,00	27 126,00	29 331,00	32 309,00	32 616,00	37 438,00
Deferred Taxes	1 266,00	1 393,00	1 926,00	1 967,00	1 620,00	2 061,00
Total sales BMW	50 681,00	60 477,00	68 821,00	76 848,00	76 059,00	80 401,00
DSO	**314,85**	**296,26**	**289,35**	**272,74**	**279,23**	**296,16**
Accounts payable	3 122,00	4 351,00	5 340,00	6 433,00	7 485,00	7 709,00
Deferred Taxes	2 769,00	3 400,00	3 273,00	3 081,00	2 459,00	1 974,00
Other Provisions	-255,00	576,00	233,00	311,00	270,00	1 592,00
COGS	50 681,00	60 477,00	68 821,00	76 848,00	76 059,00	80 401,00
DPO	**40,59**	**50,26**	**46,92**	**46,67**	**49,02**	**51,19**
NWC	44 636,00	48 526,00	55 349,00	57 324,00	57 557,00	65 052,00
Var NWC	**1 085,00**	**3 890,00**	**6 823,00**	**1 975,00**	**233,00**	**7 495,00**

Source: Annual Report and own calculations

Figure 19 - NWC ratios performance



Source: Annual Report and own calculations

Impairment Losses

Impairments are to be treated as any other non-cash expense, with its impact shown on the computation of the FCFF. Again, one needs to find the amount relevant for tax purposes. By looking closer to the Income Statement, it can be seen that the only accounts that are affected

by impairments are “Other operating income as expenses”. As a result, one is to compute the difference between both values found and add it to the value of FCFF. Historically, that difference has been presenting very low values, except for the past two years, where it increased exponentially. For that, the assumption made to forecast impairments is to consider it constant as the average of the past two years. For the case of other non-cash expenses this differentiation of operational expenses cannot be found, leading one to disregard its direct impact on FCFF.

Weighted Average Cost of Capital

By applying the WACC formula suggested by (Fernandez, 2013), a rate of 3,5% was calculated. How the different components of WACC were computed is explained below.

Beta

For the computation of Beta, the linear regression approach, which is a model to find the relationship between a dependent variable and one or more explanatory variables, is used. For the specific case of BMW, the CAPM is considered as basis for the regression analysis, as it has been the most commonly used and a standard in real-world analyses of risk and return, according to (Damodaran, 2002). Historical values from 2002 to 2014 have been used, as a way to incorporate a well-adjusted number of periods before and after the latest financial crisis. The equation to be regressed is the following.

Equation 14 - CAPM equation used for regression analysis

$$Ri - Rf = \beta * (Rm - Rf)$$

Furthermore, two benchmarks are used to represent market returns. The German market index, DAX, and the European index, STOXX Europe 600, that is considered a significant benchmark for large, mid and small capitalization companies across Europe. The risk-free rate of return used will be the German Bunds for ten years in both cases. Also, daily, weekly and monthly data was collected and compared, as it can be seen below.

Table 5 - Regression analysis

	Daily		**Weekly**		Monthly	
	DAX	SXXP	**DAX**	SXXP	DAX	SXXP
Beta	0,96	1,12	**1,01**	1,16	0,93	1,18
R^2	0,52	0,48	**0,57**	0,51	0,53	0,44
T-Stat	57,50	53,05	**29,78**	26,40	13,15	11,11

Source: Own calculations

Historical prices were collected from Bloomberg and subsequently transformed for the regression. Annual log returns were computed, in order to measure all variables in a comparable metric, throughout normalization, ensuring a correct performance analysis over the years.

All the linear Betas achieved showed to be statistically significant at 1%, but the one that uses DAX as point of reference and weekly data is considered the most representative, with a coefficient of determination (R^2) of 57%. The result is a Beta of 1,01 that is used for the computation of cost of equity.

Cost of Equity

After selecting the correct value for Beta, one is then to apply the standard CAPM formula to compute the cost of equity, as previously mentioned. With a risk-free rate at the date of valuation of 0,5% and a total equity risk-premium of 5,75%, according to Damodaran, the result was a cost of equity of 6,29%.

Cost of Debt

With the rating A+ on long-term debt by Moody's, it is safe to say that BMW is considered an investment-grade company. The fact that the probability of default becomes so little makes the inconsistency between promised and expected return immaterial, according to (Goedhart et al., 2010). Thus, one has decided to use the yield to maturity of the company's bonds, averaging these values by the amount issued on each bond. Data was collected from Bloomberg and the effect of the exchange rate was applied, on the date of valuation, so that all bonds had their amount issued in EUR. Also, the impact of the exchange rate on the YTM is not considered in this case, as there are no bonds issued in non-civilized countries that could have a value big or small enough to have relevant impact on the pretended weighted average. The result is a cost of debt of 1,08%.

Capital Structure

For the purpose of computing WACC, one should consider the capital structure of the firm in market values. For the value of equity, it was considered the information from the annual report of 2014 to get the price for preferred and common stock, as well as the corresponding number of shares.

Preferred stock is normally considered as debt, even though it is accounted as equity, for the fact that it yields a fix dividend. However, for BMW that does not appear to be the case. Preferred stock does carry a cumulative preferential right in terms of the allocation of profits but not on a fixed basis. There is a payment of an additional €0,02 for each stock and they have to be approved by the board in an annual meeting. For that, preferred stock is to be considered as Equity. A value of 57.738,15 million Euros was achieved.

As for Debt value, the interest expense reported on the income statement of BMW was used. Dividing that value by the cost of debt previously computed net of taxes resulted in a market value of debt of 70.702,98 million Euros. The result is Equity over Firm Value ratio of 45%.

Output

Having analysed each important component for the Free Cash Flow valuation, one is now one step closer to getting the value per common share of BMW. As mentioned before, by discounting future FCFF at the discount rate of WACC, the enterprise value of the firm is computed. Nevertheless, there are still some considerations to have in mind (appendix 4 and 5).

Figure 20 - FCFF Output

	2015	2016	2017	2018	2019
EBIT(1-T)	**6 761,27**	**7 256,15**	**7 715,96**	**8 129,00**	**8 484,13**
(+) Depreciation and amortization	4 765,63	5 327,11	5 890,87	6 444,54	6 974,87
(+) Operational Impairments	223,50	223,50	223,50	223,50	223,50
(-) Total Investments	5 278,17	12 973,97	12 433,79	12 486,05	12 359,49
(=) FCFF	**6 472,23**	**- 167,21**	**1 396,54**	**2 311,00**	**3 323,01**

Source: Own calculations

Market value of debt needs to be deducted and cash and cash equivalents to be added to EV. For the first, the amount used is the one computed for the capital structure of the company. As for the latter, the amount reported on the balance sheet for 2014 is considered.

One has decided to also account for the impact of pension provisions, as suggested by (Goedhart et al., 2010). According to the author, it is necessary to identify whether the company is reporting excess pensions or unfunded liabilities. In the specific case of BMW, it is said that if the benefit obligation is to exceed the plan asset, a liability is recognised under pension provisions in the balance sheet in the amount equal to the stated difference, in market values. For this, the amount of pension provisions reported is deducted to the EV.

Figure 21 - Po Computation

PV FCFF	12 251,71
(+) Terminal Value	128 318,66
(=) Firm Value	**140 570,37**
(-) MV Debt	70 702,98
(+) Cash and Cash Equivalents	7 688,00
(-) Pension Provision	4 604,00
(=) MV Equity	**72 951,38**
# Shares	656,50
Po	**108,77 €**

Source: Own calculations

Finally, perpetuity growth, one of the most important assumptions to have in mind, was set at 1%. The reason behind this value is was to consider one inflation rate that could reflect the three main markets where BMW is competing: US, Euro Union and China. The corresponding rates were weighted by the percentage of each one of the markets on sales for the group. This led one from enterprise value of 140 570,37 million € to the market value of equity of 72 951,30 million €.

Total number of shares seems to have been quite stable for the past years, reason why they are assumed to keep at the same level as of 2014. The result is a price per share of 110,87€.

Relative Valuation

The following section tries to relate BMW's share price with the performance of the overall industry and some of the companies to which it is considered as comparable. The result should be seen as a benchmark and a way to triangulate the results from the DCF Valuation that was previously presented. One will then be defining a proper peer group for the analysis of the most suitable multiples with two different approaches.

Peer Group

For the correct application of the relative valuation model, it is crucial to start by the definition of an adequate peer group. All companies have different characteristics and constraints need to be applied in order to get to similar and comparable companies. The main concern is to get to a group of companies that are considered to be equals in terms of growth, risk, cash flows and capital structure. Also, given the globalization of the BMW Group and the consequent existence of competitors all over the world, an international peer group was considered. Bloomberg is used as the main source for listing companies and multiples.

The methodology used starts by getting the top 20 firms from automotive industry, taking into account sales volume as the first constraint. This restriction is important and valid given the assumption that all the companies in the peer group benefit from economies of scale. With similar revenues, all of them should be at the same level. As (Damodaran, 2005) believes these are many times considered comparable, but might not be seen as appropriate, the relationship between their operating and financial characteristics is still put to test by the use of the "centroids" method.

Four points of assessment were chosen: ROIC as the measure for profitability; EBITDA growth rate for the latest year; raw beta, which is the equivalent for the linear beta computed earlier, as the measure of risk; and the total debt over total assets ratio to account for capital intensity throughout the peer group (appendix 6 and 7). Results are as follows.

Figure 22 - Peer Group

Name	Raw Beta	EBITDA 1Yr Growth	Debt/Assets	ROIC
VOLKSWAGEN AG	0,92	0,13	0,38	0,04
TOYOTA MOTOR CORP	1,02	0,46	0,39	0,05
DAIMLER AG-REGISTERED SHARES	0,95	0,18	0,51	0,05
NISSAN MOTOR CO LTD	1,00	0,17	0,38	0,04
RENAULT SA	1,10	0,31	0,44	0,02
BAYERISCHE MOTOREN WERKE AG	**1,00**	**0,13**	**0,52**	**0,06**

Source: Bloomberg and own Calculations

When comparing BMW to the defined peer group, one can state that the company seems to be performing better than its competitors. It is one that has been presenting good improvements on its operations, with an EBITDA growth above average of its peers (the third highest with 13% in 2014), and the highest profitability ratio of 6%. Together with the fact that it also presents a level of risk below peer average and a reasonable capital structure, one can forecast that BMW's share price should actually be higher than the one resulting from the relative valuation with the presented comparable companies.

Multiples

After defining the most appropriate peer group, one is then to choose which multiples to use in order to make a fair comparison of BMW with its main competitors and to check the validity of the DCF valuation.

For that, two multiples were chosen. First, the EV/EBITDA for being the most used in enterprise multiples and because it is the one that is less susceptible to inaccuracies due to different capital structures and tax rules. Also, as a value multiple, it represents a good proxy for cash flow valuation. Finally, when compared to the EV/EBIT multiple, one can say that the chosen is not susceptible to accounting changes that come from the use of Depreciation and Amortization that can lead to wrong conclusions. The Price to earnings ratio was also considered, because it is the most used equity multiple and for its increased relevance in valuation. Also, one of its limitations was reduced by controlling for capital structure on the centroids, thus making it more reliable.

Rather than a normal average to compute the multiples, the median was used, as a means to eliminate the effect of outliers, when compared to the normal statistical average.

Also, according to (Goedhart et al., 2005), forward looking multiples tend to yield better pricing results, especially for two-year forecasts, that cut the error of pricing using the median of the peer group by 16%. Multiples computed and the comparison between the two types is presented on the tables below.

Table 6 - Peer Group Median

Company	EV/EBITDA	P/E Ratio
VOLKSWAGEN AG	6,44	8,25
TOYOTA MOTOR CORP	8,83	10,13
DAIMLER AG-REGISTERED SHARES	10,62	10,59
NISSAN MOTOR CO LTD	7,65	9,91
RENAULT SA	9,74	8,75
Peer Group Median	**8,83**	**9,91**

Source: Bloomberg and own Calculations

Table 7 - BMW Price with multiples

BAYERISCHE MOTOREN WERKE AG	EV/EBITDA	2Yr Forward EV/EBITDA	P/E Ratio	2Yr Forward P/E Ratio
Peer Ratio	8,83	8,83	9,91	9,91
Critical Factor	13 287,00	15 958,72	5 816,00	6 902,27
# Shares	656,50	656,50	656,50	656,50
Price	**82,73**	**118,66**	**87,79**	**104,19**

Source: Bloomberg and own Calculations

Looking at the results, it seems that the multiples approach supports the results from the DCF valuation. Taking the average from both multiples, one gets a value of 113,84€ per common share. As a conclusion, one believes that with a value of 89,77€ at the date of valuation, the market is undervaluing the price of BMW's stock.

Sensitivity Analysis

To improve the credibility of the presented valuation, one is to test for the sensitivity of the results, by applying several variations that are believed to have great impact. For that, this section focuses on three different scenarios, where variations for perpetuity growth, WACC and COGS as a percentage of revenues are applied, following the ceteris paribus assumption.

Figure 23 - Perpetuity growth sensitivity analysis

Δ Growth in p.p	**-0,0015**	**-0,0010**	**-0,0005**	**-**	**0,0005**	**0,0010**	**0,0015**
Firm Value	130 621,49	133 251,41	135 996,62	138 864,87	141 864,63	145 005,15	148 296,58
Equity Value	63 002,51	65 632,42	68 377,63	71 245,88	74 245,64	77 386,16	80 677,60
# Shares	656,50	656,50	656,50	656,50	656,50	656,50	656,50
Po	**95,97**	**99,97**	**104,16**	**108,52**	**113,09**	**117,88**	**122,89**

Source: Own calculations

First, the impact of perpetuity growth is analyzed. Much like what is expected to happen with WACC, the result of small changes is a great impact on the final price, Variations of 0,0005 percentage points were applied. Price fluctuated between 95,97€, with a decrease of the rate, and 122,89€ with an increase.

Figure 24 - WACC sensitivity analysis

Δ WACC in p.p	**-0,0015**	**-0,0010**	**-0,0005**	**-**	**0,0005**	**0,0010**	**0,0015**
Firm Value	149 138,70	145 553,10	142 132,18	138 864,87	135 741,06	132 751,52	129 887,79
Equity Value	81 519,72	77 934,12	74 513,20	71 245,88	68 122,07	65 132,53	62 268,81
# Shares	656,50	656,50	656,50	656,50	656,50	656,50	656,50
Po	**124,17**	**118,71**	**113,50**	**108,52**	**103,77**	**99,21**	**94,85**

Source: Own calculations

The same deviations were applied to WACC, also as an attempt to check for different sensitivities. This second case appears to have a greater impact in the opposite direction. A positive variation leads to a decrease in price to 94,85€, whereas a negative translates in an increase to 124,17€.

This high sensitivity can be, in both cases, justified by the high impact of Terminal Value in total Firm Value, which represents about 92%.

Figure 25 - COGS structure sensitivity analysis

Δ COGS % of Revenues in p.p	**-0,0045**	**-0,0030**	**-0,0015**	**-**	**0,0015**	**0,0030**	**0,0045**
Firm Value	153 395,80	148 552,15	143 708,51	138 864,87	134 021,22	129 177,58	124 333,94
Equity Value	85 776,81	80 933,17	76 089,53	71 245,88	66 402,24	61 558,60	56 714,95
# Shares	656,50	656,50	656,50	656,50	656,50	656,50	656,50
Po	**130,66**	**123,28**	**115,90**	**108,52**	**101,15**	**93,77**	**86,39**

Source: Own calculations

With the belief that efficiency gains are also a viable possibility, the last scenario consists on assuming variations to COGS excluding R&D expenses. As it can be seen, variations to COGS have less impact than WACC and perpetuity growth, given that it is needed a greater change, in percentage points, to get to the same range of values. Furthermore, a decrease in this ratio will lead to an increase in price, much like what happens with WACC.

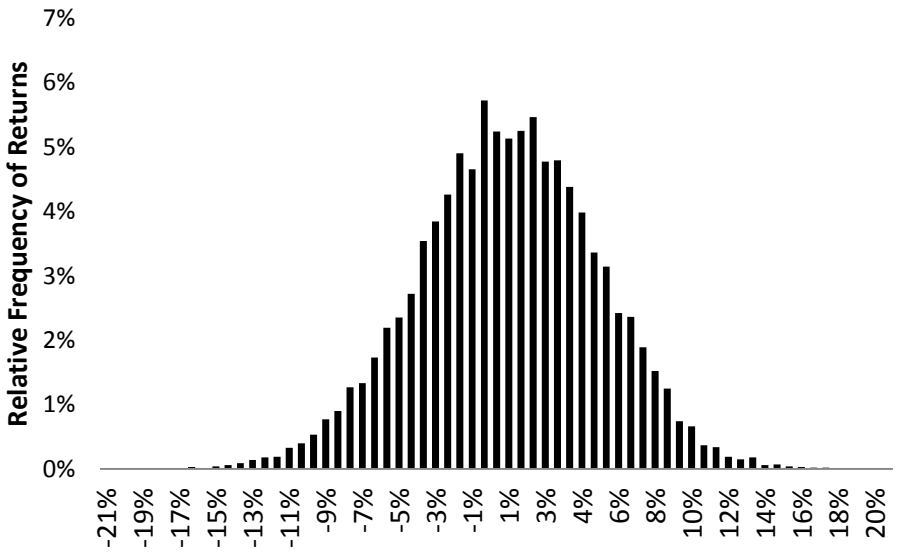
Value at Risk

Value at risk (VaR), is a statistical method that tries to assess the level of risk relating to a firm or investment portfolio, measured in three distinct variables: a potential amount of loss, a confidence interval and a time period.

To compute the potential loss for the case of BMW, the behaviour of historical stock returns was analysed, as a way to find a solid basis to make predictions about future developments. Weekly prices from 2007 to 2014 were collected from Bloomberg, as an attempt to include the latest financial crisis and reflect periods of both high and low growth, and log returns were computed.

A Monte Carlo simulation was run with 10.000 observations using the same average and standard deviation as the one of collected data and the following histogram was drawn.

Figure 26 - Monte Carlo Simulation Histogram



Source: Own calculations

Ranking all 10.000 observations and applying different confidence intervals, on came up with two different scenarios. The first, with a confidence level of 90%, concludes that the maximum weekly loss for a BMW stock is 5,87%, that results in a minimum price per share of 102,39€. The second, as an attempt to create a more conservative result, with a confidence interval of 95%, yields a maximum weekly loss of 7,72%, which means a price of 100,39€.

With the Value at Risk analysis, one is again reinforcing the idea that the undervaluation given by the market to BMW's common stock still holds, keeping it as a good investment opportunity.

Investment bank report comparison

In this section, one is to compare the previously presented valuations with one of a leading investment bank. For this specific case, the valuation from NATIXIS was chosen, for two main reasons: First, it is the one with the date of valuation closer to the one of the dissertation; and second, it is the one with the biggest difference in target price. The last point makes one willing to understand what caused such discrepancy.

Table 8 - Valuation comparison

	NATIXIS	Thesis
Date	15-12-2014	31-12-2014
Price	85,01 €	89,77 €
P/E Ratio	9,7	9,91
EV/EBITDA Ratio	3,3	8,83
Upside	5,87%	21,17%
Target Price	**90,00 €**	**108,77 €**

Source: Investment bank report and own calculations

The price differs from 90€ for the valuation of NATIXIS to 108,77€. The main reasons for this happening is the different assumptions used for forecasting BMW's results and the valuation method chosen. A more detailed presentation of these variations can be found in appendix 8.

As it can be seen in table 17, the presented thesis valuation seems to have a more optimistic approach relating to future growth. Not only does it present projections for more than two years, as done by the investment bank, as it also gives additional weight to the fact that model restructuration, brand momentum and new products are entering and disrupting the market. Thus, it was assumed a CAGR between 2013 and 2016 of 6% for sales, two percentage points higher than the 4% for NATIXIS.

Also, it is important to have in mind that results used by the investment bank in 2014 only include the third quarter. The last quarter is projected, increasing the uncertainty of the values used.

Table 9 - Fundamentals comparison

NATIXIS Valuation					
	2013	**2014**	**2015**	**2016**	**CAGR**
Revenues	76 058,00	79 411,00	84 000,00	87 929,00	0,04
EBITDA	11 731,00	13 050,00	13 725,00	14 325,00	0,05
EBITDA margin	*0,15*	*0,16*	*0,16*	*0,16*	
EBIT	8 300,00	8 950,00	9 375,00	9 825,00	0,04
EBIT margin	*0,11*	*0,11*	*0,11*	*0,11*	
Net Profit	5 314,00	5 768,00	6 090,00	6 376,00	0,05
Thesis Valuation					
	2013	**2014**	**2015**	**2016**	**CAGR**
Revenues	76 059,00	80 401,00	88 072,97	94 527,64	0,06
EBITDA	11 720,00	13 287,00	14 672,15	15 958,72	0,08
EBITDA margin	*0,15*	*0,17*	*0,17*	*0,17*	
EBIT	7 979,00	9 117,00	9 906,52	10 631,61	0,07
EBIT margin	*0,10*	*0,11*	*0,11*	*0,11*	
Net Profit	5 330,00	5 816,00	6 407,39	6 902,27	0,07

Source: Investment bank report and own calculations

Furthermore, differences in Capex and Depreciation and Amortizations need to be considered. When looking closely to the detailed presentation of both valuations, it can be seen that capex for the bank show a negative CAGR of 0,94% vs 0,05% and a CAGR for Depreciation and Amortization of 7,02% vs 9,24%.

As a consequence, net profit is also higher for the thesis valuation in both absolute and growth terms. For the valuation, the growth rate considered until 2016 is greater by three percentage points

Table 10 - Valuation multiples

	P/E	**EV/EBITDA**
Thesis	9,91	8,83
NATIXIS	9,70	3,30

Source: Investment bank report and own calculations

As for the methodology used for valuing BMW, the bank decided to use the multiples approach. Thus, one is to identify the differences between both valuations. The most relevant is undoubtedly the multiples chosen to be applied. When comparing the ones that are common, meaning the P/E and EV/EBITDA ratios as shown on the above table, it can be

easily understood why prices fluctuate so much. This inconsistency comes from the impact of exploration expenses that are included in the ratios by NATIXIS. EV/EBITDA, as an example, shows a gap of 5,53 points.

In summary, the different assumptions for growth to the various accounts of the income statement, together with the inclusion of exploration expenses in the ratios, are what justifies the lower price computed by NATIXIS on valuing BMW shares.

Conclusion

The purpose of this master thesis is to value the price of BMW's common stock and for that matter, diverse methods were applied, that ended up yielding different results. As a result, the first conclusion is that no valuation model is the same and that assumptions made about the performance and environment where the company is inserted are crucial and have great impact for an accurate analysis.

Still, it is believed that the most relevant method is the DCF Valuation, having multiples as a benchmark that confirms the provided price of 108,77€, an upside of 21,7% when compared to the price at date of valuation. Another inference that can then be taken is that the market is undervaluing BMW's stock, making it look like a good investment opportunity.

Nevertheless, variations to the most relevant inputs need to be considered and perpetuity growth rate and WACC are the ones to contemplate. With a change of 15% in G, that translates in a change of 0,0015 percentage points, the undervaluation seems to hold. Only with a decrease of 18,5% does the DCF valuation provide a price lower than the one of the market. WACC has even a greater impact, as it is only needed an increase in the discount rate of 7,7%, that translates in 0,0025 percentage points, for the undervaluation to lose its effect.

However, by applying the VaR analysis, one can state that with a confidence level of 95% the maximum weekly loss for such investment will be of 7,72%, leading to a minimum price of 100.39€, supporting once again our investment recommendation.

Another conclusion, this time about the valuation comparison made, is that much of the information and assumptions about growth rate, discount rate and financials are not disclosed, making it harder to compare. The greatest difference seems to be the inclusion on the exploration expenses that negatively impact the value of the multiples ratios used, when compared with the ones used in this valuation.

Again, one believes that the current momentum and environment of the auto industry, together with the great performance of the company for the past years and its leading position among its peers, translates in a solid basis to support the achieved price, making BMW a good investment opportunity.

Appendix

Appendix 1 – Additional Literature

Adjusted Present Value

The Adjusted Present Value (APV) model represents another type of DCF valuation. It is considered nowadays when valuing a business move as a good alternative to the standard DCF model. The rationale behind it is to compute the basic DCF method to each one of the different cash flows, adding their present values to get to a final result. It is reliant on the principle of additivity by dealing with complex subsections (Luehrman, 1997a). This will give an advantage to the model when comparing with the standard DCF models, as it requires less restrictive assumptions. It divides all the future benefits or costs provided by each and every asset in the company.

According to (Damodaran, 2002), the way one can apply the model should be divided into three steps. Starting by valuing the firm without leverage, meaning that it is entirely financed by equity, discounting its future cash flows with the required rate of return on equity, one then needs to consider the benefits and costs of borrowing, by computing the present value of interest tax shields. The process ends by assessing the probability of bankruptcy and the expected costs associated with it. Adding up these values should lead to an accurate value of the firm.

Computing the value of the unlevered firm (Vu) can be done as follows:

Equation 15 – Unlevered Firm Value

$$Vu = \frac{FCFF(1+g)}{Ru - g}$$

Where:

Ru = unlevered cost of equity

g = expected constant growth rate in perpetuity

For the first step mentioned, one is using the same method as for any other DCF valuation, where a discount rate and a terminal value are needed. In the case of APV one is trying to get an opportunity cost of capital, being the unlevered cost of equity the most appropriate (Luehrman, 1997b). Besides using the cost of equity of a comparable company that is also

fully financed by equity, (Damodaran, 2002) also believes that it can be inferred from the computation of the unlevered beta:

Equation 16 – Unlevered Beta

$$\beta u = \frac{\beta c}{1 + (1 - T)\frac{D}{E}}$$

Where:

T = Tax rate

D/E = current debt/equity ratio

βu = unlevered beta for the company

βc = current equity beta for the company

As for the PV of ITS, they are relevant for the case, because they are a reduction to the taxable income of the company equal to the value of interest (Luehrman, 1997b). The benefits from taxes should be a function of the tax rate applied to the firm and discounted at an appropriate rate to reflect the risk of cash flows. For the purpose, the cost of debt is the one to be considered (Damodaran, 2002). When computing the value for perpetuity, the value for tax benefits should follow:

Equation 17 – Interest Tax Shields

$$Value\ of\ Tax\ Benefits = \frac{T * \cancel{Rd} * D}{\cancel{Rd}} = T * D$$

It is agreed that using the DCF model to the value of tax shields is the correct way to go. However, it is not yet decided which is to be the most accurate discount rate to use. Using the cost of debt to discount the cash flows provided by tax shields is the most common one, on the basis that they are as uncertain as a cash flow arising from principal or interest payments (Luehrman, 1997b).

The final step is considered as the one that provides the most significant estimation problem and limitation of the model, as neither the probability of bankruptcy nor its associated cost are easy to be estimated directly. Even so, both direct and indirect costs are to be estimated. The present value of the expected bankruptcy costs can be computed as follows:

Equation 18 – PV Bankruptcy Costs

$$PV\ of\ Expected\ Bankruptcy\ Costs = (Prob.of\ bankruptcy) * (PV\ bankruptcy\ costs)$$

There are two different ways of assessing these costs indirectly: the first by estimating the rating of bonds at each level of debt and using a set of empirical statistics that match each one of them with an appropriate probability; the second by using statistical approaches to estimate the probability of default at each level of debt, such as *Probit*, taking into consideration different characteristics of the business. Despite being residual when compared to the value of the firm, direct bankruptcy costs can also be estimated and measured even with considerable error (Damodaran, 2002).

After one gets all three values mentioned above, the final value of the firm can be computed reliably by adding them up.

Equation 19 – Levered Firm Value

$$Vl = Vu + Value\ of\ tax\ benefits + PV\ of\ Expected\ Brankruptcy\ costs$$

Where:
VL = Value of levered firm
Vu = Value of unlevered firm

(Luehrman, 1997b) considers this model to be not only highly flexible and transparent, by being able to separate all parts of the business, but also refined to the point that it can be customized according to the required needs and tastes.

Dividend Discount Model

Again we present another applicability of DCFs. The Dividend Discount Model (DDM) represents a specialization of equity valuation where one discounts the future expected dividends to get the value of a stock today, as they represent the only cash flow that a stockholder receives from a firm (Damodaran, 2005). The DDM has been considered to be not only the simplest and oldest to be used when valuing a stock, but also the basic tool in equity valuation (Pinto, 2010). The author also states that there are two types of cash flow that can be expected by an investor: the future dividends borne by the stock and the PV of the

selling price. In perpetuity, the expected selling price can be inferred by the expected value of future dividends (Damodaran, 2005), directly by the dividends that the investor expects to receive from the stock and indirectly by the dividends it will provide after it is sold. This idea is supported by the fact that the expected selling price will also be a function of future dividends that the buying investor is expecting (Pinto, 2010). One can say that expected dividends and cost of equity represent the two basic assumptions for the model and that the value per share of stock can be determined by:

Equation 20 – Price per share

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

Again, the required rate of return is a resolute of the riskiness of a stock that can be assessed in two different ways: by the use of CAPM's market beta or the factor betas used in arbitrage and multi-factor models (Damodaran, 2005).

Also, the DDM is seen as one that needs fewer assumptions. One needs only to begin the valuation with dividends from the latest period and make expectations about its growth over time. Some add that volatility of earnings can be overcome because managers can set their dividends to levels that they can sustain (Damodaran, 2005).

Though simple to use, the DDM still has some variations that need to be taken into account, especially when considering the assumptions to be taken about future growth. The two simplest extensions of the model will be covered, in order to better clarify this idea: The constant growth model or Gordon growth Model and the Two-stage growth model.

Gordon Growth Model

The Gordon Growth Model is most used when one wants to value a stock with the belief that the firm in question is of stable growth that pays out every remaining cash flow in dividends and that can be sustained to infinity. It is based in simplicity and clarity, helping analysts to take conclusions about the relationship between value, growth and other measures of performance, such as required rate of return and payout ratio. It can also be used to value indexes in general (Pinto, 2010).

Equation 21 – Price per share by Gordon Growth Model

$$Value\ of\ Stock = \frac{Expected\ Dividends\ for\ next\ period}{Cost\ of equity - growth\ in\ perpetuity}$$

However, the assumption of stable growth needs some attention. If made incorrectly, misleading and irrational results may happen. First, as we are talking about a stable growth in perpetuity, it is important that it does not exceed the growth rate of the economy. Then, it is important that dividends grow at the same rate as the company. A good proxy to have in mind is earnings. Taking them into consideration and other measures of performance, such as payout ratio, we can see why this is critical. On the one hand, if dividends increase more that earnings over time, one will get to the point where they exceed earnings. On the other hand, if the converse happens, the dividend payout ratio will converge to zero, which should not be considered as "stable" (Damodaran, 2005). Also, one needs to be careful about the relation between growth rate and cost of equity. As they both approach the same values, stock price tends to converge to infinity. When growth rate is higher, then negative stock price should be expected.

Two-stage Growth Model

This extension of the DDM divides the forecast of dividends in two parts. The first where each period is analyzed separately and without a steady rate, and the second where the growth is again stable and expected to stay that way in perpetuity (Damodaran, 2005).

Equation 22 – Price per share by Two-stage Growth Model

$$Value\ of\ Stock = \sum_{t=1}^{t=n} \frac{E(DPSt)}{(1 + Cost\ of\ Equity)^t} + \frac{Pn}{(1 + Cost\ of\ Equity)^n}$$

$$Where: \qquad Pn = \frac{E(DPS(n+1))}{(Cost\ of\ Equity - g)}$$

It could be expected that in the initial period of analysis the growth rate would be higher than the one used in the stable period. However, this can be used by analysts in order to adapt to any shocks that can be expected in a near future, before the company is considered to become

stable. There is even a specific variation on the two-stage growth model, the H model that considers a linear decrease in growth rate for the initial periods before perpetuity

Option Pricing Model

Option pricing theory has been known to be better at handling contingencies than the normal DCF valuation models and considered to be encouraging at valuing business opportunities, although not yet vastly used as an instrument for valuing opportunities (Goedhart et al., 2010). It is the Contingent Claim type of valuation mentioned before, that is focused on assets that share some characteristics of options, such as a defined fixed life and dependence from an underlying.

An option is also considered to be an asset, however dependent on the value of an underlying, a stock, and is divided in two types: the call option that provides the holder with the right to buy a specified quantity of the underlying at a price that is fixed, which is called exercise price, at the time of the contract; and the put option with which the holder ensures the right to sell the underlying also at a previously defined price (Damodaran, 2002).

Furthermore, the value of an option is a function of six variables: The value of the underlying today, its variance, the strike or exercise price, the maturity of the option, the risk-free rate and the dividends that can be expected from the asset. (Damodaran, 2002), also gives us two variations of this model that can help on getting to the appropriate value of an option: the Binomial Model, the simplest one, and the Black-Scholes model. The idea behind them is to create a replicating portfolio that provides the same cash flows as the option under valuation, by combining the use of a risk-free and the underlying asset, to act as a proxy and come up with a final formulation.

The model is considered to be very useful, as there is a considerable amount of assets that are actually dependent on option characteristics, whose value cannot be assessed by other conventional valuation model, and because it is offering much more consistent estimations relying on the benefits of flexibility. However, some disadvantages also need to be taken into account, like the fact that the Option Pricing models provide us only with the value one or more assets, rather than the overall value of the firm, and the existing possibility of double counting of assets (Damodaran, 2002).

It is then important to know that using option pricing should be used as a complement for asset valuation, rather than a replacement (Goedhart et al., 2010).

Economic Value Added

The Economic Value Added (EVA) represents a variation of excess return models or residual income models, where one makes the distinction between excess and normal cash flows. More precisely, EVA indicates the excess value that is created to an investor either by new projects or existing assets in place. It is then also reliant on the principal of DCF. The current value of the firm is then a function of the future excess returns, discounted at WACC (Damodaran, 2005).

Equation 23 - Enterprise Value by EVA

$$EV = Invested\ Capital + \sum_{t=1}^{t=\infty} \frac{EVA\ current\ assets}{(1+WACC)^t} + \sum_{t=1}^{t=\infty} \frac{EVA\ future\ projects}{(1+WACC)^t}$$

Where, according to (Fernandez, 2007), EVA is equal to the Net Operating Profit after Taxes less the cost of capital times enterprise book value:

Equation 24 - Economic Value Added

$$EVA = NOPAT_t - (Dbv_{t-1} + Ebv_{t-1}) * WACC$$

By further analysis to the model, (Damodaran, 2002) states that there are two ways that can be used to influence results. First, as Firm value is a function on invested capital, managers can reduce its value to increase value. Some of the actions, however, are only superficial and do not necessarily increase value. They can, in fact, destroy value. Leases can be seen as an example. Also, much like the DCF, the model is a function of expectations about the future and consequent growth forecasts. Therefore, assumptions taken about these two points need to be watched closely for a proper valuation.

Economic Profit

According to (Damodaran, 2005) Economic Profit represents a variation to EVA, where the difference relies on another way to compute excess returns. In this case, one computes the excess in terms of equity and its return to investors, thus being based on net income and cost of equity.

Equation 25 - Economic Profit

$$Economic\ Profit = Net\ Income - Ke * E_{bv}$$

Valuation on emerging markets

More and more have we seen companies move their investments from developed countries to emerging markets like Asia and Latin America, which is forcing one to apply dynamic valuation models as an alternative to the static ones that have been used (Damodaran, 2005). The author then states that it is of most importance the way one assesses their assumptions on the fundamentals of a company, more specifically on risk parameters, debt ratios and growth rates.

(Goedhart et al., 2010) shows that there are two ways to account for the adverse environment present on this type of countries: the scenario DCF and the country risk premium DCF approaches. The first tries to make a simulation of two different trends for future cash flows, given a specific probability. On the one hand, one has the positive scenario where cash flows are moving in a way that reflects business growth as usual and as it is expected. On the other, a negative scenario needs to be valued, in a way that materializes the risks associated with emerging markets. The latter, is based on the idea of adding a country risk premium to the cost of capital of the company in question. This new discount factor should be used to discount future cash flows in a business-as-usual scenario. However, the author also states that there is a major drawback associated with this approach, as there is no consensus on the best way to establish and computing the country risk premium.

Appendix 2 – Forecast Assumptions

Table 11 - Automotive revenues projections

Forecast	2015	2016	2017	2018	2019
GDP Growth	0,04	0,04	0,04	0,04	0,04
Automotive Growth	0,08	0,07	0,06	0,05	0,04
Automotive Revenues	**81 224,66**	**86 950,77**	**92 210,56**	**96 865,88**	**100 787,01**

Source: Own Calculations

Table 12 - Motorcycle's revenues projections

Forecast	2015	2016	2017	2018	2019
Growth	0,04	0,04	0,04	0,04	0,04
Revenues Motorcycles	**1 747,25**	**1 818,27**	**1 892,18**	**1 969,10**	**2 049,14**

Source: Own calculations

Table 13 - Financial services revenue projections

Forecast	2015	2016	2017	2018	2019
Automotive + Motorcycle	82 971,91	88 769,05	94 102,74	98 834,98	102 836,15
% revenues	0,27	0,28	0,28	0,28	0,29
Revenues Fin Services	**22 576,99**	**24 515,65**	**26 371,62**	**28 099,99**	**29 656,05**

Source: Own calculations

Table 14 - COGS excluding R&D projections

Forecast	2015	2016	2017	2018	2019
COGS excluding as % of revenues	*0,74*	*0,74*	*0,74*	*0,74*	*0,74*
COGS excluding	**65 501,95**	**70 302,44**	**74 764,02**	**78 773,18**	**82 221,74**

Source: Own calculations

Table 15 - Research and Development projections

Forecast	2015	2016	2017	2018	2019
R&D as % of revenues	*0,049*	*0,049*	*0,049*	*0,049*	*0,049*
Research and Development	**4 296,48**	**4 611,36**	**4 904,01**	**5 166,98**	**5 393,18**

Source: Own calculations

Table 16 - Selling and Administrative costs projections

Forecast	2015	2016	2017	2018	2019
% total sales	0,095	0,095	0,095	0,095	0,095
Selling and Administrative Costs	**8 371,53**	**8 985,06**	**9 555,27**	**10 067,67**	**10 508,41**

Source: Own calculations

Table 17 - Other Operating Income and Expenses projections

Forecast	2015	2016	2017	2018	2019
% of revenues	*0,012*	*0,012*	*0,013*	*0,014*	*0,015*
Other Operating Income	**1 026,49**	**1 172,36**	**1 321,87**	**1 471,90**	**1 618,94**
% of revenues	*0,012*	*0,012*	*0,013*	*0,014*	*0,015*
Other Operating expenses	**1 022,99**	**1 169,53**	**1 319,87**	**1 470,85**	**1 618,94**

Source: Own calculations

Table 18 - Capex, PP&E and Depreciation and Amortization forecasts

Forecast	2015	2016	2017	2018	2019
% of BMW Revenues	0,07	0,07	0,07	0,07	0,07
Capex	**6 405,16**	**6 706,50**	**7 172,87**	**7 596,55**	**7 965,79**
% of PP&E	0,25	0,26	0,27	0,28	0,30
% of Revenues	0,05	0,06	0,06	0,06	0,06
Depreciation and amortization	**4 765,63**	**5 327,11**	**5 890,87**	**6 444,54**	**6 974,87**
Capital Turnover	0,21	0,21	0,21	0,21	0,21
PP&E	**18 821,53**	**20 200,92**	**21 482,92**	**22 634,92**	**23 625,85**

Source: Own calculations

Table 19 - Net Working Capital Changes projections

Forecast	2015	2016	2017	2018	2019
DSI	61,13	61,13	61,13	61,13	61,13
Inventories	*10 618,30*	*11 690,65*	*12 547,44*	*13 343,73*	*14 059,28*
DSO	284,59	284,59	284,59	284,59	284,59
Receivables	*62 688,94*	*68 670,81*	*73 703,53*	*78 380,95*	*82 584,07*
DPO	44,85	44,85	44,85	44,85	44,85
Payables	*7 790,23*	*8 576,97*	*9 205,56*	*9 789,77*	*10 314,74*
NWC	65 517,01	71 784,49	77 045,41	81 934,91	86 328,60
Var NWC	**-** **1 126,99**	**6 267,47**	**5 260,92**	**4 889,50**	**4 393,69**

Source: Annual reports and own calculations

Appendix 3 – Forecasted Income Statement

INCOME STATEMENT	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015E**	**2016E**	**2017E**	**2018E**	**2019E**
Revenues	53 197,00	50 681,00	60 477,00	68 821,00	76 848,00	76 059,00	80 401,00	88 072,97	94 527,64	100 526,61	105 917,27	110 554,16
Automotive	*48 782,00*	*43 737,00*	*54 137,00*	*63 229,00*	*70 208,00*	*70 630,00*	*75 173,00*	*81 224,66*	*86 950,77*	*92 210,56*	*96 865,88*	*100 787,01*
Motorcycles	*1 230,00*	*1 069,00*	*1 304,00*	*1 436,00*	*1 490,00*	*1 504,00*	*1 679,00*	*1 747,25*	*1 818,27*	*1 892,18*	*1 969,10*	*2 049,14*
Financial Services	*15 725,00*	*15 798,00*	*16 617,00*	*17 510,00*	*19 550,00*	*19 874,00*	*20 599,00*	*22 576,99*	*24 515,65*	*26 371,62*	*28 099,99*	*29 656,05*
Other	*191,00*	*3,00*	*4,00*	*5,00*	*5,00*	*6,00*	*7,00*	*5,00*	*5,00*	*5,00*	*5,00*	*5,00*
Reconciliation	*-12 731,00*	*-9 926,00*	*-11 585,00*	*-13 359,00*	*-14 405,00*	*-15 955,00*	*-17 057,00*	*-16 468,45*	*-17 619,08*	*-18 677,73*	*-19 616,99*	*-20 411,15*
Cost of good sold	47 148,00	45 356,00	49 545,00	54 276,00	61 354,00	60 791,00	63 396,00	69 798,43	74 913,80	79 668,02	83 940,16	87 614,93
Automotive	*43 505,00*	*39 616,00*	*44 703,00*	*50 164,00*	*56 525,00*	*57 778,00*	*61 221,00*	*67 403,78*	*72 343,64*	*76 934,76*	*81 060,33*	*84 609,02*
Motorcycles	*1 024,00*	*925,00*	*1 095,00*	*1 207,00*	*1 236,00*	*1 253,00*	*1 365,00*	*1 502,85*	*1 612,99*	*1 715,36*	*1 807,34*	*1 886,47*
Financial Services	*15 332,00*	*14 880,00*	*14 798,00*	*15 013,00*	*16 984,00*	*17 270,00*	*17 783,00*	*19 578,92*	*21 013,82*	*22 347,41*	*23 545,77*	*24 576,57*
Other	*145,00*	-	-	-	-	-	-	-	-	-	-	-
Reconciliation	*-12 858,00*	*-10 065,00*	*-11 051,00*	*-12 108,00*	*-13 391,00*	*- 15 510,00*	*-16 973,00*	*-18 687,12*	*-20 056,66*	*-21 329,51*	*-22 473,28*	*-23 457,13*
Gross profit	**6 049,00**	**5 325,00**	**10 932,00**	**14 545,00**	**15 494,00**	**15 268,00**	**17 005,00**	**18 274,54**	**19 613,84**	**20 858,59**	**21 977,11**	**22 939,24**

INCOME STATEMENT	2008	2009	2010	2011	2012	2013	2014E	2015E	2016E	2017E	2018E	2019E
Other expenses	5 128,00	5 036,00	5 821,00	6 527,00	7 219,00	7 289,00	7 888,00	8 368,02	8 982,24	9 553,27	10 066,61	10 508,41
Sales and administrative costs	*5 369,00*	*5 040,00*	*5 529,00*	*6 177,00*	*7 032,00*	*7 257,00*	*7 892,00*	*8 371,53*	*8 985,06*	*9 555,27*	*10 067,67*	*10 508,41*
Automotive	4 572,00	4 329,00	4 778,00	5 260,00	5 862,00	6 114,00	6 645,00	7 048,76	7 565,35	8 045,46	8 476,89	8 848,00
Motorcycles	147,00	126,00	140,00	176,00	181,00	177,00	201,00	213,21	228,84	243,36	256,41	267,64
Financial Services	583,00	560,00	589,00	719,00	980,00	953,00	1 035,00	1 097,89	1 178,35	1 253,13	1 320,33	1 378,13
Other	57,00	16,00	16,00	27,00	18,00	23,00	28,00	29,70	31,88	33,90	35,72	37,28
Reconciliation	10,00	9,00	6,00	-5,00	-9,00	-10,00	-17,00	-18,03	-19,35	-20,58	-21,69	-22,64
Other operating Income	*1 428,00*	*808,00*	*766,00*	*782,00*	*829,00*	*842,00*	*877,00*	*1 026,49*	*1 172,36*	*1 321,87*	*1 471,90*	*1 618,94*
Automotive	559,00	443,00	508,00	528,00	673,00	742,00	749,00	876,68	1 001,25	1 128,94	1 257,07	1 382,66
Motorcycles	3,00	2,00	3,00	2,00	8,00	7,00	-	-	-	-	-	-
Financial Services	31,00	41,00	72,00	74,00	101,00	57,00	73,00	85,44	97,58	110,03	122,52	134,76
Other	891,00	352,00	224,00	249,00	122,00	115,00	136,00	159,18	181,80	204,99	228,25	251,06
Reconciliation	- 56,00	- 30,00	- 41,00	- 71,00	- 75,00	- 79,00	- 81,00	- 94,81	- 108,28	- 122,09	- 135,95	- 149,53
Other operating expenses	*1 187,00*	*804,00*	*1 058,00*	*1 132,00*	*1 016,00*	*874,00*	*873,00*	*1 022,99*	*1 169,53*	*1 319,87*	*1 470,85*	*1 618,94*
Automotive	574,00	500,00	809,00	856,00	895,00	831,00	812,00	951,51	1 087,81	1 227,65	1 368,07	1 505,82
Motorcycles	2,00	1,00	1,00	10,00	72,00	1,00	2,00	2,34	2,68	3,02	3,37	3,71
Financial Services	57,00	44,00	101,00	89,00	129,00	65,00	98,00	114,84	131,29	148,16	165,11	181,74
Other	607,00	309,00	253,00	246,00	51,00	54,00	44,00	51,56	58,95	66,52	74,13	81,60
Reconciliation	-53,00	- 50,00	-106,00	-69,00	-131,00	-77,00	-83,00	-97,26	- 111,19	-125,49	- 39,84	-153,92
EBIT	***921,00***	***289,00***	***5 111,00***	***8 018,00***	***8 275,00***	***7 979,00***	***9 117,00***	***9 906,52***	***10 631,61***	***11 305,31***	***11 910,50***	***12 430,82***

INCOME STATEMENT	2008	2009	2010	2011	2012	2013	2014	2015E	2016E	2017E	2018E	2019E
Financial Result	*570,00*	*-124,00*	*258,00*	*635,00*	*472,00*	*85,00*	*411,00*	*518,50*	*518,50*	*518,50*	*518,50*	*518,50*
Result from equity acc. Investments	-26,00	-36,00	-98,00	-162,00	-271,00	- 407,00	- 655,00	- 531,00	- 531,00	- 531,00	-531,00	- 531,00
Interest and similar income	-685,00	-856,00	-685,00	-763,00	-224,00	-183,00	-200,00	-191,50	-191,50	-191,50	-191,50	-191,50
interest and similar expenses	930,00	1 014,00	966,00	943,00	375,00	469,00	519,00	494,00	494,00	494,00	494,00	494,00
other financial result	351,00	- 246,00	75,00	617,00	592,00	206,00	747,00	747,00	747,00	747,00	747,00	747,00
EBT	**351,00**	**413,00**	**4 853,00**	**7 383,00**	**7 803,00**	**7 894,00**	**8 706,00**	**9 388,02**	**10 113,11**	**10 786,81**	**11 392,00**	**11 912,32**
Income taxes	21,00	203,00	1 610,00	2 476,00	2 692,00	2 564,00	2 890,00	2 980,63	3 210,84	3 424,73	3 616,88	3 782,07
Net profit	***330,00***	***210,00***	***3 243,00***	***4 907,00***	***5 111,00***	***5 330,00***	***5 816,00***	***6 407,39***	***6 902,27***	***7 362,08***	***7 775,12***	***8 130,25***

Source: Annual Reports and Own calculations

Appendix 4 – Discounted Cash Flows

FCFF PROJECTIONS (million €)	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015E**	**2016E**	**2017E**	**2018E**	**2019E**
EBIT	921,00	289,00	5 111,00	8 018,00	8 275,00	7 979,00	9 117,00	9 906,52	10 631,61	11 305,31	11 910,50	12 430,82
Taxes	0,49	0,49	0,33	0,34	0,34	0,32	0,33	0,32	0,32	0,32	0,32	0,32
EBIT(1-T)	**468,31**	**146,95**	**3 415,41**	**5 329,04**	**5 420,16**	**5 387,39**	**6 090,57**	**6 761,27**	**7 256,15**	**7 715,96**	**8 129,00**	**8 484,13**
Depreciation and amortization	3 670,00	3 600,00	3 682,00	3 646,00	3 541,00	3 741,00	4 170,00	4 765,63	5 327,11	5 890,87	6 444,54	6 974,87
Operational Impairments	44,00	69,00	2,00	21,00	18,00	252,00	195,00	223,50	223,50	223,50	223,50	223,50
Total Investments	**8 919,00**	**4 556,00**	**7 153,00**	**10 502,00**	**7 211,00**	**6 926,00**	**13 594,00**	**6 870,17**	**12 973,97**	**12 433,79**	**12 486,05**	**12 359,49**
Variation NWC	4 715,00	1 085,00	3 890,00	6 823,00	1 975,00	233,00	7 495,00	465,01	6 267,47	5 260,92	4 889,50	4 393,69
Capex	4 204,00	3 471,00	3 263,00	3 679,00	5 236,00	6 693,00	6 099,00	6 405,16	6 706,50	7 172,87	7 596,55	7 965,79
FCFF	**-4 736,69**	**-740,05**	**-53,59**	**-1 505,96**	**1 768,16**	**2 454,39**	**-3 138,43**	**4 880,23**	**-167,21**	**1 396,54**	**2 311,00**	**3 323,01**
Terminal Value	**128 318,66**											
WACC	**0,032**											
Discount factor								0,97	0,94	0,91	0,88	0,85
PV FCFF	10 709,53							4 727,48	-156,91	1 269,47	2 034,97	2 834,52
FIRM VALUE	**139 028,20**											
MV Debt	70 702,98											
Cash	7 688,00											
Pension Provisions	4 604,00											
Equity	**71 409,21**											
# shares	656,50											
Po	**108,77**											

Source: Own Calculations

Appendix 5 – Weighted Average Cost of Capital

WACC	**3,23%**
Kd	1,08%
D/V	55,05%
Ke	6,29%
E/V	44,95%
Taxes	31,75%
Ke	**6,29%**
Rf	0,50%
Rm-Rf	5,75%
Beta	1,01

At date of valuation	**# Shares**	**Market Price**	**Market Value**
Preferred Stock	54 500,00	67,84 €	3 697 280,00
Common Stock	601 995,00	89,77 €	54 041 091,15
Market Value of Equity	57 738,37		
Market Value of Debt	70 702,98		
Firm Value	128 411,36		
D/V	0,55		
E/V	0,45		

Source: Own Calculations

Appendix 6 – Centroids Output

Name	Distance to D/A	Distance to ROIC	Distance to Beta	Distance to EBITDA G	Allocation	
VOLKSWAGEN AG	**1,887**	**1,305**	**0,648**	**3,521**	**Centroid III**	**GOOD**
TOYOTA MOTOR CORP	**1,942**	**1,967**	**0,844**	**3,152**	**Centroid III**	**GOOD**
DAIMLER AG	**2,494**	**1,628**	**0,595**	**3,801**	**Centroid III**	**GOOD**
GENERAL MOTORS CO	2,186	1,225	2,348	4,688	Centroid II	GOOD
FORD MOTOR CO	3,039	1,357	1,478	4,886	Centroid II	GOOD
FIAT CHRYSLER AUTOMOBILES NV	1,594	0,816	1,620	4,151	Centroid II	GOOD
HONDA MOTOR CO LTD	1,726	0,553	0,897	3,902	Centroid II	GOOD
BMW AG	**2,453**	**1,484**	**0,708**	**3,883**	**Centroid III**	**GOOD**
NISSAN MOTOR CO LTD	**1,704**	**1,135**	**0,427**	**3,490**	**Centroid III**	**GOOD**
SAIC MOTOR CORP LTD-A	0,935	1,685	2,160	3,338	Centroid I	GOOD
HYUNDAI MOTOR CO	1,813	0,628	1,692	4,322	Centroid II	GOOD
AUDI AG	4,117	4,990	4,464	2,866	Centroid IV	GOOD
PEUGEOT SA	1,872	2,305	2,449	4,062	Centroid I	GOOD
RENAULT SA	**2,190**	**1,425**	**0,666**	**3,946**	**Centroid III**	**GOOD**
KIA MOTORS CORP	1,154	2,123	2,541	3,221	Centroid I	GOOD
TATA MOTORS LTD	1,764	2,958	2,618	2,330	Centroid I	GOOD
SUZUKI MOTOR CORP	0,727	2,042	2,170	3,145	Centroid I	GOOD
MAZDA MOTOR CORP	0,810	1,580	1,694	3,014	Centroid I	GOOD
FUJI HEAVY IND LTD	3,883	5,332	4,708	2,866	Centroid IV	GOOD
MITSUBISHI MOTORS CORP	1,452	3,065	3,055	2,076	Centroid I	GOOD

Source: Own Calculations

Appendix 7 – Multiples

		Forward looking Multiples	
BMW	**2014**	**2015**	**2016**
EBITDA	13 287,00	14 672,15	15 958,72
EV/EBITDA Peer Average	8,83	8,83	8,83
EV	117 324,21	129 555,10	140 915,46
Debt	70 702,98	70 702,98	70 702,98
Cash	7 688,00	7 688,00	7 688,00
Equity	54 309,23	66 540,12	77 900,48
# shares	656,50	656,50	656,50
Price	**82,73**	**101,36**	**118,66**
Earnings	5 816,00	6 407,39	6 902,27
P/E Peer Average	9,91	9,91	9,91
Equity	57 636,56	63 497,27	68 401,49
# shares	656,50	656,50	656,50
Price	**87,79**	**96,72**	**104,19**

Source: Bloomberg and Own Calculations

Appendix 8 – Financials comparison

NATIXIS Valuation					
(Million €)	**2013**	**2014**	**2015**	**2016**	**CAGR**
Revenues	**76 059,00**	**79 411,00**	**84 000,00**	**87 929,00**	**3,69%**
Auto	70 629,00	73 962,00	78 456,00	82 614,00	4,00%
Motor	1 504,00	1 660,00	1 750,00	1 820,00	4,88%
Financial	19 874,00	20 469,00	21 084,00	21 822,00	2,37%
Other	-15 949,00	-16 680,00	-17 290,00	-18 327,00	3,54%
EBITDA	**11 720,00**	**13 050,00**	**13 725,00**	**14 325,00**	**5,12%**
EBITDA margin	*0,15*	*0,16*	*0,16*	*0,16*	
Depreciation and Amortization	3 431,00	4 100,00	4 350,00	4 500,00	7,02%
% of Revenues	*0,045*	*0,052*	*0,052*	*0,051*	
EBIT	**8 300,00**	**8 950,00**	**9 375,00**	**9 825,00**	**4,31%**
EBIT margin	*0,11*	*0,11*	*0,11*	*0,11*	
Net Profit	**5 314,00**	**5 768,00**	**6 090,00**	**6 376,00**	**4,66%**
Capital Expenditures	6 575,00	6 195,00	6 300,00	6 331,00	-0,94%
% of Revenues	*0,09*	*0,08*	*0,08*	*0,07*	

Thesis Valuation					
(Million €)	**2013**	**2014**	**2015**	**2016**	**CAGR**
Revenues	**76 059,00**	**80 401,00**	**88 072,97**	**94 527,64**	**5,58%**
Auto	70 630,00	75 173,00	81 224,66	86 950,77	5,33%
Motor	1 504,00	1 679,00	1 747,25	1 818,27	4,86%
Financial	19 874,00	20 599,00	22 576,99	24 515,65	5,39%
Other	-15 955,00	-17 057,00	-16 468,45	-17 619,08	2,51%
EBITDA	**11 720,00**	**13 287,00**	**14 672,15**	**15 958,72**	**8,02%**
EBITDA margin	*0,15*	*0,17*	*0,17*	*0,17*	
Depreciation and Amortization	3 741,00	4 170,00	4 765,63	5 327,11	9,24%
% of Revenues	*0,049*	*0,052*	*0,054*	*0,056*	
EBIT	**7 979,00**	**9 117,00**	**9 906,52**	**10 631,61**	**7,44%**
EBIT margin	*0,10*	*0,11*	*0,11*	*0,11*	
Net Profit	**5 330,00**	**5 816,00**	**6 407,39**	**6 902,27**	**6,68%**
Capital Expenditures	6 693,00	6 099,00	6 405,16	6 706,50	0,05%
% of Revenues	*0,09*	*0,08*	*0,07*	*0,07*	

Source: Investment Bank report and own calculations

Appendix 9– GDP performance

	2007	2008	2009	2010	2011	2012	2013	2014	2015E	2016E	2017E	2018E	2019E
GDP Growth (%)	0,057	0,030	0,000	0,054	0,041	0,034	0,033	0,033	0,038	0,040	0,041	0,040	0,040

Source: IMF Database

Appendix 10 – Industry composition for Correlation analysis (Sales Volume)

Company	2007	2008	2009	2010	2011	2012	2013	2014
Ford	125 991,53	99 167,28	83 616,78	97 403,38	97 987,36	103 934,63	110 648,06	108 632,43
Toyota	162 751,38	145 780,23	144 646,00	168 076,88	171 229,19	207 676,95	191 500,95	196 465,32
BMW	56 018,00	53 197,00	50 681,00	60 477,00	68 821,00	76 848,00	76 058,00	80 401,00
Volkswagen	108 897,00	113 808,00	105 187,00	126 875,00	159 337,00	192 676,00	197 007,00	202 458,00
Daimler	99 399,00	95 873,00	78 924,00	97 761,00	106 540,00	114 297,00	117 982,00	129 872,00
GM	-	-	75 207,86	102 417,29	108 063,38	118 484,50	117 057,23	117 568,70
Nissan	33 617,00	34 196,00	29 840,00	35 441,00	44 096,00	48 771,00	49 880,00	53 787,00
Renault	40 682,00	37 791,00	33 712,00	38 971,00	42 628,00	41 270,00	40 932,00	41 055,00
Industry	**627 355,91**	**579 812,51**	**601 814,64**	**727 422,55**	**798 701,93**	**903 958,09**	**901 065,24**	**930 239,45**

Source: Bloomberg

Nomenclature

APT - Arbitrage Pricing Theory

APV – Adjusted Present Value

BMW – Bayerische Motoren Werke

CAGR – Compound Annual Growth Rate

CAPEX – Capital Expenditures

CAPM – Capital Asset Pricing Model

COGS – Cost of Goods Sold

DCF – Discounted Cash Flows

DDM – Dividend Discount Model

EBIT – Earnings Before Interests and Taxes

EVA – Economic Value Added

FCFE – Free Cash Flows to the Equity

FCFF – Free Cash Flows for the Firm

ITS – Interest Tax Shields

NOPAT – Net Operating Profit After Taxes

PBR – Price to Book Ratio

PER – Price to Earnings Ratio

PV – Present Value

PP&E – Property Plant and Equipment

R&D – Research and Development

ROIC – Return on Invested Capital

VaR – Value at Risk

VL = value of levered firm

Vu = Value of unlevered firm

WACC – Weighted Average Cost of Capital

WC – Working Capital

WCN – Working Capital Needs

YTM – Yield to Maturity

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