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# Equity Valuation of the BMW Group

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RESEARCH NOTE

HIGHLIGHTING POTENTIALS

A fair value of 92€ was found for the BMW group, representing the success of the implementation of the strategy number ONE together with the exceptional performance of the BMW group over the last few years. Even considering all the risks the company is facing and the strong investments expected to be made, the stock price found on this valuation reflected a current undervaluation in the market and therefore we issue a buy recommendation on BMW stock.

LEADING OVER THE YEARS

The BMW group is one of the largest car manufacturers in the world. It currently owns three very well positioned brands: BMW, Mini and Rolls Royce. Through each one of the brands, the group tries to have a different goal and transmit a different idea. Nevertheless, they all share the quality and luxury that strongly characterizes the company. The BMW group was founded in 1917 and has been growing strongly since then. Nowadays, it has strong market position in all of its three revenue segments. Even with the automobile segment representing the highest source of revenue, the company also has a strong market position in the motorcycle segment and operates a successful financial services business, by being leader in all of them. In 2012, BMW sold more than 1.84 million BMW, Mini and Rolls Royce vehicles, which represented an increase in revenues of about 10% in comparison to the previous year. Profit before tax and net profit of the group also registered record figures in 2012. Over the last years, the BMW group has been expanding to many different countries and is now more international than ever, with 29 production facilities in 14 different countries by the end of 2012.

**Recommendation:**  
**BUY**

**Price: 92, 1€**

October 17<sup>th</sup> 2013, Portugal

BMWG.DE, BMW GR

Company's Data

Price (date of the valuation, €): 83

Shares O/S (mn): 655

Valuation Target

Value (mn): 90.619

Date of Price: 17-Oct-13

Price Target (€): 92.1

Shares O/S (mn): 658

JP Morgan Valuation Target:

Price Target (€): 85

Date of Price: 2-Dec-2013

*Source: Bloomberg, company reports and own calculations*

TABLE 1 – BMW GROUP IN FIGURES (IN € MILLION)

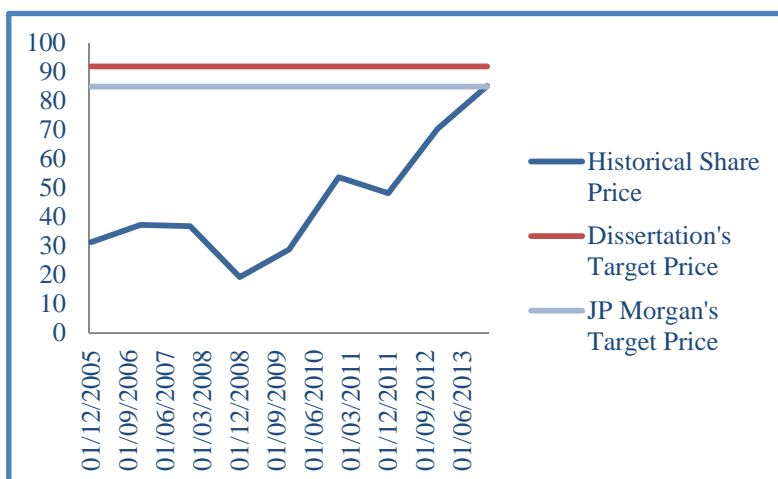
	2013
Revenues	79.328
Capital Expenditure	6.346
Operating Cash Flow	5.747
Depreciation and Amortization	1.755
Equity	60.606
Profit Before Tax	5.824
Income Taxes	2.039
Net profit/loss for the year	3.758

Source: Company reports and own calculations

### BEATING THE MARKET

Even with the debt crisis strongly affecting the segments where BMW operates, the company was able to beat the market and continue to generate profits and be on top. BMW stock price has been performing very well along the years and registered its high momentum, until the date of the valuation, in October 2012, by being valued in the market at 83€. Even after that date, it has been increasing almost every month.

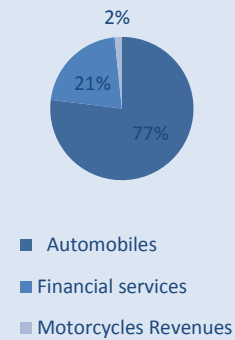
GRAPHIC 1 - BMW'S HISTORICAL SHARE PRICE



Source: Company reports, Bloomberg and own calculations

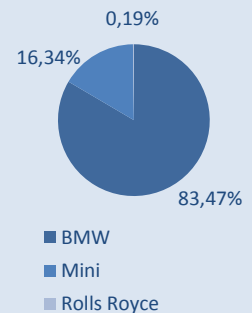
Upon analysis of the German stock index, the DAX 40, we can observe that BMW was able to avoid the negative influences of

Revenues by segment (2012)



Source: Company reports and own calculations

Revenues by brand (2012)



Source: Company Reports and own calculations

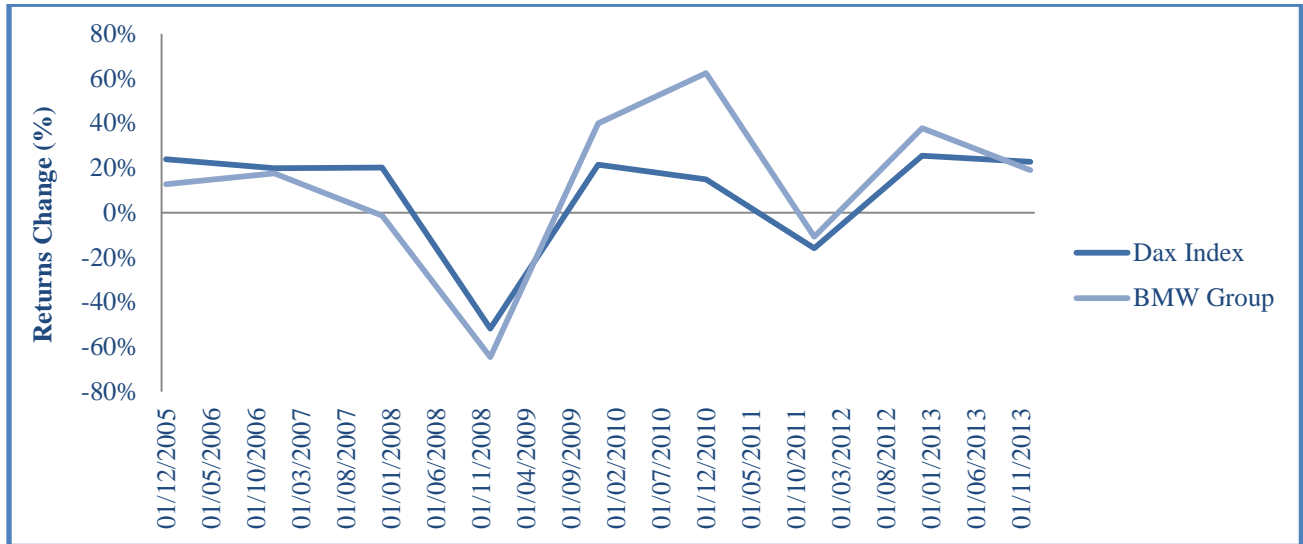
### WACC Assumptions

WACC	5,8%
Cost of Debt	3,1%
Cost of Equity	7,7%
Tax Rate	31,6%
Total Debt/Total Assets	34%
Total Equity/Total Assets	66%

Source: Company Reports, Bloomberg and own calculations

the high volatility felt all over the world and even so its share price increased, most of the times, in a higher scale than the reference index.

Graphic 2 - Development of BMW stock and DAX 40 index returns



Source: Bloomberg and own calculations

## INVESTING STRONGLY

This extremely good performance is primarily the result of the strategy number ONE implementation, through which BMW has been taking long-term and future-oriented decisions. During the next few years, BMW is expected to develop a huge variety of new models, by putting electro mobility on the road, which will need intensive investments in new and innovative raw-materials as well as the development of new production facilities. Given this, it is expected that the firm will register huge capital expenditures, especially in 2013 and 2014. Thus BMW is trying to set new standards of resource conservation by launching, for example, BMWi3, a solution for emissions-free driving and to lower fuel consumption and CO<sub>2</sub> emissions. Moreover, the political uncertainties regarding conflicts in the Middle East kept the price of Brent oil and the energy prices at huge levels. Those are one of the most important ones in Europe, which will also mean an increase in raw material prices for the BMW group. The Brent oil is an important basic material for production and a change in the price of oil also leads to a change in fuel prices, which is dangerous regarding the purchasing power of customers. In addition, a sharp increase in the price of crude oil may affect the world economy and international capital markets as a whole, and as such also affect BMW's business performance indirectly.

### FACING THE MARKET RISKS

Exchange rates also remain volatile and given that more than half of BMW's total revenue comes from sales outside the euro zone, this also represents a risk that the company should be aware of. Nevertheless, in 2012 the Chinese renminbi and the US dollar remained practically unchanged on a year-end comparison. In order to try to eliminate the risk that foreign currencies depreciate against the euro, BMW tries to hedge its currency exposure through 'natural hedging', by rising the volume of local production and purchases denominated in foreign currency, and through financial hedging on the financial markets. Asia and America were also the regions where BMW registered its higher increase in demand in 2012, with the second one providing its strongest momentum. On the other hand, in Europe the demand for car registrations has been decreasing. Even so, the decrease in Germany was less pronounced, which was good news for BMW given its senior presence in this particular country. As for the motorcycle segments and financial services market, Europe was also where the crisis effects were more prominent and where the company revenues contracted more. However, increases in the USA, Brazil, Germany and Japan more than justified the double digit growth that the group achieved.

### VALUATION OUTPUT

This report is based on the investigation of all the public information and pays particular attention to the huge impact that the next few years changes will have on the company share price, given the high injection of capital from the group and the strong profitability that has been registered. By making the most accurate assumptions possible about BMW's operations, the valuation was carried out by means of three different methodologies: the Discounted Cash Flows (DCF) and the Weighted Average Cost of Capital (WACC) approach, the Dividend Discount Model (DDM) and the Relative Valuation. Each one provided different results, since they also have different assumptions.

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**ABSTRACT**

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The present dissertation aims to value the BMW group, which currently owns three different and physically powerful brands: BMW, Mini and Rolls Royce. There is still much deliberation among analysts about which valuation method is the most accurate, but almost all investors agree that the Discounted Cash Flow is one of the best models to use. Therefore, the BMW group will be valued with this method, as well as with a relative valuation which is extremely important fundamentally as a complementary tool for the DCF. The Dividend Discount Model was also used in order to value the price per share based on the present value of future dividends.

The results obtained with these methodologies will be compared with the ones of an investment bank – JP Morgan, published in 2013. This has been done in order to understand the main differences on the valuation and to provide a way of checking its strength. Therefore, given the exceptional period that the BMW group is undergoing, we find that the current value of BMW is in fact undervalued and that there is a high probability that the current share price of the company will rise.

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## ACKNOWLEDGMENTS

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This dissertation faced me with a lot of crucial concepts regarding equity valuation and valuable inputs to my future from now on.

Luckily, I had a great amount of help during this process which was essential to the improvement of this work. Firstly, I would like to thank my advisor, Professor José Tudela Martins, for the invaluable help and for his immediate support in clarifying my doubts during the whole process. Furthermore, a mention to Miss Andreas Stoeffler, from the investor relationships' department of the BMW group, who was also highly cooperative in responding to my e-mails and giving me precious inputs, fundamentally for my forecasts of the company. Finally, I also want to thank all of my colleagues for providing me with constructive inputs and suggestions of improvement and for all the support from my family and friends along the way.

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## 1. INTRODUCTION

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In order to assess if a company is performing well or not, valuation is the key. Nowadays, it plays a central role in a large amount of finance jobs. Additionally, it's the key to understand what to expect from a given company in the near future in terms of its stock development or if it's valuable or not to invest in that company, according to the overvaluation or undervaluation of that particular stock. Plus, in cases of mergers and acquisitions or joint ventures, for example, it's important to value the synergies of those companies. Therefore, valuation plays not just a finance role but also a strategic one.

In order to accomplish my objective of valuing the BMW group, one needs to access a lot of relevant articles on this topic with the aim of being aware of the different consensus among analysts regarding this. Currently, there's huge discussion in the literature about which model provides the most reliable results, although they all give applicable inputs in order to choose the model that is more adequate to the company characteristics and the market where it is inserted. Given this, the first part of this dissertation includes a review of these published articles.

Afterwards, the valuation methods that were chosen were implemented so as to reach a final stock value for the BMW group, which is a public company that had registered its most exceptional year in 2012 and has been growing since ever, even when almost all the other companies in the same industry are suffering from the economic downturn. That valuation was done with three different methods in order to check the quality and reliability of the valuation. Then, DCF/WACC approach, Multiples and DDM were the methods chosen to value the group.

Once the valuation was done, a sensitivity analysis was conducted in order to catch the impacts that the future risk and uncertainties on the market can have on the company's value and share price.

The last step was to reach a final value per share and compare it to the target value achieved from an analyst from JP Morgan, in order to specify the main differences between them.

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## 2. LITERATURE REVIEW

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### 2.1. INTRODUCTION

“Behind every major resource-allocation decision a company makes lies some calculation of what that move is worth”  
- Luerhman 1997

The variety of different approaches available to value a company originate a lot of discussions about which one seems to provide the most accurate results. One consensus of all financial experts on this topic is the fact that all valuations produce the same results if they are all under the same assumptions. Nowadays, valuation should be present in almost all kind of decisions that managers need to face. Either when launching a new product or an entering a strategic partnership, managers who are not finance specialists need to be prepared to carry out those valuations in order to be present in the company’s resource allocation decisions (Luerhman 1997).

Luehrman (1997) claims that all valuations are a function of cash, timing and risk. Nevertheless, each different problem needs different valuations and the right methodology should be the one adapted to the structural features and major kinds of decisions that managers face (Luehrman 1997). Young et al. (1999) defend that when making a specific valuation, companies shouldn’t use a great number of different methods, since the more approaches companies use, the weaker the final message is. Then, it becomes hard to understand which approach provides the most reliable result. The previous authors also argue that all valuation models should be mathematically equivalent, and managers should be able to express a valuation based on discounted cash flows in terms of P/Es, for example. According to Young et al. (1999), managers need to have in mind four basic implications before carrying out any kind of valuation: consistency of the data and of the assumptions; comparison between models; uniqueness of the one single fair value estimation and, lastly, consistency without uniformity, in which all analysts should be free to decide about the valuation approach to use.

### 2.2. VALUATION FRAMEWORKS

#### 2.2.1. THE DISCOUNTED CASH FLOWS METHOD

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A discounted cash flow valuation regards business as a series of risky cash flows and assumes that the value of an asset is the present value of the expected cash flows of that assets, discounted at a risk that reflects the risk of those cash flows.

$$1. \text{ Value of Assets} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} + \dots + \frac{E(CF_n)}{(1+r)^n}$$

Where:

$E(CF_t)$  = Expected Cash Flow in period  $t$

$r$  = discount rate reflecting riskiness of estimated cash flows

$n$  = Life period of asset

It is then expected that the value of the assets with lots of predictable cash flows should be higher than the ones with low and volatile cash flows (Damodaran 2002). Valuations based on the DCF method are discounted at one unique discount rate, the weighted average cost of capital (WACC), which should catch up all the cost and benefits of a specific capital structure (Luehrman 1997).

$$2. \text{ WACC} = \frac{D}{D+E} K_d (1-t) + \frac{E}{D+E} K_e$$

Then, the cash flows will vary from assets to assets according to the dividends the company pays, the stocks it has, the interest it pays, the face value of bonds and the after-tax cash flows for a business (Damodaran 2002). Therefore, the value of interest tax shields is picked up on this tax-adjustment. Nevertheless, the value of those interest tax shields are based on fairly restrictive assumptions. Further, Luehrman (1997) argues that both the cost of debt and cost of equity are opportunity costs, each one reflecting the time value and its own risk premium.

Nowadays, there are many discussions among analysts about the advantages and limitations of this approach. An opinion shared by everyone is that there are now a lot more methods better tailored for specific operations and problems that managers have to face. Although, the DCF still continues to work well in a range of cases and it has the large advantage of being standard and simple to use.

First of all, DCF requires analysts to understand the all business they are valuing, which obliges them to study the sustainability of cash flows and risk (Damodaran 2002). In addition, it obliges analysts to look for the essentials that drive the value and not the market perceptions about it. As a result, it is easy to find stocks that are undervalued or overvalued just by understanding if stock prices fall or rise, respectively, disproportionately to the earnings and cash flows (Damodaran 2002).

On the opposite side, there are some limitations related to the DCF methodology. Firstly, this approach should be applied in companies without complex capital structures, tax positions or fundraising strategies, because those are the circumstances where mistakes are more easy to be made

within this methodology (Luerhman 1997). Estimations based on this methodology have the risk of miscalculation of WACC (Weighted Average Cost of Capital). The problem is that those conditions are not exactly common nowadays. In most real cases, the WACC needs to be adjusted for all the effects of a specific financing program, like tax shields, issue costs, subsidies hedges, exotic debt securities or dynamic capital structures (Luerhman 1997). On the other hand, if a company has a constant debt to equity ratio over the long run, the DCF methodology may be used accurately.

Fernández (2013) argues that the WACC is a weighted average of two different aspects: the cost of debt (which translates the cost) and a required return (which can either translate a cost or a return). The second one is usually called the required return on debt, although that is not always a return but also a cost, sometimes. Therefore Fernández (2013) defends that calling the WACC as “cost of capital” is not accurate. Besides that, Luerhman (1997) presents the fact that most analysts neglect costs of financial distress associated with corporate leverage and consequently ignore other interesting financial side effects.

Another problem with this approach is that some analysts use book values to generate the weights in the WACC, whereas the procedure is valid only for market values (Luerhman 1997). Fernández (2003) also shares this argument. Damodaran (2002) states that the use of the DCF approach can be considered an act of faith. This is because one is expecting that every asset has an intrinsic value which is calculated by looking at the company’s fundamentals. Another drawback associated with DCF is that any analyst has access to all the information necessary to some kinds of assumptions. There is always private information that can distort the assumptions that have been made based on public information. Consequently, Damodaran (2002) defends that the intrinsic value used is never actually the true intrinsic value.

### **2.2.2. ADJUSTED PRESENT VALUE METHOD**

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Over the past years, it has usually been argued that Discounted Cash Flows (DCF) methodology was the best practice for valuing operating assets. Nowadays, some authors tend to disagree with that.

Luehrman (1997) defend that DCF is now an obsolete methodology and that the Adjusted Present Value (APV) is especially versatile and reliable, stating that the DCF is still taught in schools and books but that is because it is standard and not the best methodology to use. They are, however, two different methodologies used with the same purpose: to evaluate any existing asset that will generate future cash flows.

The first benefit of using the APV approach is that it always works when WACC does, and sometimes it also works when WACC doesn't. The rationale for that is the fact that APV requires less restrictive assumptions. Besides that, APV is less prone to serious errors than WACC (Luehrman 1997).

The way in how managers account for the value created or destroyed is where the difference between both methodologies come from. The fundamental idea under the use of the APV method is the results it provides. It gives the managers more information than the DCF, providing not only the final value of the valuation, but also the distinction of where the different parts of the value came from. The APV methodology evaluate financial maneuvers separately and then add that value to that of the business. Therefore, the effects on value of debt financing are separated from the ones of assets financing. In terms of calculation, it aims to value the business as if it were 100% equity financing and then adding the present value of the tax benefits of debt and take away the expected bankruptcy costs (Damodaran 2002).

3.  $APV = \text{Value of the project as if it were financed entirely with equity} + \text{Value of all financial side effects}$

While in the DCF approach the value of debt is captured in the discount rate, the APV approach estimates the benefits and costs of debt, not linking it to the assets of the business (Damodaran 2002).

On the one hand, debt financing creates tax advantages because interest payments are tax-deductible. On the other hand, it also increases bankruptcy costs. In the past, the APV had some limitations compared to the DCF methodology, since the second one simply requires one discounting operation (Luehrman 1997) which facilitates the process. Nonetheless, the development of new technologies and speed spreadsheets prepared to perform those kinds of calculations exceeded that facility. Currently, any company that is not prepared to use spreadsheets for valuation is far behind the times.

Another advantage of this approach is that fact that it is flexible. The company can organize the valuation according to what makes more sense for them (Luehrman 1997). However, not all the characteristics of this approach are that beneficial. One of the problems with the APV is that it is not an easy task to estimate probabilities of default and bankruptcy costs (Damodaran 2002), which leads lots of investors to ignore that part of the calculation. Because of that, analysts tend to consider only the benefits of debt on the valuation, which makes them conclude that the firm value increases as they borrow money. It indicates that the optimal debt ratio for a firm is 100%. That is why the APV approach is more appropriate when firms are analysing debt proportions, while the DCF considers

that the debt ratio of the firm remains constant over time. Damodaran (2002) states that when trying to determine the debt ratio of the firm, one should look at the leverage of similar firms in the industry in which the firm operates.

### 2.2.3. RELATIVE VALUATION

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Multiples are one of the most straightforward methods when it comes to interpreting results and drawing conclusions. Their aim is to help companies understand their positioning compared to the competition and therefore be able to adapt strategically and create more value. They are similarly very easy to use. Analysts usually calculate an industry average Price-to-Earnings Ratio (PER) to multiply it by the company's expected earnings in order to achieve a specific forecast for the valuation, when using the PER. Similarly, enterprise value equals trend free cash flow divided by the average free cash flow yield, when applying this approach to yields. This approach is followed by Young et al. (1999) stating that the use of multiples should be based on a trend rather than actual profits.

The simplicity of using this approach resides in the fact that it needs much less restrictive assumptions than Discounted Cash Flows or Adjusted Present Value do. That is why Fernández (2002) supports that the valuation by multiples shouldn't be carried out on its own. When investors decide to use this valuation approach, it is preferable to compare the results with another valuation method, like DCF.

Liu et al. (2002) show that the use of more complex measures of intrinsic value, for example, doesn't improve performance. That is explained as a surpass of the multiples benefit. They are used because they are simple and intuitive, which makes the practice of including complex restrictions pointless. Nevertheless, the use of this methodology should be cautious, since multiples present some limitations. One of the problems associated with multiples is that, most of the times, they are not correctly applied and drivers such as company's return on invested capital (ROIC), growth rate or weighted average cost of capital are misapplied (Goedhart et al. 2005). Nevertheless, not all companies, even in the same industry, have equivalent figures. For example, growth rates, costs of capital or even the capital structure can be completely diverse. These dissimilarities lead to one of the biggest problems of using multiples, which come about when analysts have to decide which companies are truly comparable. This also one of the most important decisions and, at the same time, the most difficult part when making this kind of valuation, seeing that an incorrect definition of the peer group can lead to completely pointless valuations.



One must look at indicators like profitability, growth rate, capital structure, cost of capital and also to choose companies within the same market and business segment. The fact that not all investors have the same expectations about the company's ongoing activity and therefore on its ability to create value make the selection of comparable companies extremely cumbersome. Therefore, Goedhart et al. (2005) discuss that one has to match those with similar expectations for growth and ROIC. Liu et al. (2002) argue that selecting firms from the same industry improves the reliability of the valuation results. Foushee et al. (2012) agree by saying that peers should compete in the same markets and be subject to the same macroeconomic events. On the other hand, Damodaran (2002) defends that comparable companies should present similar cash flows, potential growth and risk.

Another problem associated with the multiples valuations is that there are a lot of different multiples and different ones lead to inconsistent conclusions (Goedhart et al., 2003). What's more is that if they're used in different contexts, they can be absolutely meaningful. Damodaran (2002) also defends that they are depended on the way the market is valuing these firms, since it's based on how good the market was in pricing the company and in determining if it is overvalued or undervalued, for example.

Goedhart et al. (2003) state that companies should have in mind four basic principles when using multiples: the use of peers with similar ROIC and growth rate, the use of forward-looking multiples and of enterprise-value multiples and lastly, the adjustment of enterprise-value multiples for non-operating items.

Another drawback associated is the fact they are static as they value the firm at that specific point, which fails to capture future events and the competition dynamics. Liu et al. (2002) also defend that multiples based on forward earnings are more accurate in explaining stock prices. The most commonly used ones are the PER (price-to-earnings ratio) and the Enterprise-Value Multiples. The PER is even more frequently used, since it takes into account risk and EPS growth. Furthermore, it is the easiest to use for the majority of companies and it links company value to profit. It also depends on information which is widely available and easy to access. Moreover, some investigations have shown that prices provide information about earnings ahead of time and that those earnings capture the effect on prices of macroeconomic events. Beaver et al. (1978) have shown that PER ratios not only predict future earnings changes but they also recognize temporary aspects of current earnings.

On a different point of view, Goedhart et al. (2005) defend that PER is misleading, since non-recurring and non-operating items are frequently set in the earnings figures. Besides that, it is based

on earnings and consequently on equity, which lead them to be extremely sensitive to the capital structure of the companies.

The Price-to-earnings Ratio should be computed as follows (Fernández 2001):

$$4. \text{ Price Earnings Ratio (PER)} = \frac{\text{Current Market Price}}{\text{EPS}} = \frac{\text{Market Capitalization}}{\frac{\text{Total Net Income}}{\text{Total Shares Outstanding}}}$$

The second most common multiples are the ones based on Enterprise Values. This is less susceptible to changes in the debt ratio of the companies than the second one, according to Goedhart et al. (2003). When PER is difficult to use because of accounting policies or negative earnings, usually analysts use enterprise value multiples. However, Fernández (2001) states that these multiples are non inclusive of variations in working capital requirements, nor considering capital investments. Moreover, Liu et al. (2002) showed that adjusted EBITDA performs better than EBIT and sales.

5. Some Enterprise Value Multiples:

- i.  $\frac{\text{EV}}{\text{EBITDA}}$
- ii.  $\frac{\text{EV}}{\text{Sales}}$
- iii.  $\frac{\text{EV}}{\text{EBIT}}$
- iv.  $\frac{\text{EV}}{\text{Capital}}$

### 2.2.4. OPTION PRICING MODEL

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Recently, the need to value listed options, assets, businesses and equity stakes in businesses has made analysts use option pricing models instead of DCF valuation (Damodaran 2002). There is also the case in which one wants to know how to value the investment in R&D or in which kind of R&D to invest. In this case, they are valuing opportunities (Luerhman 1997). The basics with that investment is that one is spending now and the payoffs of that investment only come later.

How companies typically evaluate opportunities is to use a DCF based approach but evaluating strategic projects with special rules. That rule tends to compensate the tendency of DCF to undervalue strategic options by discounting them at a lower hurdle rate than routine investments (Luerhman 1997). Damodaran shares this opinion by saying that DCF models value assets based on a set of expected cash flows, not considering the fact that firms might learn something from real-time developments and respond to that learning.

Luerhman (1997) highlights the fact that the ideal decision is based on to do what is best when the time comes. That's because one is depending on how things look now and in the future. Damodaran (2002) agrees and states that ones has to be very careful when valuing real options. Luerhman (1997) also presents the similiarity between an opportunity and an option, by saying that with an option one has the right, but not the obligation, to buy or sell something at a specific date and with a specific price. With opportunities, one wants to invest when that specific opportunity proves to be valid. Therefore, the action of exercising an option when the price goes up is similar to the investment in an opportunity that appears to be valuable.

Damodaran (2002) states that option pricing models are very useful because there are a lot of assets whose value depends on the characteristics of options and that couldn't be valued conventionally. Besides that, this approach offers more reliable estimates for the value of an asset when there is a significant benefit associated with learning or flexibility. Nevertheless, it is not all advantageous. The value that comes from learning from what happens over time is really valuable if this learning is not picked up by our competitors as well and if they do not adapt their behaviour as well (Damodaran 2002).

Luerhman (1997) argues that the use of pricing models should be a complement, not a replacement. That means that another valuation methodology should have been used before. He defends that the Black-Scholes option pricing model is its favourite applicant because it shares some inputs with the DCF models and then can be used as a match of that. Despite the fact that it is not very easy to learn, it is widely available in commercial software, which means that the computer can price the option for you if you give it the necessary inputs. Moreover, Luerhman (1997) states that the most difficult part about the use of option pricing models relies on its application to corporate problems as opposite to simples puts and calls. Additionally, the author argues that this approach is costlier but requires more time to learn, as well as being less intuitive.

### **2.2.5. DIVIDEND DISCOUNT MODEL**

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When making important decisions about whether or not to participate in a joint venture, strategic alliances, partnerships or the large proportions' investments using project financing, companies are sharing ownership of their stakes with other parties. Therefore, managers need to value not only the project as a whole but also their company's interest in it (Luerhman 1997).

The Equity Cash Flow (ECF) approach is a way of valuing a company's equity. Consequently, the cash flows are discounted at a rate that compensate the company for bearing a specific risk. Every

manager that is able to do a DCF approach is able to do a ECF approach, as well. Moreover, Luerhman (1997) states that the ECF is a more specialized valuation method than the APV or option pricing, since it addresses more specific assumptions and requires more inputs from corporate finance. This methodology, when considering only dividends as cash flows to equity, is called the Dividend Discount Model (DDM), which is the oldest discounted cash flow model. This approach is based on the underlying principle that when investors buy stock from listed companies, they expect to get dividends during the holding period and an expected price at the end of that period (Damodaran 2002).

The cash flows for equities are generally dividends and its risk relies on the timing and growth of the firm's earnings and on its ability to pay dividends (Foerster et al. 2005). According to Damodaran (2005) there are two different ways of using this model, depending on the growth perspectives:

$$\text{Stable Growth Model: } P_0 = \frac{E(\text{DPS})}{k_e - \text{Expected Growth in Perpetuity}}$$

$$6. \quad \text{Two Stages Growth Model: } P_0 = \sum_{t=1}^{t=n} \frac{E(\text{DPS}_t)}{(1+k_e)^t} + \frac{\frac{E(\text{DPS}_{n+1})}{k_e - \text{Expected Growth in Perpetuity}}}{(1+k_e)^n}$$

The two basics necessary to use this model are the expected dividends and the cost of equity. To obtain the first one, one should make assumptions about future growth rates in earnings and payout ratios, while the second one illustrates the required rate of return on a stock and is determined by its riskiness.

Farrell (1985) says that the DDM is an essential model for determining the attractiveness of individual stocks as well as attractiveness of the stock market where that stock belongs. Besides that, this approach has the advantage of helping to understand how the risk factors such as interest rate variations and changing inflation rates affect stocks (Farrel, 1985).

Foerster et al. (2005) suggested that dividends constituted the majority of the total return received by investor over the past century. They found that the DDM and Gordon Growth are the two most accurate valuation methods at explaining the stock price of a firm that has been paying dividends over a long-period. Damodaran (2002) remembers that the Gordon Growth model is very simple and powerful. However, it is limited to firms that are growing at a stable rate. Given the volatility of earnings, that is a difficult assumption to be made. Nevertheless, if the payout ratio is adjusted to reflect changes in the expected growth rate, this model can be used accurately (Damodaran 2002).

Moreover, he argues that even a growing firm paying no dividends can be valued on the dividends that this company expects to pay out when the growth rate declines. Foerster et al. (2005) argue that this is especially true when using the full history of market returns in the Capital Asset Pricing Model (CAPM) to estimate the discount rate.

### **2.2.6. ECONOMIC VALUE ADDED METHOD**

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The Economic Value Added (EVA) approach is based on the measure of the excess value that is created on an investment, given by the difference between the after-tax operating income (adjusted for operating leases, R&D and one-time events) and the WACC, at market values, times the book value of debt and equity of the previous period (Damodaran 2005).

Of all the conflicts of interest there may be in company and among all its stakeholders, the EVA approach tends to especially emphasize the interest of the owners, given that the latter expect a maximum reward over the cost of capital invested in the firm.

Salmi et al. (2001) showed that the EVA is very sensitive to its cost of equity constituent but it is insensitive to its cost of debt part, under regular conditions. Furthermore, growth policies or leverage effects seem to strongly affect the result within this methodology. Therefore, when using this method one has to be very careful about the management policies and external economic factors.

Young et al. (1999) stated that EVA is a rearrangement of Discounted Cash Flow and that we can be precise about the EVA fair value estimation, although we can not be precise about the details that make up that estimate. Plus, this approach has some data issues with financials of how to interpret debt on the balance sheet. Deposit takers typically have huge amounts of debt on its balance sheet, which complicates the task of estimating the WACC (Young et al. 1999). If one relates EVA with the Enterprise Value (EV), the following formula is derived (Damodaran 2005):

$$7. \quad EV = \text{Invested Capital}_{\text{assets in place}} + \sum_{t=1}^{\infty} \frac{EVA_t \text{ assets in place}}{(1+WACC)^t} + \sum_{t=1}^{\infty} \frac{EVA_t \text{ future projects}}{(1+WACC)^t}$$

### **2.2.7. ECONOMIC PROFIT METHOD**

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As the DCF models rely solely on how cash flows enter and exit the company, it doesn't provide insight into the company's economic performance. The understanding of the rise or decline in free cash flows can be the key when making strategic decisions that imply an understanding of the

company's evolution. Therefore, the economic profit based valuation model highlights how and when the company creates value ( Koller et al., 2005).

$$8. \quad \text{Value}_0 = \text{Invested Capital}_0 + \sum_{t=1}^{\infty} \frac{\text{Invested Capital}_{t-1} * \text{ROIC}_t - \text{WACC}}{(1+\text{WACC})^t}$$

The future economic profits are valued using a constant growth rate in perpetuity. The formula above shows that when future economic profits are expected to be zero, the value of operations will equal invested capital. On the other hand, the company should be able to identify its competitive advantage when the value of operations is higher than its invested capital.

### **2.2.8. VALUATION IN EMERGING MARKETS**

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With the increasing globalization observed in recent years, companies have increasingly expanded to emerging markets, which have offered them attractive investments and a lot of different opportunities. The problem with this vast mobilization of capital begins when the need for valuation appears.

Companies involved in projects in those markets face much more risks, including accelerated inflation, exchange rate fluctuations, adverse repatriation laws and fiscal measures or even macroeconomic or political distress (Goedhart et al, 2003). The different measures of those risks and the way investors see them, lead to the use of different assumptions or different approaches and, consequently, to different final estimations in the valuations.

James et al. (2003) suggest that the best approach in these cases is to use discounted cash flows (DCF) together with probability-weighted scenarios that model the risks each business faces. They argue that the extra risk involved in these markets should be included either in the assessment of the actual cash flow or in the extra risk premium added to the discount rate. On the other hand, Goedhart et al. (2003) state that sometimes investors overestimate those risks, which make them reject good investment opportunities and underestimate the performance of existing businesses. They argue that the risk involved in these markets can be much more modest if it is spread over a diverse portfolio of investments and that both a cash-flow-scenario approach or a country-risk-premium approach can generate accurate valuations if it takes into account findings in emerging-markets investment risks.

## 2.3. IMPORTANT CONSIDERATIONS

### 2.3.1. TERMINAL VALUE

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The terminal value is one of the most important estimation parameters in valuation. When the company wants to make a cash flow valuation in a certain period of time, it doesn't know how much those cash flows will be worth somewhere in the future. Then, one should choose a specific time and then calculate the terminal value that reflects the value of the firm at that point (Damodaran 2002). It assumes that the company will be growing at a constant rate and therefore in a steady-state, reinvesting a constant proportion of its operating profits. That gives the company the Return on Invested Capital (ROIC).

However, analysts typically spend less time than they shouldn't on estimating this variable. Forecasts for the next few years occupy only 10% to 20% of the analysts' time, when it accounts for 80% to 90% of the market value estimate (Young et al. 1999). Therefore, one should make very careful assumptions when accounting for the terminal value. Koller et al. (2005) argues that the forecasting period should be around 5 to 7 years.

$$9. \quad \text{Terminal Value} = \frac{CF_n * (1+g)}{(k-g)}$$

The Terminal Value can be estimated in three different ways. Firstly, by the liquidation of the firm's assets in the terminal year, estimating what market value that firm has accumulated at that point and what others are willing to pay for those assets. The second approach applies a multiple to earnings, revenues or book value to estimate the value in the terminal year, assuming the firm as a growing concern at the time of the terminal value estimation. The third one assumes a steady-state by using a constant growth rate forever.

### 2.3.2. PRESENT VALUE OF THE INTEREST TAX SHIELDS

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Seeing as debt is tax-deductible, companies benefit somehow from carrying debt on their balance sheets. This benefit is usually called tax shield, which represents an addition to the companies' value. There are a lot of discussions about how to calculate the value of tax shields and it seems that there is no agreement on which discount rate to use. The majority of them assume that the present value of the tax savings on debt should be simply the present value of tax shields associated with interest.

While Modigliani et al. (1958, 1963) state that the discount rate should be the risk free, Myers (1974), who introduced the APV approach, Luerhman (1997), Koller et al. (2005) and Damodaran

(2005) assume the discount factor is the cost of debt since the tax shield's risk arises from the use of debt and to use the same risk is plausible.

Fernández (2004) contradicts those results and states that the value of tax shields itself shouldn't be the present value of the tax savings due to the payment of interest but rather one should look at the value of tax shields as the difference between the present value of taxes for the unlevered company and the present value of taxes for the levered company. And that is where the difficulty on assessing the value of tax shields arise. This is because their riskiness is difficult to evaluate, given that it depends on two flows with different risks (the taxes paid by the unlevered company and the taxes paid by the levered company). Therefore, one should consider the difference between those two cash flows and measure each one with its own level of risk (Fernández 2004).

Cooper et al. (2005) reverse Fernández (2004) result and argue, as well as the previous authors, that the value of the debt tax savings is the present value of the tax savings from interest.

Koller et. al (2005) presented a different perspective stating that what matters is the capital structure choice. If the company expects its debt to grow with the business, according to a target debt-to-value ratio, the risk of tax shields should be the same risk of the operating assets (unlevered cost of equity). On the other hand, if that's not believed, then the risk of tax shields should be the same as the cost of debt.

### **2.3.3. RISK PREMIUM**

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The results usually show that riskier investments should have higher expected returns, and the opposite works as well. Every expected return should consider the sum of the riskfree rate and an extra return to compensate for that specific level of risk (Damodaran 2002).

The reasons that justify the risk taken provide from two different sources: the firm-specifications and the market around it. The first one (called diversifiable risk) is related only to that specific investment or to a few investments like it, whereas the second one (called non-diversifiable risk) contains the risk that affects a higher number of investments. Damodaran (2002) presents three different reasons that justify the fact of not all analysts using the same risk premiums. The first reason has to do with the time period that is used. This is because some analysts use short-time horizons and others use long-time horizons. The second reason is the choice of risk-free security, as there is a difference between using treasury bills and treasury bonds. The risk premium is higher if it is related to the first one, as it is related to short-term government securities. The final reason questions how the average return on stocks, treasury bills or treasury bonds are computed (since it



can be estimated by arithmetic or geometric means). The abovementioned reasons justify the differences that currently exist on the risk premiums used, depending on the choices that were made. Damodaran (2002) argues that they should range from 3.47% to 8.6%.

#### 2.3.4. LEVERED AND UNLEVERED BETA

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The betas are a measure of a company's volatility in relation to the market where it belongs, adjusted to the degree of leverage of the firm's capital structure. As debt is tax-deductible and therefore results in tax benefits, the levered beta has less volatility than the unlevered beta (which removes the impact from debt obligations). In order to compute raw betas, the standard procedure is to regress stock returns ( $R_j$ ) against market returns ( $R_m$ ), where its slope is the aimed beta:

$$10. \quad R_j = a + b (R_m - R_f)$$

Consequently, the company is riskier than the market when its beta is greater than one, as well as it is less risky than the market if its beta is lower than one. They both have the same risk if beta is equal to one.

According to Fernández (2007), the relationship for a company that maintains a fixed book-value leverage ratio is the following:

$$11. \quad \beta_L = \beta_u + (\beta_u \beta_d) D (1 - t) / E$$

Miles and Ezzel (1980) present the subsequent relationship for a firm that maintains a fixed market-value leverage ratio:

$$12. \quad \beta_L = \beta_u + (D/E) (\beta_u \beta_d) [1 - t K_d] / (1 + K_d)$$

At last, Modigliani and Miller (1963) show the following relationship for a company with a preset debt in every period:

$$13. \quad \beta_L = \beta_u + (\beta_u \beta_d) (D - VTS) / E$$

Damodaran (200) presents three different limitations associated with the betas. Besides the fact that they have a high standard error, they also reflect the firm's business mix over the period of the regression, not the current mix. Furthermore, they show the firm's average financial leverage over the period rather than the current period. Therefore, adjusting the regression beta estimate by bringing information about the company's fundamentals or estimating the beta for the firm using

accounting earnings or revenues (which are less noisy than market prices) are two different solutions presented by Damodaran (2002).

### 2.3.5. COST OF EQUITY

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The cost of equity is the return that investors require to invest in the company's equity, in exchange for owning the asset and bearing the risk of ownership. To determine the Cost of Equity, the most common method is the Capital Asset Pricing Model (CAPM), according to Damodaran (2001) and Koller et al. (2005). This approach is based on the work of Markowitz on diversification and portfolio theory. Therefore, the following expression may be used:

$$14. K_e = R_f + \beta_L [ E (R_m) - R_f ]$$

### 2.3.6. COST OF DEBT

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The cost of debt represents the rate at which the company can currently borrow money. It is often measured as an after-tax basis, since interest payments are tax-deductible. The cost of debt reflects both the default risk and the level of interest rates in the market (Damodaran 2001).

The most common approach to estimate them is to assume that the pre-tax cost of debt is equal to the yield to maturity (YTM) of the company's long-term bonds. According to Damodaran (2001), this approach has the limitation that very few firms have long term straight bonds that are liquid and widely traded.

Another common approach, which applies if the firm is rated, is to estimate a default spread based on the rating of the firm. Compared to the first approach, this one presents more robustness. As different bonds from the same firm can have different ratings, one should use a median rating for the firm (Damodaran 2001).

Finally, when it is the case that the company is not rated, one should look at the recent borrowing history and therefore deduce a rating based on the spreads paid. Moreover, a synthetic rating can be used to estimate the cost of debt, which could be deduced through the interest coverage ratio (Damodaran 2001):

$$15. \text{Interest Coverage Ratio} = \frac{\text{EBIT}}{\text{Interest Expenses}}$$

### 2.3.7. FREE CASH FLOW TO THE FIRM (FCFF) AND FREE CASH FLOW TO THE EQUITY (FCFE)

The Free Cash Flow to the Firm (FCFF) represents all the cash flows available to all the capital providers of the firm (common shareholders, preferred shareholders and debtholders), after removing from the EBIT the total of taxes and all the operating expenses. This means excluding amortization and depreciation, provisions and all non-cash charges. Besides that, all expenditures required to maintain the firm's productive capacity should also be removed, which means excluding accounts receivables/accounts payables, and all the cash flows that come from non-core activities, since they do not represent available cash for the firm. Items that represent financial cash flows should also be removed, such as cash and cash equivalents, financial applications or debt.

TABLE 2 - FREE CASH FLOW TO THE FIRM

<b>EBIT</b>
<b>- Taxes on EBIT</b>
<b>+ Amortization + Provisions (Change) - All non cash Items</b>
<b>= Cash Flow from operations</b>
<b>- Investment on working capital</b>
<b>- Capital Expenditures</b>
<b>= Free Cash Flow from operations</b>
<b>+ Cash Flow from non-operational sources</b>
<b>= FCFF</b>

Source: Slides "Thesis Equity Valuation – Basic Concepts II" – Prof. Dr. José Tudela Martins

In relation to the Free Cash Flow to the Equity, the basic difference is that it represents the cash flows only available to common shareholders. Pinto (2010) states that this represents the cash flow outstanding after all operating expenses and capital expenditures have been made. According to Pinto (2010), to find FCFE, one must deduct from FCFF the after-tax interest expenses and then add net new borrowing.

To calculate the FCFF or the FCFE is the first step to perform a valuation of a company using, for instance, the discounted cash flows method. Consequently, when calculating the enterprise value the only difference between them is in the discount rate. Whereas with the FCFF we should discount using the weighted average cost of capital, in the FCFE the discount rate should be the cost of equity, since the only present risk is the one faced by equityholders.

According to these differences, the FCFE represents the obligations for both stockholders as well as bondholders, while the FCFE only represents the obligations for stockholders, which is useful in understanding how much the company could pay in dividends. Therefore, when the firm have an unstable capital structure or negative FCFE, it is better of to use the FCFE.

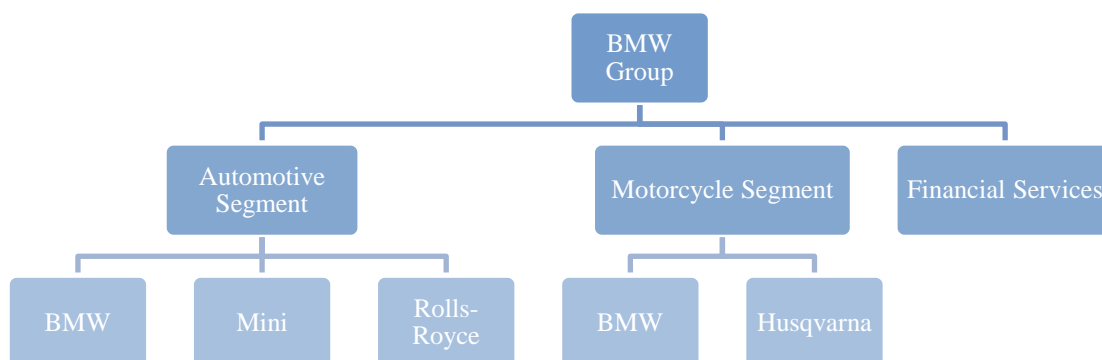
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### 3. COMPANY'S PRESENTATION

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The company on which this equity valuation thesis will be carried out is the BMW (Bayerische Motoren Werke) Group, founded in 1917 under the name Bayerische Flugzeugwerke AG (BFW). In 1918 it was named Bayerische Motoren Werke Aktiengesellschaft (BMW AG). The primary distinction of BMW AG is the fact that it is one of the few automobile and motorcycle manufacturers worldwide whose focus is exclusively on producing premium and high quality products for all its brands and all its segments. Currently, BMW AG is a legal entity that owns the BMW, MINI and Rolls Royce brands. While the first one has the main goal of providing the pleasure for driving and the thrill and enthusiasm for innovation, the MINI brand tries to bring in the originality of the models, as well as the high recognition value and the distinctive design. Finally, Rolls Royce conveys luxury and the attention to the finest detail. BMW AG is not only focussed on the production of automobiles, but also has a position in the motorcycles market (by means of the BMW and Husqvarna brands) and offers a successful range of financial services. This sector's largest business is credit financing and the lease of BMW group cars and motorcycles.

FIGURE 1 - ORGANISATIONAL STRUCTURE OF THE BMW GROUP



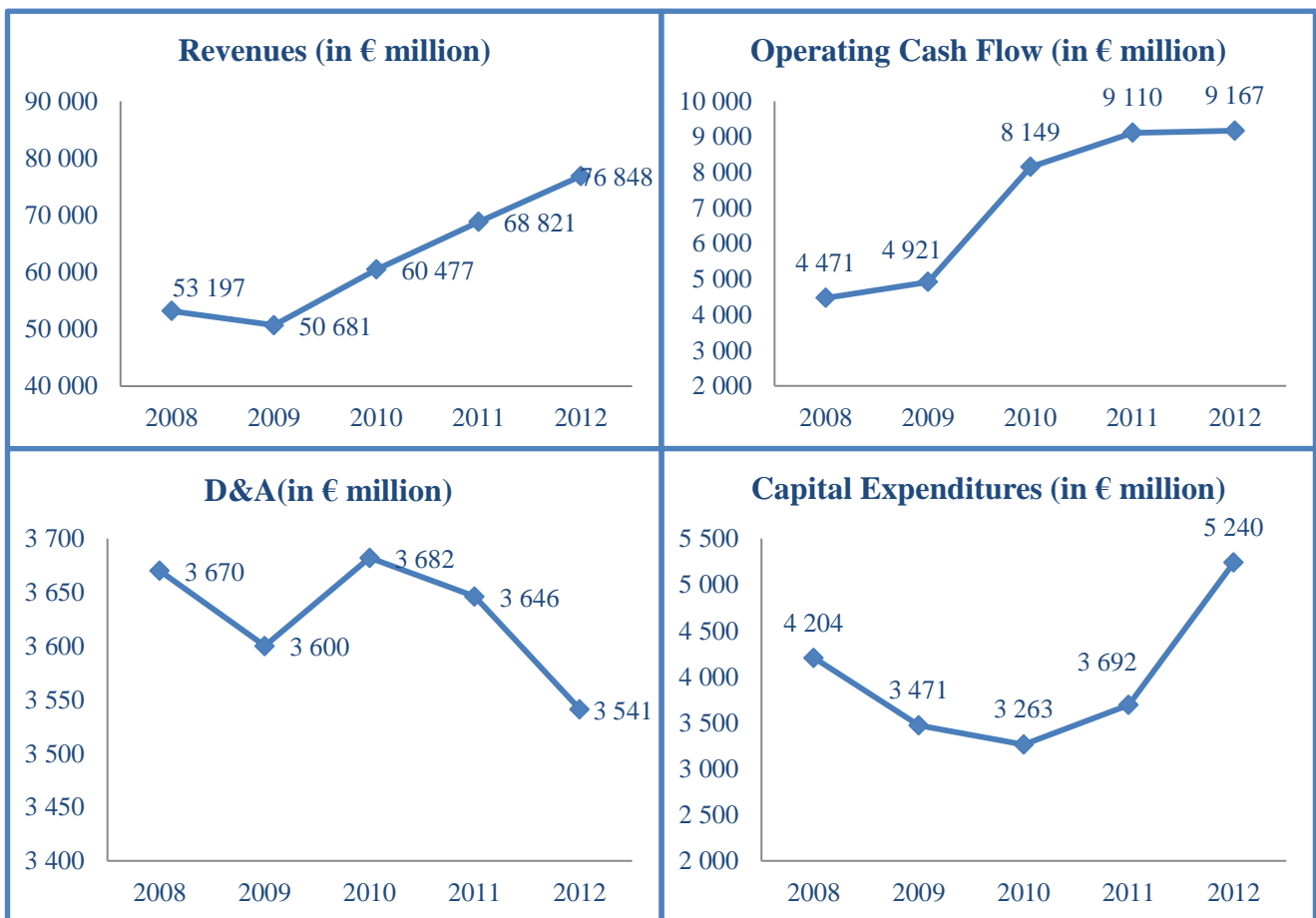
Source: Own creation using the annual reports

BMW AG is a company listed on the stock exchange and traded in the DAX 40 and the EuroStoxx indices. Moreover, it represents one of the largest industrial companies in Germany, where it is headquartered (Munich). This is where the company's head-office is located and it is responsible

for the coordination of 150 countries. In terms of production facilities, the BMW group currently has 29 units in 14 countries.

Since 2007 this group has been investing on its successful future by adopting the Strategy Number ONE, with a new strategic long-term direction focussed on four fundamental pillars: Growth, Shaping the Future, Profitability and Access to Technologies and Customers. Thanks to this strategy, in 2012 BMW fulfilled all the interim targets, having delivered more than 1.84 million BMW, MINI and Rolls-Royce vehicles to customers, which represented an increase of more than 10% from the previous year. Moreover, it was the most successful year in the history of BMW AG. On the other hand, the BMW Group has demonstrated more and more concerned over social sustainability and ecological responsibility. Proof of that is the fact that they are now developing the fully electric BMW i3, the solution for emissions-free driving in urban areas, which should be launched this year. With that in mind, they have been the most sustainable company in the automotive industry for many years and they intend to be a leader in the future development of individual mobility. Consequences of these facts are shown below:

GRAPHIC 3 - BMW GROUP IN FIGURES (ANNUAL DATA)

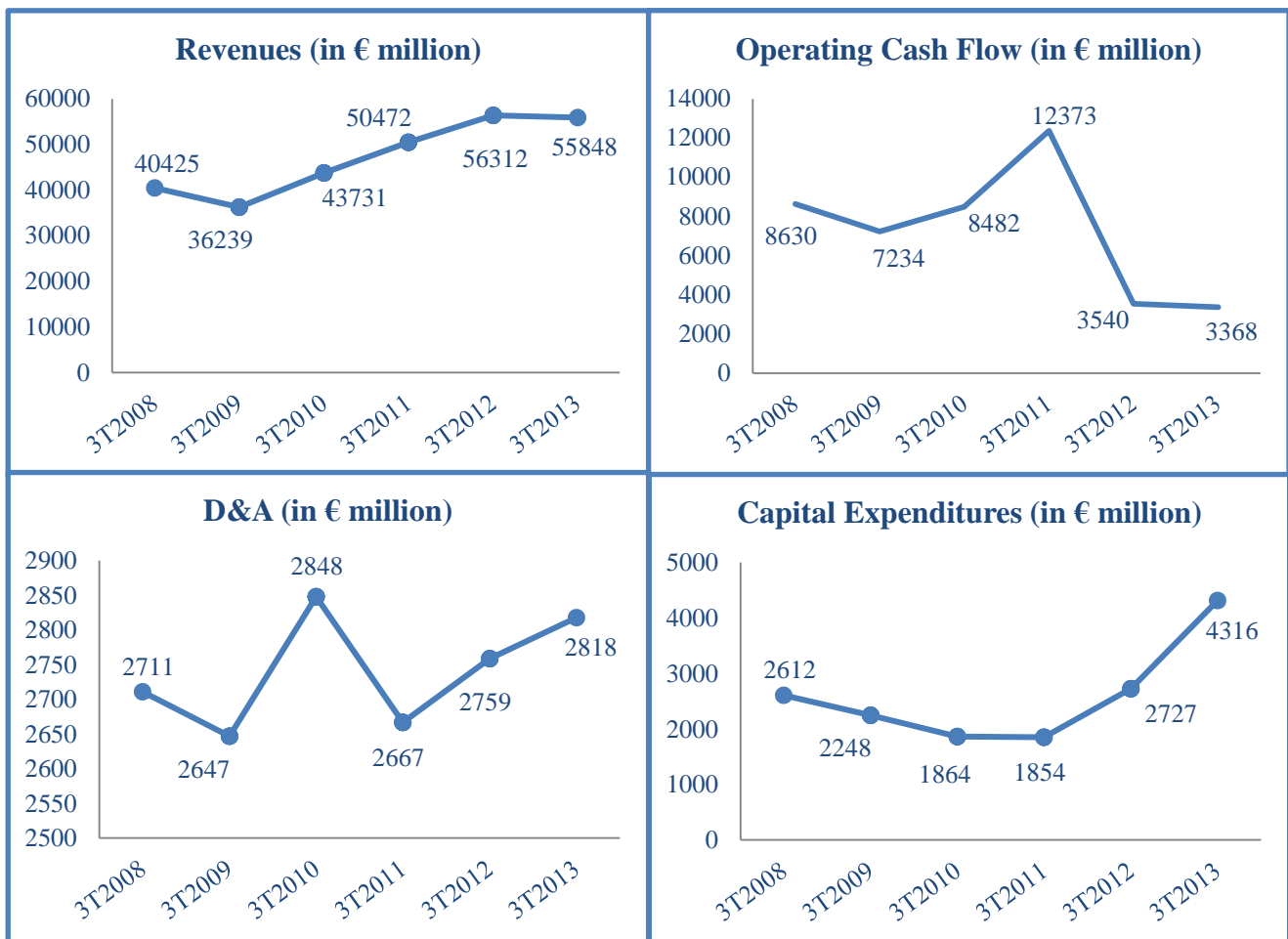


Source: Company reports and own calculations

Looking at BMW historically, one can say that the company has been performing better along the years in terms of revenues and operating cash flows. Depreciation and amortization and capital expenditures have been increasing as a result of the latest strong injections of capital.

In order to have an idea of the developments of these figures in 2013, one should look at the data available at the time of the valuation and compare with the same moment of the last years. Thus, the following graphics were computed:

GRAPHIC 4 - BMW GROUP IN FIGURES (TRIMESTRAL DATA)



Source: Company reports and own calculations

Revenues for the third trimester of 2013 were very similar to the ones of the same period in 2012, which explains one more time the remarkable year that 2012 was for the group. Nevertheless, depreciation and amortization are expected to increase and therefore the combination of both those variations should cause the operating cash flow to decline. Besides that, capital expenditures are expected to increase as a result of the huge injections of capital, and therefore cause free cash flows for the year to the very low.

The year 2012 represented the most successful one on the history of BMW and the company is expected to keep growing at 2012 rhythm at least until 2014. Those exceptional figures were the result of the previous referred Number ONE strategy. That huge financial success also contributed to the investments already made this year and expected to be made along the next few years. In terms of operating expenses, research and development are the ones expecting to grow more, mostly due to the connection with projects to make safe their future growth.

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## 4. GENERAL ENVIRONMENT

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### 4.1. INDUSTRY OVERVIEW

In order to carry out a good valuation, it is extremely important to understand the industry where the company being valued is located. Macroeconomic conditions are crucial and a huge influence for the company's forecasts.

The first point to consider is the fact that global economy has been suffering a downturn since 2008, and is still currently experiencing huge effects. Therefore, this valuation will be extremely subjective due to the economic outputs felt during this period. This downturn was experienced fundamentally in Europe and in the United Kingdom, with the US economy remaining relatively stable. Those conditions led to the volatility in exchange rates all over the world. Moreover, higher prices for major raw materials were another consequence of these political uncertainties. Regarding that, Brent oil – the most important in Europe - remained at a high level, while the WTI oil – most relevant in the USA – decreased. Besides that, energy prices and prices of non-ferrous and precious metals remained at high levels.

The automotive industry is one of the most important businesses in Europe, which is where this sector assumes the largest numbers for production of motors and passenger cars. This huge relevance can be explained from the fact that it is one of the highest employing industries and the key driver of knowledge and innovation. Moreover, it is closely connected with other industries – mechanical engineering, information technology, steel, etc. – which represent the largest percentage of value added in this industry. In relation to this sector, it is important to highlight fundamentally the increase in demand in the USA, China, Japan and Russia, while in Europe the demand for passenger cars and light commercial vehicles is still decreasing. In Germany, this decrease was less pronounced, while in France and Spain the opposite was observed.

The motorcycle market has also been contracting worldwide, with the highest drops being recorded in Europe. Nevertheless, last year this market segment grew in Germany, as well as in the USA, Brazil and Japan.

In relation to the financial services, it is crucial to stress that political measures have been implemented in order to stabilize the financial markets in the euro zone. However, unfavourable economic developments in southern Europe (high debt levels and unemployment rates, for example) are still felt and have caused used car prices to drop in the region. By contrast, in North America, Germany and Great Britain price levels of used car markets remain stable.

### **4.2. THE BMW GROUP OVERVIEW**

The automobile market represents the highest percentage of revenues for the BMW group (78% in 2013), followed by the financial services (20% in 2013) and finally the motorcycle industry (only 2% in 2013).

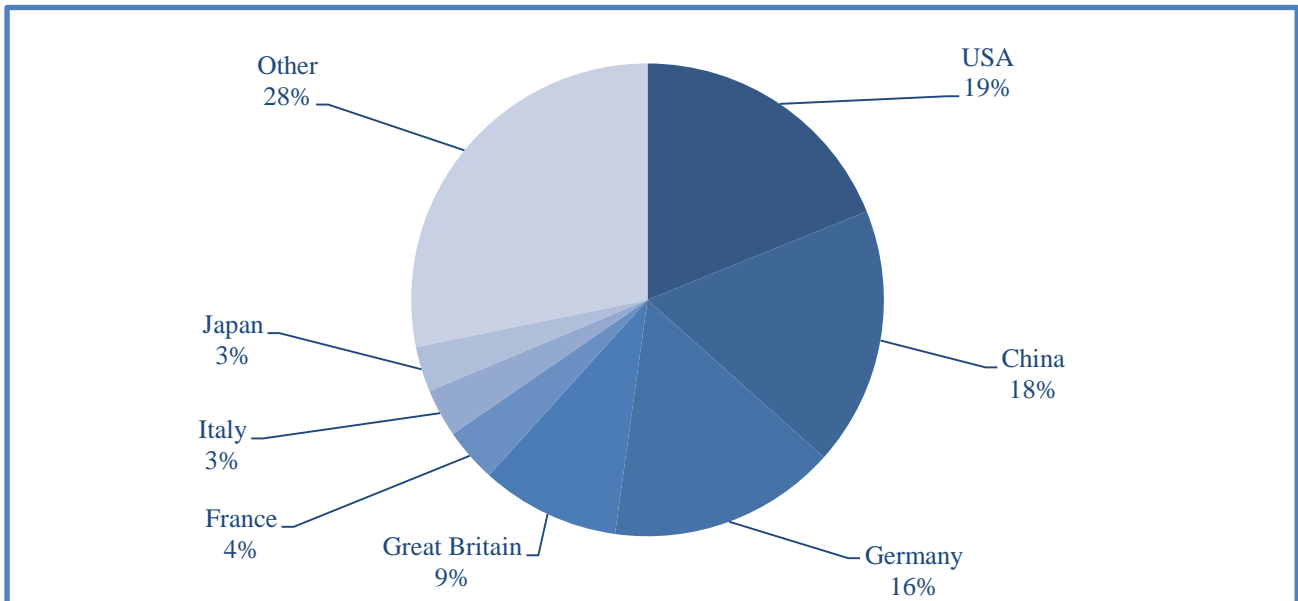
Despite the global downturn and the increase in volatilities all over the world, the BMW group maintained its premium position by not following the general tendencies of the global market. Therefore, 2012 represented the most exceptional year in BMW's history, as it registered record sales in all automobile brands (BMW, Mini and Rolls Royce), motorcycle brands (BMW and Husqvarna) as well as and in the financial services provided for these first two segments.

#### **4.2.1. AUTOMOBILES SEGMENT**

In 2012, the BMW group owned 29 different production networks in 14 different countries. As for the contribution of each continent to BMW automobile sales, one can say that Europe represented the most significant consumer for the company (32%). Subsequently, the Asian and the American region also made a very good contribution, with 21% in sales recorded in the former and 19% in sales concentrated in the USA. These numbers represent an increase in all the regions of the graphic, except for France (where sales decreased 4%). In the near future, the BMW group is expected to open new assembly productions in Asia and America, thus further expanding production and sales in these continents. The next graphic represents the contribution of each continent or country to the level of sales achieved in 2012.

GRAPHIC 5 - AUTOMOBILES' SALES DISTRIBUTION WORLDWIDE (2012)





Source: Company reports and own calculations

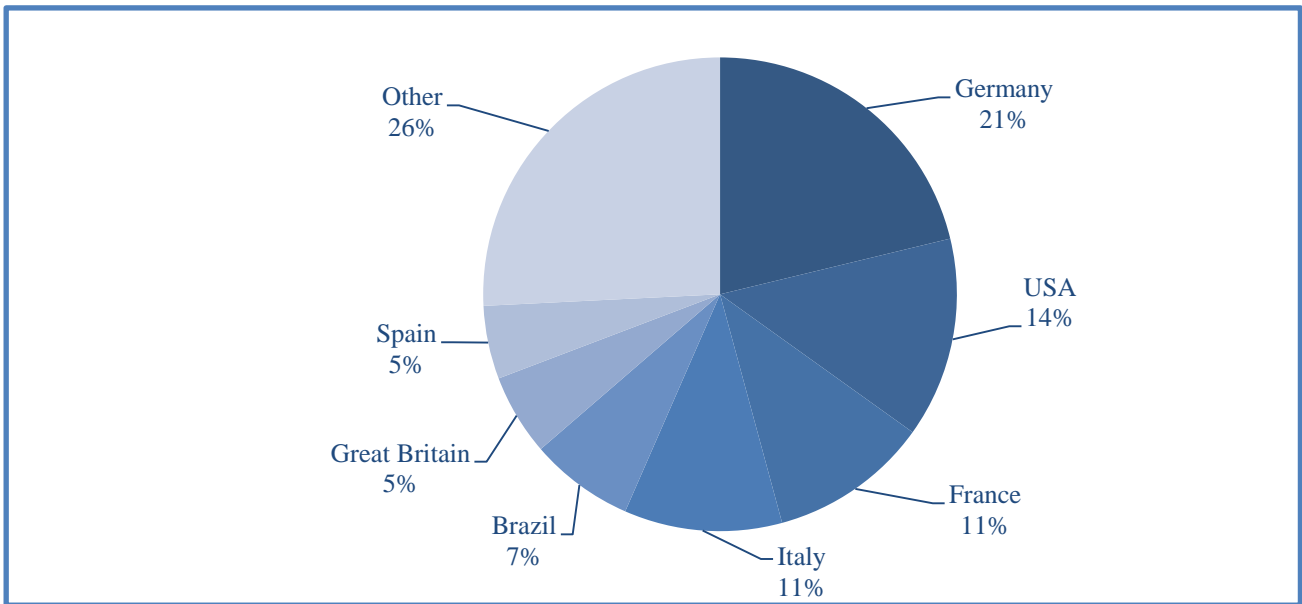
#### 4.2.2. MOTORCYCLES SEGMENT

The motorcycle market also performed very well in 2012, registering record sales regardless of the adverse market conditions in this sector.

The key motorcycle markets were similar to the ones of the automobile sector. However, in the former the whole European region, especially Germany, have more heavy weights in the percentage of revenues (48,1% and 19,1%, respectively). Consequently, Asia and America were not as relevant as consumers of motorcycles as they were for the automobile sector. Nevertheless, in 2012 the highest growth was achieved in Brazil and Japan, when compared to 2011 (+36, 8% and +22, 4%, respectively). By contrast, the market uncertainties in Europe made the sales in this region suffer a decrease of 5, 1% in comparison to 2011, with Germany and France as the only countries that contributed positively to this result.

Besides the variety of different models presented to the customer during 2012, a prototype of an electric scooter is being developed and is expected to become available to customers in 2014 as well as other BMW and Husqvarna models. At the end of 2012, Germany accounted for 21% of the revenues and Europe as a whole accounted for 48%, as shown in graphic 6:

GRAPHIC 6 - MOTORCYCLES' SALES DISTRIBUTION WORLDWIDE (2012)



Source: Company reports and own calculations

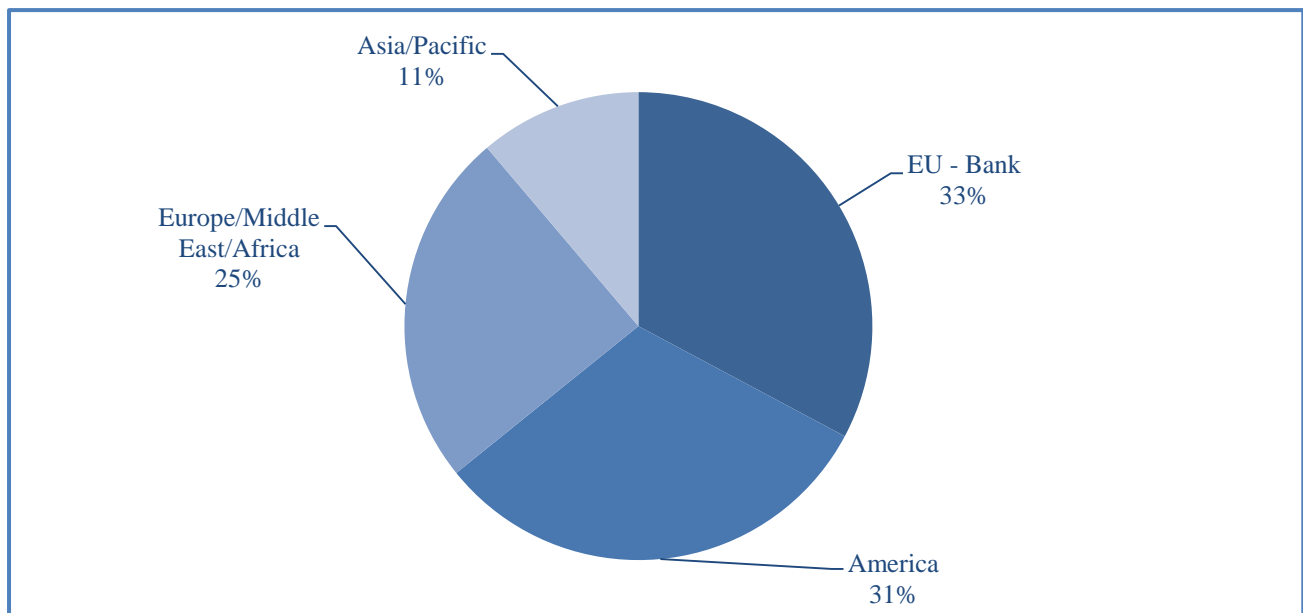
#### 4.2.3. FINANCIAL SERVICES SEGMENT

The growth in the financial services throughout the years is the result of an increase in credit financing and new lease contracts related to the automotive part of the business. The Financial Services division operates in more than 50 countries all over the world as partner to the sales organization.

The largest line of business in this segment is credit financing and the lease of the BMW group cars and motorcycles to retail customers, but it also comprises several more activities, such as banking, insurance, dealer financing or multi-brand financing. In 2012, credit financing and lease contracts increased by 10% and 16%, respectively. The number of retail customer contracts was also 6,7% higher than in the previous period.

All regions worldwide contributed to the sales increase in this segment. Although the banks in Europe are the main clients, the increase was higher in the Asian and Pacific region, in comparison to last years' records (+24,2% in 2012, in relation to 2011). The final distribution of sales over the world was as follows:

GRAPHIC 7 - FINANCIAL SERVICES' SALES DISTRIBUTION WORLDWIDE (2012)



Source: Company reports and own calculations

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## 5. COMPANY'S VALUATION

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### 5.1. DCF VALUATION

As analysed in the literature review, one of the methods used to value the BMW group was the Discounted Cash Flow with the WACC approach. The valuation will be done as of 17th of October of 2013, and all market parameters refer to that date. If not, details are clearly stated.

Since ever, the debt ratio of the company has been decreasing along the years. This decrease can be explained with the increases in equity or the retirement of old debt on the firm. Even so, over the last four years the capital structure of the firm has been close to the optimal target and therefore it's expected to be kept, which justifies the absence of the Adjusted Present Value methodology to value the BMW group. The company has a debt ratio of just 34% in 2013, while in 2008 the debt ratio was about 66%. This far above the normal debt level can be explained with the financial crisis, where equity values dropped unexpectedly in the whole automobile industry. This also translates the recent decrease in the bankruptcy probability and bankruptcy costs of the company.

Besides that, the company intends to keep its payout ratio between 30% and 40%. Given that it was about 32% in 2012 and 30% in 2011, it's expected that an average level (35%) can be used for the explicit period, by means of enlargements in the dividends policy of the firm (which is an indicator of the strong future prospects that are expected).

In terms of growth, it is predictable that 2013 and 2014 will continue to be very positive years for the BMW group, which again expects to reach another record sales level. As it is not reasonable to think that these double-digit growths will last perpetually, it is assumed that until 2017 the company will achieve its steady growth state and return to the normal sales levels of the years before 2012.

The growth rate assumed in this valuation was of 4, 24%, which is related to the global projections for nominal GDP forecasts and therefore should reflect the growth at which the company will grow during the valuation period. It resulted from the multiplication of global forecasts for real GDP and European forecasts for inflation, in order to take care of the global presence and the currency effects, respectively.

The free cash flow to the firm (FCFF) was computed in accordance with the formula stated in the literature review (section 3.3.7).

### **5.1.1. VALUATION ISSUES**

This section will provide the main explanations and assumptions done for the forecasted period, in order to provide the discounted cash flow valuation. Revenues and costs of goods sold are the items that differ from segment and therefore will be analyzed separately. The remaining figures were calculated for the company as a whole, since for them the automobiles segment justify the highest weight and therefore those figures are almost exclusively related to the automobiles segment development. Therefore, it doesn't make sense to analyze those figures by segment, given that the motorcycles and the financial services segment have very little weights on them.

The performance of BMW will be forecast for a period of 4 years (from 2013 to 2017). That period was chosen in order to represent the high-growth period of BMW (which is expected to be from 2012 and 2014) and 3 more years (2015-2017) that represent the stability of the company and the come back from the steady growth and normal figures recorded until now.

#### **5.1.1.1. BMW'S REVENUES**

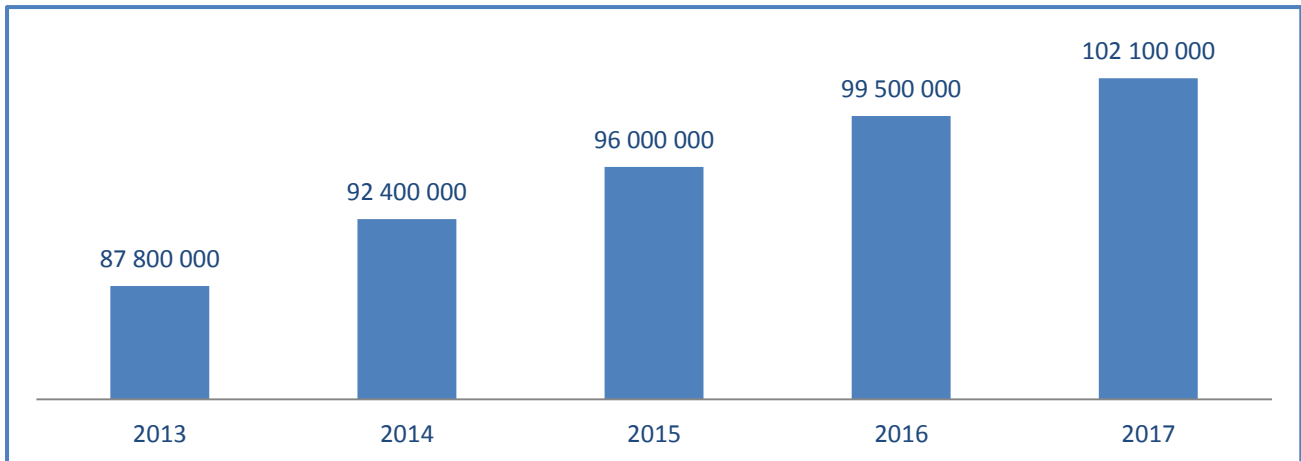
Revenue is a core item of forecasting for BMW, because many things are held up against it to estimate value drivers. The next sections explain how revenues for the group and for each segment were projected.

##### **5.1.1.1.1. AUTOMOBILES SEGMENT**

BMW's revenues are distributed all over the world, especially in the automotive segment. The year 2012 also marked the expansion of the segment revenues for Asia and America, which are starting to

represent event more weights in the sales of cars from the company. Therefore, one has decided to use global forecasts in order to estimate the automobile revenues of the BMW group. According to *IHS* reports, the automobile industry is expected to sell 102 million cars worldwide in 2017, as shown below:

GRAPHIC 8 - VEHICLE SALES OUTLOOK (IN UNITS)



Source: IHS Automotive Light Vehicle Sales Outlook

Given that projection, a Constant Annual Growth Rate (CAGR) of 3,06% was reached and used to estimate BMW's revenues of cars until 2017. The company has a long term target for sales in 2016 of 2m vehicles according to the investor relations' department, which was also the result obtained upon using the CAGR from the global projection. Those forecast units were multiplied by the maximum price reached by the company and not by the average price, in order to take into account the record sales of the company and the increase in market share expected in the next few years.

### 5.1.1.1.2. MOTORCYCLES SEGMENT

As shown below, motorcycles sales are also distributed worldwide and therefore they are exposed to global development. Given that, the same procedure used for the automobiles segment was used in the motorcycles segment, by looking at Research and Markets forecasts for the sales in this segment. According to these, the global motorcycle industry has been living a high growth period for the past five years and is expected to grow at a CAGR of 4.9% over the next five years. Therefore, BMW's motorcycle revenues were forecast by increasing historical revenues at that rate until 2017.

### 5.1.1.1.3. FINANCIAL SERVICES SEGMENT

According to the BMW quarterly report of 30th June 2013, the pace of growth reported for the Financial Services segment in the first six months of 2013 is likely to be maintained over the remainder of the year. Given that, 2013 revenues for the financial services were forecast by

increasing 2012 revenues at 2,3%, which was the growth rate registered in the first six months of 2013. For the remaining years, financial services forecast revenues were calculated as an average of the percentage of the weight that this item represents in the automobile revenues, historically. As stated below, the growth in the financial services over the years is the result of the increase in credit financing and new lease contracts related to the automotive part of the business.

### **5.1.1.2. BMW'S COST OF SALES**

The cost of sales comprises the cost of products sold and the acquisition cost of purchased goods sold. In the specific case of BMW, it also includes research costs and development costs not recognized as assets. Therefore, in order to obtain the Cost of Goods Sold (COGS) one must deduct the research and development expenses. That is because it is believed that the COGS margin will to some extent increase in the future, since the BMW Group will have to increase their investments in research and development in the future in order to be able to act in accordance with the strict CO2 emission limits set in place by the European Union and the new electric models developed in the next few years. Thus, R&D expenses as a margin of revenue have been separated from the COGS margin to illustrate this more clearly. This figure will be explained further on. The following table allows us to look at the evolution of the company's historical and forecast cost of sales.

TABLE 3 - HISTORICAL AND FORECASTED COST OF SALES (IN € MILLION)

	2008	2009	2010	2011	2012	2013E	2014E	2015E	2016E	2017E
<b>Cost of Sales - Automobiles</b>	43 505	39 616	44 703	50 164	56 525	59 506	61 088	63 022	65 017	67 009
<b>Cost of Sales - Motorcycles</b>	1 024	925	1 095	1 207	1 236	1 343	1 426	1 515	1 611	1 714
<b>Cost of Sales - Financial Services</b>	15 332	14 880	14 798	15 013	16 984	18 490	19 535	20 154	20 792	21 429

Source: Company Reports and own calculations

#### **5.1.1.2.1. AUTOMOBILES SEGMENT**

Since global projections were used to estimate the revenues of this segment, the same would be used in order to estimate the COGS for the automobiles division. Moreover, the average of COGS to revenue in the period from 2003-2007 has been around 75%, whereas during the crisis it was much higher given the increase in raw material prices of metals and oil. In the period of 2008 and 2009, the COGS represented 112% of the revenues in the automobile segment. Given this inconsistency and the global assumption used previously, one had assumed that the number of vehicles sold would grow at a CAGR of 3,06% until 2017, which was also assumed when estimating the revenues for this

segment. Therefore, by knowing the number of cars expected to be sold and the COGS historical, we could look at an average of the cost per unit that BMW has been paying. That average cost per unit was multiplied by the number of cars expected to be sold in order to reach the COGS in absolute terms for the automobiles segment. It is then expected that this figure will represent on average 80,9% of the revenues, during the forecasting period, which is a similar weight of the one registered in 2011 and 2012.

### **5.1.1.2.2. MOTORCYCLES SEGMENT**

On average, the COGS for the motorcycle segment has been almost constant through the period of analysis. It also suffered from the crisis effect but given its lower magnitude in the BMW business, the effect was not as significant as the one of the automobiles segment. From the crisis onwards, it represented a higher weight of revenues (on average 84,5%), whereas before the crisis the weight was around 74%. Nevertheless, in view of the fact that the weight has been the same since 2008 and still remains unchanged, one assumed that it will continue to represent the same percentage of revenues during the forecasting period.

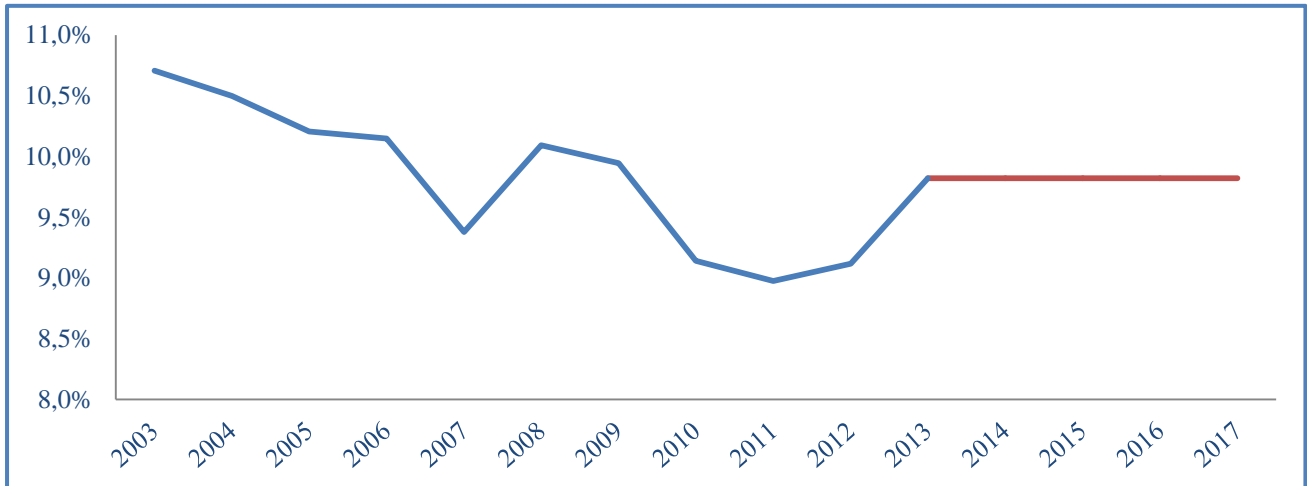
### **5.1.1.2.3. FINANCIAL SERVICES SEGMENT**

As stated below, the financial services segment has a higher correlation with the developments of the automobile sector. That can also be seen by the amount of COGS as a % of revenues, in this segment. Like the automobiles segment, the years of the crisis had a huge effect on the increase in costs by the company (107% during 2008 and 2009). On the other hand, that weight was much lower in the years previous to the crisis (87% on average). In the last few years, BMW's cost of sales has seemed to be recovering from the crisis effect and reaching the percentages of revenues seen historically before the crisis. Therefore, one had assumed that they will keep its COGS/Revenues average ratio demonstrated in the last few years during the forecasting period.

### **5.1.1.3. SELLING AND ADMINISTRATIVE COSTS**

Selling expenses of the BMW group comprise mainly marketing, advertising and sales personnel costs, whereas administrative expenses are related with expenses for administration not attributable to development, production or sales functions. Since this figure has represented historically very similar weights as a percentage of revenues (always between 9% and 10%) and no significant changes to this figure were identified by the company, one had assumed that they will represent an average of those percentages during the forecasting period (9, 8% of revenues).

GRAPHIC 9 - SELLING AND ADMINISTRATIVE EXPENSES AS A % OF TOTAL REVENUES



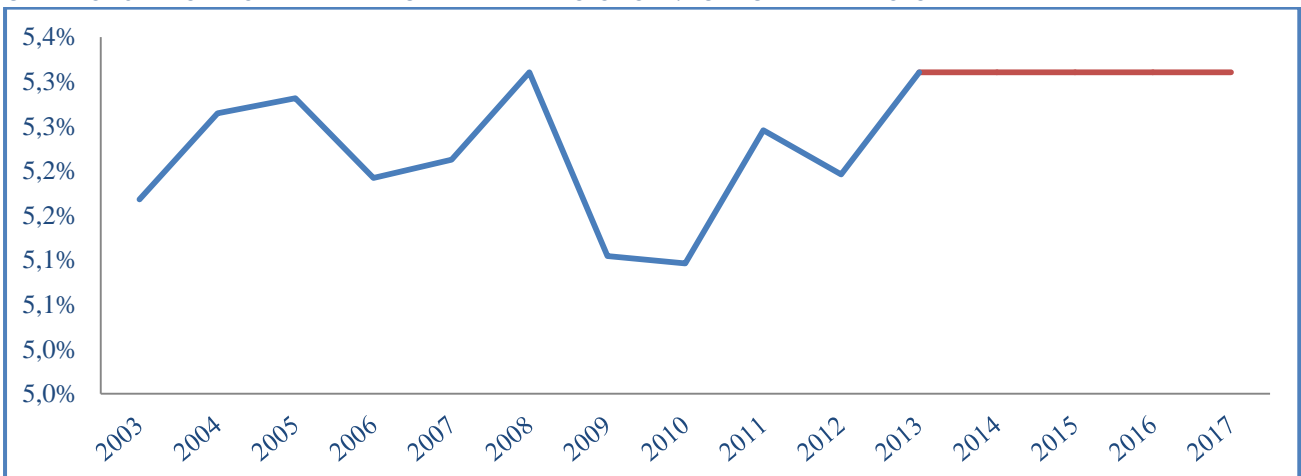
Source: Company Reports and own calculations

#### 5.1.1.4. RESEARCH AND DEVELOPMENT EXPENDITURES

R&D expenses have been always a function of a percentage in revenues. In 2012, BMW’s research and development expenses rose by 10%, given the financial success reached in that year with an increase in revenues of 11%, which allowed the company to invest in projects to secure their future growth. Nevertheless, that figure continued to represent around 5, 2% of revenues, which is the percentage observed historically.

Therefore, there is a very strong connection with R&D and revenues and this link is assumed to remain constant. The next graphic show the very closest to 5% ratios obtained by the company regarding research and development expenses, as well as the forecast years. It was assumed that an average of 5, 3% of revenues will be constant until 2017.

GRAPHIC 10 - RESEARCH AND DEVELOPMENT EXPENSES AS A % OF TOTAL REVENUES



Source: Company Reports and own calculation



### 5.1.1.5. OTHER OPERATING INCOME AND EXPENSES

The variable “other operating expenses” may be hard to predict, as it includes exchange losses, impairment losses and write downs amongst other items and then may vary from year to year depending upon both the external and internal environment. Nevertheless it is also believed that these costs are more likely to increase as the group expands their sales and operations (assuming that revenue increases as a result). The same happens with “other operating income”, for the same reasons. Then, historically, operating income (including exchange gains, income from reversals of provisions and income from reversals of impairment losses) had averaged 1,5% of revenues, without any significant change in any year. On the other hand, operating expenses (including exchange losses, expenses from additions to provisions or expenses from impairment losses) as a percentage of revenues have been higher since the beginning of the crisis. Consequently, it averaged out 1,8% of revenues after crisis and 0,8% before crisis. It will be assumed that it will keep its after-crisis weight since it has been constant throughout the previous years. Hence, other operating income is set equal to its historical average, whereas operating expenses are set equal to the after-crisis period average.

### 5.1.1.6. INTEREST EXPENSES AND INCOME

By looking at the bonds outstanding that the company has in the moment, it is possible to take out the interest expected to be paid over the forecasting period. According to interest income, it was observed that it had been averaged 10% historically of the profit before financial result. As a result, it is expected that it will stabilize within this average.

### 5.1.1.7. RESULTS FROM EQUITY ACCOUNTED INVESTMENTS

Results from Equity Accounted Investments include interests in the joint ventures of the company. In 2012 it was higher given the BMW Group’s share of the joint venture BMW Peugeot Citroën Electrification B. V. and a Joint Venture with BMW Brilliance Automotive Ltd., Shenyang. Therefore, in 2012 this figure weighted a higher percentage of the profit before financial result. Given the fact that the company expects to keep increasing its operations in emerging markets as done in 2012, it will then be expected that those investments will represent the average of this figure as a percentage of profit before financial result over the last two years, where the company integrated these future growth opportunities in its strategic analysis.

### 5.1.1.8. OTHER FINANCIAL RESULT

Impairment losses recognized in investments or losses/gains on stand-alone commodity and currency derivatives are included in this figure. This is a very inconstant figure and it is thus very hard to

forecast. Nevertheless, in the last two years it represent almost the same weight of profit and therefore it will be expected that the same percentage (7% of profit before financial result) will be maintained.

**5.1.1.9. INCOME TAXES**

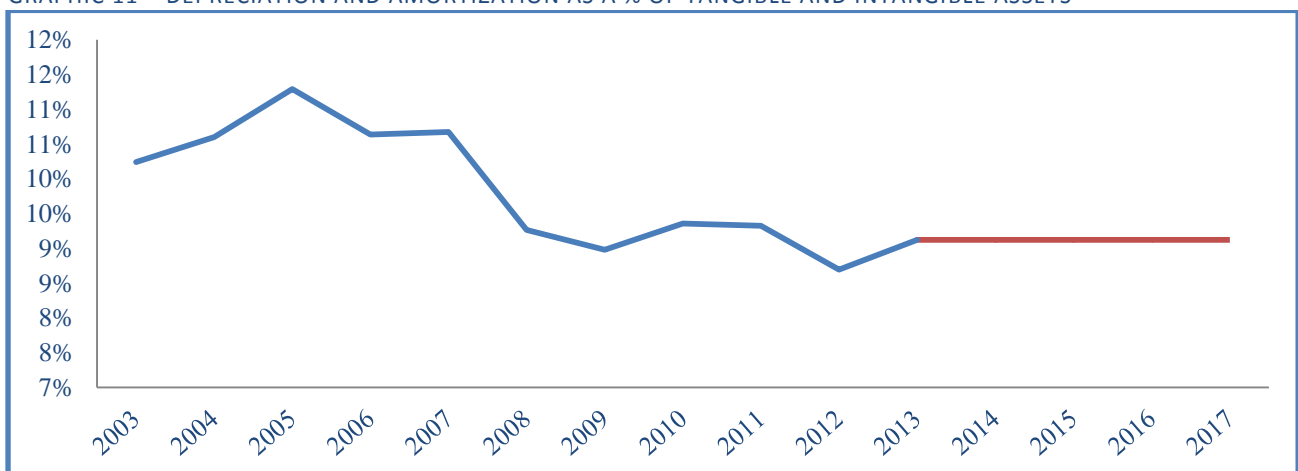
The year 2008 was an exceptional time regarding this figure. BMW used a lot of their deferred tax assets to gain a higher profit, which explains the low 2% income tax rate to EBIT observed in this year. Hence, to include the historical average does not seem to be a reasonable assumption and therefore it was assumed that the effective tax rate of the company for the forecasting period will be an average of the last three years (31, 6%).

**5.1.2. FREE CASH FLOW TO THE FIRM**

**5.1.2.1. DEPRECIATION AND AMORTIZATION**

According to Koller et al. (2010), depreciation and amortization should be forecasted either as a percentage of revenue or as a percentage of property, plant and equipment (PP&E). Then, the depreciation and amortization rate for property plant and equipment and intangible assets used in the valuation was computed averaging the percentage of that figure in the tangible and intangible amount, over the period of analysis (2003-2012), since it has been representing very similar values along the years. Nevertheless, from 2008 onwards that weight has been a bit lower and therefore it's assumed that the depreciation rate would be 9% of the tangible and intangible assets during the forecasting period, which is the average weight of D&A over tangible and intangible assets from 2008 to 2012.

GRAPHIC 11 – DEPRECIATION AND AMORTIZATION AS A % OF TANGIBLE AND INTANGIBLE ASSETS



Source: Company Reports and own calculations

### 5.1.2.2. PROVISIONS

Total provisions of the BMW group include pension provisions, other current provisions and other non-current provisions. Regarding the first one, they are recognized as a result of commitments to pay future vested pension benefits and current pensions to present and former employees of the BMW Group and their dependants. In relation with the other provisions, it is related with provisions for obligations for personnel and social expenses, consisting mainly of performance-related remuneration, early retirement part-time working arrangements and employee long-service awards.

As a result, the forecasting of provisions for the period 2013-2017 was based on the total personnel expenses projected. It includes primarily wages and salaries and social security, retirement and welfare costs.

### 5.1.2.3. INVESTMENT IN WORKING CAPITAL

Regarding the investments in working capital of the BMW group, it included all the non-financial figures recorded by the company. Therefore, trade receivables, receivables from sales financing, current tax on assets, inventory, other current assets were summed up and then trade payables, current tax on liabilities and other short-term liabilities deducted in order to compute the working capital amount.

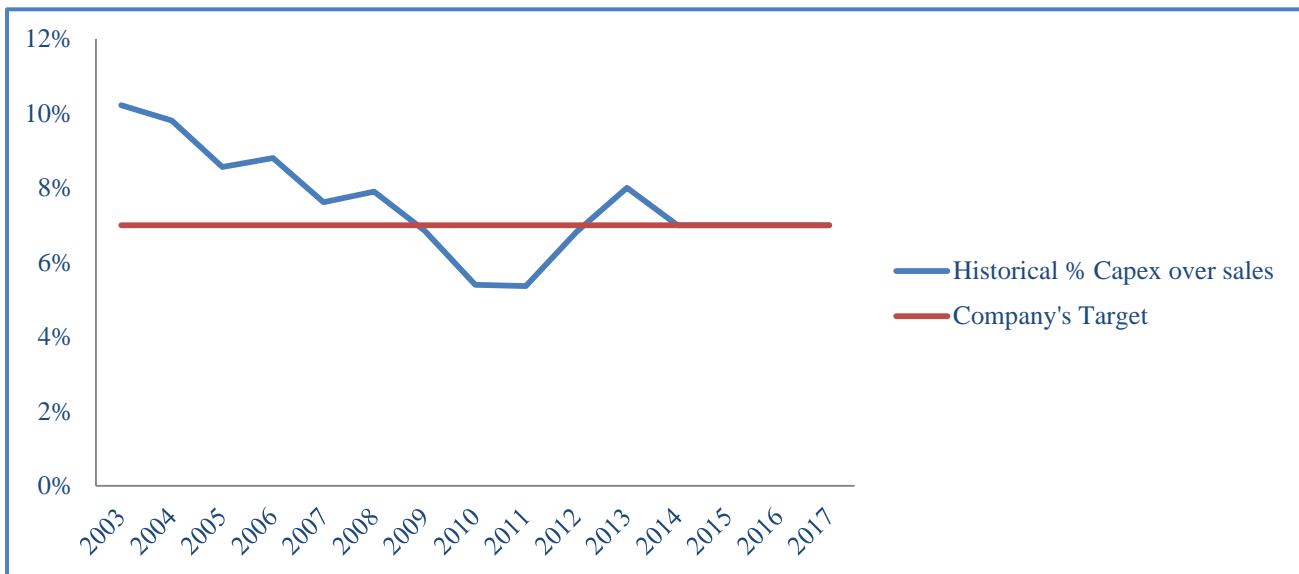
When estimating each one of these variables for the forecasting period, it was assumed that each rubric would maintain the same Days Inventory Held (DHE), Days Sales Outstanding (DSO) or Days Payables Outstanding (DPO) registered in 2012 or the average of the last years, according to what the company expects to reflect more in the future prospectus. This assumption was made by the fact that in almost all the figures these last year terms represented the average observed historically. On the one hand, DSO was used to forecast trade receivables, receivables from sales financing, current tax on assets or other current assets, in order to measure the number of days that a company takes to collect its revenues after a sale has been made. On the other hand, DPO is an indicator of how long a company is taking to pay its trade creditors, and therefore was applied in the projection of trade Payables, other short-term liabilities as well as current tax on financial liabilities. The inventory variable was estimated through the using of inventory average levels, by transmitting an idea of how long a company takes to take its inventory into sales.

### 5.1.2.4. CAPITAL EXPENDITURES

Over the last three years the capital expenditures of the firm represented around 5% of the revenues, which represented a decrease compared to the remaining years of the historical analysis.

Nevertheless, the company stated in the 2012 annual report that they intend to maintain a target ratio between investments on assets and revenues of 7%. 2013 and 2014 are considered ‘strong’ investment years as the BMW Group tries to make itself more future proof and meet stricter regulation and environmental standards. Therefore, this growth in capital expenditures will primarily be due to the expansion of the production network and the preparations for the new models and architectures (BMW i & MINI). In addition, development costs will be capitalized for the development of new models and product derivatives, new vehicle and engine architectures, and new vehicle and drive concepts (e.g. lightweight construction and electric cars). Hence, it was assumed that the CapEx ratio will be above 8% in 2013 to include the strongest investments. Since the current aim is to reduce the ratio in 2014 compared to 2013 and achieves 7%, which is the percentage used between 2014 and 2017.

GRAPHIC 12- HISTORICAL CAPEX OVER SALES



Source: Company's reports and own calculations

### 5.1.3. WEIGHTED AVERAGE COST OF CAPITAL (WACC)

The Weighted Average Cost of Capital (WACC) is a measure of the opportunity cost that investors face when investing in any stock. The formula used to calculate that risk was the following (Koller et.al. 2005):

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

The estimated (WACC) of the BMW group was about 5,8%. All the parameters were calculated by myself, except the tax rate, and explained on the following sections. The next table summarizes the results obtained and the constituents of BMW's WACC:

TABLE 4 - CONSTITUENTS OF WACC

WACC	5,8%
Cost of Debt	3,1%
Cost of Equity	7,7%
Tax Rate	31,6%
Total Debt/Total Assets	34%
Total Equity/Total Assets	66%

Source: Bloomberg, company reports and own calculations

The effective tax rate of the company has been around 31,6% over the previous years, on average. Excluding the exceptional years of the crisis, an average of the tax rates verified in the last few years is expected to be kept. The corporate tax rate in Germany is lower (around 29% in 2012), although the trend is for the group to expand even more around the world and pay taxes in countries where the tax rate is higher than the German one. Thus, an average of the last years represents a spread over the corporate tax rate and is, at the same time, similar to the actual effective tax rate of the company. Effective tax rate was used given the complexity in finding marginal tax rates.

**5.1.3.1. CAPITAL STRUCTURE**

The weights used as capital structure to the valuation of the BMW group were based on market values (as stated by Koller et al. 2005). The BMW group has two different stock classes: common and preferred shares. The second ones are usually treated as if they were debt and this is not in line with BMW preferred stocks, which are not yielding a fixed dividend. Moreover, shareholders that hold preferred stock are entitled to receive more dividends per year than common stock owners. A preferred stock yields 0.02 € more per share than a common stock. On these conditions, preferred stock will be used as equity and not as debt. Therefore, market capitalizations for both classes of stock were calculated on our own by multiplying the number of common and preferred shares by the respective market price. These two different stock classes gave us weights for common equity and preferred equity, which were both aggregated to form the final equity ratio of 66%. Moreover, the preferred equity constitutes approximately 4% of the total equity of the firm, whereas the common equity represents 62%.

Based on the information provided by the company and the current market trends, an equity ratio of 66% and a debt ratio of 34% were assumed for the forecasting period of the valuation, representing therefore the same capital structure of 2013. Those weights are related only with the information available on the date of the valuation, representing therefore the first semester of the year. Nevertheless, it's similar to the previous year and therefore it's expected to be kept.

In order to obtain the market values of debt, interest expense of each year was divided by the cost of debt. The next table summarizes the market weights obtained through these calculations:

TABLE 5 - MARKET WEIGHTS FOR CAPITAL STRUCTURE (IN € MILLIONS, EXCEPT FOR PRICES AND RATIOS)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Interest Expense	930	1.014	966	943	913	847
Total Debt	29.801,7	32.493,5	30.955,3	30.218,3	29.257,0	27.142,0
Number of Common Shares	602,0	602,0	602,0	602,0	602,0	602,0
Price (common shares)	21,6	31,8	58,9	51,8	72,9	81,4
Market Capitalization (Common Equity)	13.009,1	19.143,4	35.427,4	31.159,3	43.903,5	49.020,5
Number of preference shares	52,2	52,7	53,2	53,6	54,0	53,6
Price of preference shares	13,9	23,0	38,5	36,6	48,8	61,4
Market Capitalization (Preferred Equity)	723,4	1.211,3	2.046,8	1.958,0	2.632,7	3.289,2
Total Market Capitalization	13.732,5	20.354,7	37.474,2	33.117,3	46.536,2	52.309,7
D/V	68%	61%	45%	48%	39%	34%
$E_{\text{common}}/V$	30%	36%	52%	49%	58%	62%
$E_{\text{preferred}}/V$	1,66%	2,29%	2,99%	3,09%	3,47%	4,14%
E/V	32%	39%	55%	52%	61%	66%

Source: Bloomberg, company reports and own calculations

### 5.1.3.2. COST OF EQUITY

There are several ways of calculating the cost of equity, according to different analysts. Among a variety of different ways to estimate the cost of equity of a company, I will use the formula proposed by Robert F. Bruner et.al. (1998) which is commonly known as the CAPM equation (stated in section 3.3.5 of the literature review):

$$K_e = R_f + \beta L [ E (R_m) - R_f ]$$

There are more models that have also gained recognition on the previous years, such as the Fama-French three-factor model and the arbitrage pricing theory (APT) (Koller et.al, 2005). However, I decided to use the CAPM equation given the fact that it is the most common and preferred model among analysts and it has been tested over the years providing usually reasonable results.

The next table summarizes the inputs obtained (which are explained in the following sections):

TABLE 6 - COST OF EQUITY CONSTITUENTS

	Risk free Rate	Beta	Market Risk Premium	Cost of Equity
Daily (used)	1,87%	1,09	4,98%	7,30%
Weekly	1,87%	1,07	5,49%	7,71%
Monthly	1,87%	1,12	4,94%	7,38%

Source: Bloomberg, company reports and own calculations

### 5.1.3.3. RISK FREE RATE

Since the 10-year German Bund is the most common used to value companies in Europe, it was the one I chose to the valuation of the BMW group. Therefore, the risk free rate used was the yield of the day of the valuation (1, 87% at 17th of October of 2013). The data for the daily 10-year German Bund was taken from Bloomberg.

### 5.1.3.4. MARKET RISK PREMIUM

Since the BMW group is listed on the German stock exchange, the market risk premium was calculated by comparing the returns of the Dax 40 index and the risk free rate. The prices of the German index were taken from Bloomberg and returns were computed. As stated before, the risk free rate was based on the 10-year German bund, also taken from Bloomberg. However, Bloomberg always give this last indicator with annualized values. In order to go beyond this data limitation, all the inputs were transformed into daily, weekly and monthly values. The procedure used to perform this transformation was the following:  $[(1 + R_{f_{annualized}})^{1/n}] - 1$ . Given this, the n parameter was adjusted according to the three different frequencies used. The time-frame used for all the frequencies was from 2004 until 17th of October of 2013 (day of the valuation). This was done in order to include both the crisis influence and the pre-crisis period. Moreover, it was the one that produced the most reasonable value, according to Damodaran (which states that the risk premium for German should be between 4% and 6%).

Finally, weekly data was the one chosen to be used on the valuation since it provided the highest R<sup>2</sup> on the CAPM regression. Finally, the market risk premium obtained was of 5,49%.

Country risk premium for Germany was assumed to be zero, as it is stated in Damodaran's website.

### 5.1.3.5. BETA

The used beta for the valuation of the BMW group was the one computed by means of the CAPM regression, given historical BMW returns as the dependant variable and the market risk premium as the independent variable. Those calculations were once again performed with three different frequencies (daily, weekly and monthly) and from the same time-frame as the market risk premium (from 2004 until 17th of October of 2013). The beta chosen was the one obtained from the weekly data, also from the same reason (it provided the highest  $R^2$  on the CAPM regression). Therefore, the beta used was 1,07. This much closer to 1 result can be explained by the fact that the automobile segment (which is the responsible for biggest percentage of revenues of the company) is much more related with macroeconomic factors than with company specific factors (such as operating risks). This can also be seen by the fact that almost all the companies in the peer group present very close to 1 betas, as we can see in table 7:

Table 7 - Betas of the Peer Group

	Beta
DAIMLER AG-REGISTERED SHARES	1,13
VOLKSWAGEN AG	0,92
RENAULT SA	1,24
FORD MOTOR CO	1,18
NISSAN MOTOR CO LTD	1,09

Source: Bloomberg (from 2004 to 17th of October of 2013)

### 5.1.3.6. COST OF DEBT

An historical cost of debt was computed by looking at all of its long-term bonds outstanding at the time of the valuation and therefore by doing a weighted average of their interest rates, according to its amount outstanding. In this case, the cost of debt obtained was 2, 72%.

Nevertheless, different analysts defend that the cost of debt used to calculate the WACC should reflect the market rates that the company has negotiated mostly closely to the time of the valuation. Given this, the procedure was to look to the most recent bond issues from BMW at 17/10/2013. The bond found in this conditions were issued in 4/9/2013 with 990 million € with a yield of 1, 84%. Since both short and long term ratings of the firm have been stable along the years and therefore it's expected a low cost of debt, it seems to be a reasonable value to use in the valuation of the company.



Moreover, ratings of S&P and Moody's (A and A2, respectively) were attributed by certifying that BMW's found a solvency position for debt with a maturity of more than one year and with the expectation of a sustainable higher level of earnings and cash flow generation in future. Nevertheless, a spread should be summed up in order to catch possible future fluctuations that influence the interest rate. Then, an Euribor spread for a 5 years period of 1,277% was aggregated to the latest issued bond yield and the final cost of debt used for this valuation was 3, 12%.

#### **5.1.4. OUTPUT OF THE VALUATION**

The first step in this valuation was to collect all the previous information and then calculate the FCFF to the firm, as on section 3.3.7 of the literature review. In order to calculate the present value of the FCFF, the free cash flows are discounted at the WACC rate of 5, 8% per year. The PV of the FCFF in the horizon period is €87 216 Million, as shown in the table below. Furthermore, FCFF in the terminal period is calculated as FCFF in the terminal year 2017 divided by the WACC less the assumed terminal growth rate of 4, 2% (Easton et al. 2010). The sum of horizon period FCFF and terminal period FCFF yields an enterprise value of the BMW Group of €90 619 million. Moreover, an equity value of €60 606 Million and a debt value of €30 013 Million were found. The second one was achieved by assuming an average of the last three years debt, whereas the first one was the result of the deduction of that debt level from the total value achieved. Therefore, an equity ratio of 66% and a debt ratio of 34% were accomplished. Then, by dividing that for a 658 Million shares outstanding, a price per share of 92,1€ was obtained. It was assumed that the number of common shares would remain equal, in view of the fact that it has been the same since 2010. On the other hand, the number of preferred shares has been increasing by an average of 0, 79% and therefore that increase justifies the increase in the total number of shares from 655 Millions to 658 Millions.

TABLE 8 - VALUES OBTAINED THROUGH THE DCF VALUATION

Price	92,1 €
Terminal Value	87 216 380 750
Sum PV future CF	3 403 309 393
Value	90 619 690 143
Equity	60 606 462 019
Debt	30 013 228 124
N° of shares	658.154.631

Source: Bloomberg, company reports and own calculations

## 5.2. DIVIDEND DISCOUNT MODEL

With the aim of knowing the intrinsic value of the BMW stock, a final price was obtained by discounting the dividends that are expected to distribute to the shareholders of the company. We know that the company pays part of its Free Cash Flow as dividends and besides it's expected to keep constant its financial policy, which are both basic conditions to the using of this model. In order to have a constant cost of equity, named  $k$ , it's required that the leverage ratio of the firm doesn't change, since it implies changes in this variable.

In order to use this approach, one had to assume also that the free cash flow to the equity of the firm will grow at a constant rate called  $g$ , year after year. This  $g$  was assumed to be the same terminal growth rate used on the DCF approach, in order to represent the steady growth stage of the firm.

Consequently, the Dividend Discount Model was applied to the BMW by using the following formula to obtain the terminal value for the company:

$$P_0 = \frac{E \text{ (DPS)}}{k_e - \text{Expected Growth in Perpetuity}}$$

The sum of the present value of all the expected future dividend payments, discounted at a constant cost of equity of 7, 7% should be added to the terminal price to obtain the price that values the company. Those calculations were applied for the two different stock classes that BMW owns - common stock and preferred stock - since they differ on the amount of dividends received, as expected. Preferred shareholders have received more 0, 02€ in dividends than common shareholders.

We know that the payout ratio of any firm represents the dividends per share divided by the earnings per share. Further, the company intends to keep its payout ratio between 30% and 40%. Given that it was about 32% in 2012 and 30% in 2011, it's expected that an average level (35%) can be obtained in 2013 and 2014, which increases the dividends policy of the firm (which is an indicator of the strong future prospects that are expected). As a result of those two indications, it's possible to multiply the expected payout ratio to the expected EPS and therefore obtain the expected dividends that the company will pay.

Finally, by applying those values to the formulas specified one should obtain a common stock price of 93,4€ and a preferred stock price of 94,7€. By comparing this results with the ones obtained through the DCF approach, one can observe the discrepancy between them. When the DDM gives higher prices than the DCF, the conclusion is that the firm has greater dividends comparing to the

FCFE. This fact can have some consequences to the company, given that to exceed these high dividends, the firm will have to issue new debt or new equity to pay them. By borrowing money to do that, the firm takes the risk of turning away of its optimal and the risk of increases in bankruptcy, as well as high bankruptcy costs. If new equity is issued, the cost may be too high and then create high expenditures. These consequences should be taken into account closely since they can change the capital structure of the firm. Since dividends are not sustainable forever, it's better to look to the DCF result as a valuation method for the BMW group.

### 5.3. RELATIVE VALUATION

As stated by Fernandez (2002) the use of multiples is very important in order to be a complement valuation of other methods, especially the DCF. According to this, one will use the multiples approach with the aim of checking whether the results obtained in the Discounted Cash flow hold or not. The candidates for this valuation were the ones discussed previously in the literature review: the Price to Earnings Ratio, the Enterprise Value to EBITDA, Enterprise Value to EBIT and Enterprise Value to Sales. As stated before, while the PER is even more used, the Enterprise Value multiples are less susceptible to changes in the debt ratio of the companies than the first one, according to Goedhart et al. (2003). From these, it was also showed that adjusted EBITDA performs better than EBIT and sales (Liu 2002).

#### 5.3.1. PEER GROUP

Establishing the peer group is a fundamental part of any valuation analysis, essentially in strategic terms. The ratios of that peer group derive very important insights about any company's competitors and therefore is a very good starting point for further valuations.

In order to start defining the peer group, the preliminary step was to define it according to Liu et al. (2002) and therefore to choose companies within the same market and business segment. Therefore, the second step was to go into bloomberg and look to the closest 20 companies of BMW according to several pointers - companies chosen were from the same market and had similar revenues. Besides that, data was collected from the last year and companies from all over the world were chosen, since BMW's sales and production facilities are distributed worldwide. Therefore, a centroids approach was made in order to restrict bloomberg's peer group to the ones even closer according to sales growth, cost of capital, ROIC and capital structure. ROIC was used instead of ROA or ROE in order to take into account investments by debtholders, as well, or to assume that only invested capital can create higher net income. The main purpose of this choice was to look at different indicators of profitability, growth rate (as stated by Goedhart et al. 2005), capital structure and cost of capital. The

method gave six different companies (Daimler AG, Volkswagen, Renault, Peugeot, Ford and Nissan).

Since the Audi Group is not listed on the stock exchange by itself, but is a part of the Volkswagen Group, the Volkswagen Group is used as a peer instead of the Audi Group in this case. From these peer group, only Peugeot was excluded since it doesn't share the same strategic vision of the others. This can be influenced by the takeover of Citroen from this company, since the new strategy of the group aims to separate the two brands in order to target two different costumers groups. Therefore, whereas the Peugeot brand aims to be more close to the others of the BMW's peer group (with elegant dynamics, perceived quality and innovative driving), the Citroen brand aims to target a complete different public, who is searching for less sophisticated and easy to use technology and purist design). The Daimler Group is probably the best peer of the BMW group in terms of the products and services offered and recognition in the market. According to all of this restrictions, the companies chosen to be the peer group of the BMW group were Daimler, Volkswagen, Renault, Ford and Nissan, as shown in table 9:

TABLE 9 - PEER GROUP INDICATORS (%)

Name	Sales Growth (1 year)	ROIC	WACC	Total Debt/Total Assets
DAIMLER AG-REGISTERED SHARES	7,28	6,57	5,65	50,4%
VOLKSWAGEN AG	20,92	6,64	5,05	37,5%
RENAULT SA	-3,19	1,19	5,64	44,0%
FORD MOTOR CO	-1,48	4,59	6,25	54,6%
NISSAN MOTOR CO LTD	2,34	4,54	5,91	38,9%

Source: Bloomberg (trailing 12 months)

TABLE 10 - BMW GROUP INDICATORS (%)

Name	Sales Growth (1 year)	ROIC	WACC	Total Debt/Total assets
BAYERISCHE MOTOREN WERKE AG	11,66	4,64	5,56	50,6%

Source: Bloomberg (trailing 12 months)

According to our peer group, BMW currently trades at a significant premium to its peers. As can be observed from table 9 and table 10, the BMW Group had the second highest growth rate on a year-

end comparison, after Volkswagen (11,6% comparing to 20,9%), reflecting one more time the huge sales volume of the company in the last few years. Moreover, it can be observed that half of the companies in the peer group observed negative sales growth, which shows the impacts of the financial crisis in this business segment and the superior profitability of BMW even in times like this. The company also had one of the lowest ROIC. Volkswagen is again the company with the highest ROIC comparing to the peers, revealing its higher efficiency at allocating the capital in order to make profitable investments. Even so, the ROIC of the BMW group is considered to be very high, which can be explained by the fact that BMW is always one step ahead with the consecutive launching of attractive products. Moreover, the premium car market may be more concentrated and less competitive than the general automotive market and then have a higher ROIC. That can be confirmed with the lowest ROIC on the general automotive brands, like Renault, Ford or Nissan, and the highest ROIC on the premium brands of the peer group: Daimler, Volkswagen and BMW. In terms of cost of capital, we can observe that BMW is very well positioned according to its peers, by having one of the lowest cost of capital (5,56%). In relation to the capital structure, the Daimler corporation is the one with the closest debt-to-total-assets ratio.

### 5.3.2. THE MULTIPLES APPROACH

After choosing the peer group of the BMW group as discussed below, the harmonic mean of the peer group's multiples was computed and then multiplied by the respective driver.

From the 4 different candidates and most used multiples discussed above, the chosen one to value BMW was the EV/EBITDA. As discussed in the literature review, it's one of the most widely used multiples in valuations.

The PER, which is computed by taking the ratio of the latest price and the earnings from the year, it's also commonly used given it's simplicity and by linking company value to profit. Nevertheless, it is, according to Koller et al. (2010), distorted by capital structure and non-operating gains and losses. Moreover, the denominator is based on an accounting measure of earnings, which is vulnerable to forms of manipulation. Therefore, its quality truly depends on the accuracy of the earnings forecasts. As we can observe on the table below, the price per share obtained through this multiple was of 63€, which represents an overvaluation in the market of the BMW share price (83€ at the date of the valuation). This result is different from the one obtained through the DCF and DDM models, which may happen given the fact that with multiples we are valuing only one period, and therefore not taking into account the future profitability of the group (which may rise the prices).

The Enterprise Value multiples represent the ratios between the enterprise values and the respective trailing twelve month denominator (EBITDA, EBIT or sales). The EV/Sales multiple is computed by taking the stock price and the sales per share. On the other hand, on the first and second ones, one should apply the multiple to the forecasted denominator (EBITDA or EBIT) and deduct the total net interest bearing debt of the group from that value. Enterprise value over Sales was excluded from the valuation given the fact that BMW registered record sales in the last years (which didn't happen in the majority of the comparable companies). Additionally, Liu et al. (2001) also stated that it's the multiple that performs worst. Furthermore, the EV/EBIT multiple assumes that the company has similar ROIC, WACC, tax rate and terminal growth rate, according to Petersen and Plenborg (2011), which in most cases might not be completely truthful. The EV/EBITDA, on the other hand, is widely used to value firms and it does not include depreciation and amortization costs and is, therefore, less susceptible to manipulations in accounting policies.

The use of the PEG ratio was also considered. Nevertheless, it didn't seem to apply well in the case of BMW given its high growth momentum and expected growth volatility during the explicit period. Then, there is no time-frame for which the growth rate should be taken into account and it doesn't transmit the true value of the company stock price.

Moreover, forward earnings were used, since trailing earnings are not representative of the firm's future value, given the high growth period that the firm is living on the last year and is expected to live in the next few years.

TABLE 11 - MULTIPLES VALUATION (2013, IN €)

Name	PER	EV/EBITDA	EV/EBIT
Harmonic Mean	11	8	16
BMW's Driver	3 784 460 998	11 613 156 969	6 449 885 451
BMW's price per share	63	94	111

Source: Bloomberg and own calculations

In conclusion, the EV/EBITDA appeared to be the most reasonable multiple to use, by valuing BMW stock price at 94€ in 2013. The same was done for 2012 and 2014, which can be seen in the appendices section. This result is in accordance with the undervaluation of the BMW stock reflected both with the DCF and the DDM models.

## 6. SENSITIVITY ANALYSIS

All the previously mentioned valuation was carried out with the assumption that the variables used for the growth rate and for the cost of capital are the ones that best describe the current and future prospectus of the BMW group. Nevertheless, we know that the companies are living times of higher uncertainties and therefore it is important to understand how those affect the equity value of the company and the final stock price. This sensitivity analysis will be conducted on the variables weighted average cost of capital (WACC) and earnings before interest and taxes (EBIT). The choice of these variables was related to the fact that they represent the most important figures in the development of the company value.

The sensitivity analysis was performed by drawing two-dimensional data tables. This meant it was possible to change two variables at the same time (growth rate and WACC).

TABLE 12 - SENSITIVITY ANALYSIS (VARIABLES: GROWTH RATE AND WACC)

	Growth Rate – 5% (4%)	Growth Rate baseline (4, 24%)	Growth Rate + 5% (4,5%)
WACC - 5% (5,5%)	97,0 €	112,8 €	135,0 €
WACC baseline (5,8%)	81,6 €	92,1 €	106,7 €
WACC + 5% (6,1%)	70,7 €	78,5 €	88,4 €

Source: own calculations

From the table above we can see that changes in the cost of capital of the firm truly influence the price of the BMW stock. On the worst case scenario, if the WACC decreases 5%, the price increases by 20,7€ and if the WACC increases by the same percentage the stock price decreases 13,6€. On the other hand, by keeping the cost of capital constant, we can see that changes in the growth rate also influence very much the price. In the worst case scenario, if the growth rate decreases 5%, the stock price of the company varies 10,5€ and if the growth rate increases by the same amount the stock price varies 14,6€.

The EBIT is a further extremely important variable in the valuation of BMW. Therefore, a sensitivity analysis was made in order to catch the effects that different changes (positively or negatively) can have on the equity value and therefore on the stock price of the company. From the table below we can observe the value, equity value and stock price based on different EBIT levels for the company is presented.

TABLE 13 - SENSITIVITY ANALYSIS (VARIABLE: EBIT)

Changes	Value	Equity	Price
-0,05%	72 596 435 338	43 203 275 508	65,6 €
-0,04%	76 053 766 968	46 660 607 139	70,9 €
-0,03%	79 511 098 599	50 117 938 769	76,1 €
-0,02%	82 968 430 229	53 575 270 399	81,4 €
-0,01%	86 425 761 859	57 032 602 030	86,7 €
0,00%	90 619 690 143	60 606 462 019	92,1 €
0,01%	93 340 425 120	63 947 265 291	97,2 €
0,02%	96 797 756 751	67 404 596 921	102,4 €
0,03%	100 255 088 381	70 861 928 552	107,7 €
0,04%	103 712 420 012	74 319 260 182	112,9 €
0,05%	107 169 751 642	77 776 591 813	118,2 €

Source: own calculations

Through the table above we see that increases of 5% on the EBIT along the explicit period would decrease the company stock price from 92,1€ to 118,2€, representing a positive change of 26€ on the share price. On the other hand, decreases of 5% on the EBIT variable would decrease the company's share price by 26,5€ and thus represent a 29% negative change. As a result, it's observable that the EBIT variable changes truly influence the share price in a larger scale. Nevertheless, the EBIT used on this valuation is in accordance with the one that the investor relations departments expects for the explicit period and therefore changes are not anticipated yet.

In conclusion, we can state that the equity value is significantly influenced by the change of WACC, growth rate and EBIT. Particularly the WACC proved to be very significant, which is consistent with the valuation technique of discounting cash flows by the WACC.

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## 7. THE VALUE AT RISK

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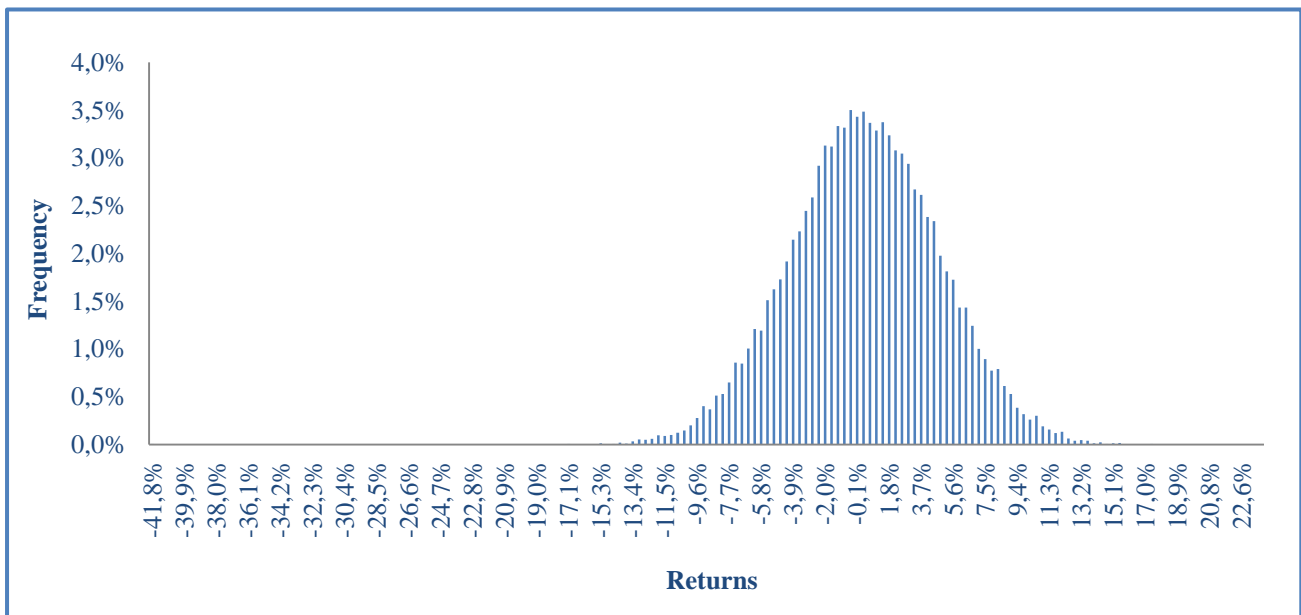
The Value at Risk (VaR) is a recent risk management model that aims to measure the potential risk of any firm within a specific portfolio of assets and time frame, for a given confidence interval. By looking into it, firms are able to control the level of risk that assures the company's prospectus wouldn't be below expected. This model can be used for an individual asset, a portfolio of assets or



for an entire firm. This model however has one underlying assumption – it is based on the current level of risk of the firm, based on the portfolio that the firm has at that specific moment and assuming it would remain the same. Nevertheless, we know that the volatility in the past might not be the same in the future. It is important to state that this measure can be used in any entity but it is most commonly used by commercial and investment banks.

In order to compute the VaR, several methodologies can be applied. It can be based on a previously known distribution, in which the financial losses depend on hypothesis of the behaviour of the distribution of the return’s probability or it can be based on the history of returns to understand the financial losses. In this case, the second methodology would be applied through a Monte Carlo Simulation, with weekly data and within a range from January 1st, 2003 to December 6th, 2013. As shown in graphic 12, the returns don’t follow a normal distribution and are skewed to the right. So as to make that conclusion, a normal random generator was used with an average of 0,18% and a standard deviation of 4,48%, the same ones as the sample. The result is shown on the following histogram, with 30.000 times simulations:

GRAPHIC 13 - HISTOGRAM



Source: own calculations

Then by ordering returns by a ranking and by looking at the 1500 lowest ones (calculated for a 95% confidence interval), we arrived to the conclusion that the weekly VaR is 7, 4%. On another perspective, we could look into a 90% confidence interval and conclude that the weekly VaR is 5, 5%. Therefore, one should conclude that this asset has a probability of 5% of falling more than 7, 4%

and a probability of 10% of falling more than 5, 5%. Accordingly, one can state that with a 95% confidence, the price target on this valuation (92, 1€) would not fall more than 6, 6€.

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### 8. RESEARCH REPORT COMPARISON

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In order to once more test the consistency of the valuation that has been performed, this section aims to compare the results in this dissertation with the ones published by the investment bank JP Morgan on December 3rd, 2013. The choice of this report was related with it being the most recent report published until the date of the valuation and with its clarity in terms of information.

The report published by JP Morgan valued the company only until 2015, and therefore it represents a smaller period than the one chosen to this dissertation. In order to have a rational basis of comparison, only the years in the valuation that are common to both this dissertation and the investment bank report will be compared (2013-2015).

Additionally, it is worth mentioning that JP Morgan carried out a valuation based on multiples, whereas this dissertation aims to value the BMW group through the DCF methodology. We also present the multiples valuation but it is important to mention that it was used as a complementary valuation of the DCF method and not as a valuation tool on itself. Therefore, it is expected that some differences derive from this discrepancy between valuation methods or even arise from the operational assumptions or the valuation assumptions. There is no justification for the use of the multiples valuation but we can anticipate that it may be related with its simplicity and easier interpretation.

In the Investment Bank report, the defined target price was 85€, which resulted from a revision and an upgrade of a previous target price (78€) announced by the analyst. Furthermore, JP Morgan kept its “Neutral” recommendation unchanged. The upgrade in the target price was related with the fact that JP Morgan had done the same with Daimler estimations, which is one of the strongest peers of BMW. Since they both benefit from the profiting in the short term from the improved pricing power and they are very close to each other, they can be compared and give similar conclusions. The analyst justifies that they expect discounts of BMW to stabilize at lower levels, meaning margins do not decline sequentially as much as previously expected.

The first difference that should be noted is the higher revenues and higher cost of sales that resulted from this dissertation, comparing to the investment bank report. The €75,930 Million revenues

## Equity Valuation of the BMW Group

projected for 2013 by JP Morgan represent a slightly decrease in the revenues from 2012 of 1, 2%. This result is not as consistent with the evolution in revenues that the group has been registering. It is expected that the pace of growth registered over the last few years will continue during the first years of the explicit period. Besides that, the launch of a huge variety of new and innovative models in 2013 and 2014 is expected to realize a success to the group - BMW eagerly pointed out the launch of 14 new models in 2013. The BMW group' core model series – the BMW 3 Series, the BMW 5 Series and the BMW 7 Series – will be available as full hybrids, which together with the launch of the BMW i3, their solution for emissions-free driving in urban areas, will certainly be a success.

TABLE 14 - BMW GROUP AND JP MORGAN VALUATION COMPARISON (€)

	2013	2014E	2015E
<b>Revenues - dissertation</b>	79 328 033 879,47	81 275 230 056,11	83 106 477 444,59
<b>Revenues - JP Morgan</b>	75.930.000.000	77.181.000.000	81.322.000.000
<b>Cost of sales - Dissertation</b>	64 611 925 303,35	65 851 242 915,32	66 875 266 037,20
<b>Cost of Sales – JP Morgan</b>	60.587.000.000	61.849.000.000	65.417.000.000
<b>EBIT – Dissertation</b>	6 449 885 451	6 954 860 234	7 571 262 936
<b>EBIT – JP Morgan</b>	7.951.000.000	7.684.000.000	7.791.000.000
<b>% EBIT - Dissertation</b>	8,13%	8,56%	9,11%
<b>% EBIT – JP Morgan</b>	10,50%	10,00%	9,60%
<b>Financial Result - Dissertation</b>	625 644 319	503 594 482	280 212 821
<b>Financial Result – JP Morgan</b>	51.000.000	62.000.000	203.000.000
<b>Pre-tax Income – Dissertation</b>	5 824 241 132	6 451 265 751	7 291 050 114
<b>Pre-tax Income – JP Morgan</b>	8.012.000.000	7.736.000.000	7.994.000.000
<b>Net Income - Dissertation</b>	3 784 460 998,37	4 251 787 040,38	4 896 633 680,44
<b>Net Income – JP Morgan</b>	4.232.000.000	4.267.000.000	4.499.000.000
<b>Depreciation and Amortization – Dissertation</b>	1 755 399 397,50	1 820 872 554,90	1 888 898 220,64
<b>Depreciation and Amortization – JP Morgan</b>	3.872.000.000	4.013.000.000	4.147.000.000
<b>Capital Expenditures – Dissertation</b>	6 346 242 710,36	5 689 266 103,93	5 817 453 421,12
<b>Capital Expenditures – JP Morgan</b>	6.954.000.000	6.560.000.000	5.693.000.000

Source: Bloomberg, company reports and own calculations

Moreover, the introduction of those models sets new standards for resource conservation and the use of innovative materials, such as carbon fibre, in automobile manufacturing, which is expected to increase the cost of sales of the company.

Another observed difference was the higher EBIT and EBIT margins reported by JP Morgan. Both the results of the investment bank and the results of the dissertation are consistent with the target EBIT that the company intends to maintain in the following years. Based on the Strategy Number ONE, which was introduced in 2006 for the time period until 2016, a long term EBIT target corridor of 8 to 10% is expected. Besides that, EBIT margins followed different paths. While in this dissertation an increase in the EBIT margin in the first years is presumed, JP Morgan analyst assumes a slight deterioration. Nevertheless, the investor department of the company has clearly stated the fact BMW had become more profitable (with double profit before tax between 2007 and 2012), and expected its EBIT margin to be above the target rate (8%-10%) in 2013 as a result of this far above the ground increase in profits. Since in 2012 the EBIT margin was about 10,8%, a higher decrease in 2013 was expected to compensate the lower growth in revenues and therefore to be on the target range during the explicit period.

Regarding depreciation and amortization, JP Morgan estimated this figures in a smaller amount than the one estimated in this dissertation (40% on average). Nevertheless, there is no indication in the investment bank report regarding the assumptions behind these estimations.

Moreover, the capital expenditures in 2013 were similar between both reports. Nevertheless, in 2014 JP Morgan expects it to remain at higher levels and therefore decrease in 2015. On the other hand, in this dissertation we expected the higher decrease to be noticed between 2013 and 2014. However, as stated before, the investor relations department of the firm declared a target 8% CapEx over sales in 2013 and a 7% CapEx over sales on the remaining years of the explicit period. This was explained primarily with the expansion of the production network and the preparations of new models and architectures (BMW i & MINI). In addition, development costs will be capitalized for the development of new models and product derivatives, new vehicle and engine architectures, and new vehicle and drive concepts (e.g. lightweight construction and electric cars).

In relation with the financial result, it can be seen that JP Morgan expects it to be slower than the one presented in this dissertation. However, any guidance in respect of this was made in the report of the investment bank. We expect the lower pre-tax income reported in this thesis to be related with that. The net income reported by JP Morgan is also larger than the one used in this thesis. Nevertheless, the main difference derives from the variance in the estimation of revenues.

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## 9. CONCLUSION

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The first conclusion to be reached with this thesis is that there is no ideal method or correct valuation to carry out. The results depend greatly on the assumptions made and on the initial goal of the valuation. Therefore, the crucial part is that the assumptions we make are accurate with the features of the company, the characteristics of the environment and of the sector where the company belongs. Moreover, the level of information assessment is another key factor in the consistency of the valuation. Luckily, we had the great help provided by the investor relations department of BMW group that disclosed very useful information and estimations for the forecasting period.

It was observed that the research reports do not justify their assumptions and consequently it is problematic to make a comparison of results with the above-mentioned reports. These misjudged assumptions may be the justification for the differences and the inconsistent values found in the comparison.

Regarding the company itself, it was shown that BMW has a strong prospectus and that it has shown a strong struggle against the financial crisis and especially, the huge effect that that crisis has had on the industry where the company operates. It can be proved with the fact that even in the strongest peak of the crisis (2008 and 2009), BMW achieved a positive income and paid interest to its shareholders. Nowadays, BMW is a stronger and more international brand than it was in 2006 (when it entered strategy number ONE).

In order to estimate the market value of the company, which was the purpose of this report, a DCF, DDM and multiples methodology were used. These methods were built on forecasts and gave different stock values, which is normal since they all reside on different valuations and different goals. The current WACC was estimated to be 5,8%. We computed a 92,1€ price target for the company, which represents a 10% upside potential with respect to the stock price at October 17th, 2013 (the valuation date). This higher price may be related with the different assumptions made and maybe the incorporation of different prospectus to the company. On the DDM valuation, the final price obtained was 93,4€, which is higher than the price that the group had on the date of the valuation, giving force to the idea that the stock is actually undervalued. Moreover, the EV/EBITDA multiple valuation resulted on a 94€ price target, which indicates the stock is also undervalued. Nevertheless, it was taken less attention to this given the fact that with multiples we're valuing only one specific year and therefore not taking into account the future prospectus of the firm.

The undervaluation we found in BMW's stock price holds even if the growth rate increases 10% in relation to the 4,24% used in the valuation. On the other hand, if the growth rate decreases by the same percentage, a lower price would be observed than the one observed on the date of the valuation. Notwithstanding we consider that the growth rate used is the one that best fits the prospectus of the company. We believe that in times like these, uncertainties are very high and changes in the growth rate may happen to influence the company's stock price. On the contrary, we have perceived that the company is much more dependent on the WACC changes. Nevertheless, changes in these variables are less expected than the ones in the growth rate given the constant capital structure, cost of equity and ratings that BMW has registered over the years.

As stated, the results truly depend on the degree and quality of the assumptions made and therefore the quality and accuracy of the valuation also depends on that. We are somehow limited due to the restriction and incomplete data, since the thesis was carried out with data from the 3rd quarter of 2013 and not final data. Whenever possible, the data was updated in order to reflect the highest accuracy possible.

Finally, we strongly believe that BMW has a very strong prospectus and it is a company that is worth investing in or analysing. The current undervaluation should be a sign that the market will somewhere in the future recognize its high value.

## 10. APPENDIX

### 10.1. FORECASTED INCOME STATEMENT FROM 2011 TO 2017 (IN € MILLION)

	2011	2012	2013E	2014E	2015E	2016E	2017E
<b>Revenues</b>	68821	76848	79328	81275	83106	84938	86660
<b>Automobiles</b>	63229	70208	73516	75470	77860	80324	82785
<b>Financial Services</b>	17510	19550	19999	21130	21799	22489	23178
<b>Motorcycles</b>	1436	1490	1588	1685	1791	1905	2026
<b>Other Entities</b>	5	5	5	5	5	5	5
<b>Reconciliations</b>	0	0	0	0	0	0	0
<b>Eliminations</b>	-13359	-14405	-15781	-17017	-18349	-19786	-21335
<b>Growth</b>	13,8%	11,7%	3,2%	2,5%	2,3%	2,2%	2,0%
<b>Cost of Sales</b>	54276	61354	64611	65851	66875	67825	68600
<b>Automobiles</b>	50164	56525	59506	61088	63022	65017	67009
<b>Financial Services</b>	15013	16984	18490	19535	20154	20792	21429
<b>Motorcycles</b>	1207	1236	1343	1426	1515	1611	1714
<b>Other Entities</b>	0	0	0	0	0	0	0
<b>Reconciliations</b>	-12108	-13391	-14728	-16198	-17816	-19595	-21552
<b>Growth</b>	9,5%	13,0%	5,3%	1,9%	1,6%	1,4%	1,1%
<b>- COGS</b>	50666	57361	60399	61535	62461	63315	63998
<b>Growth</b>	9,0%	13,2%	5,3%	1,9%	1,5%	1,4%	1,1%
<b>Gross Profit</b>	14545	15494	14716	15423	16231	17112	18060
<b>Automobiles</b>	13065	13683	14010	14382	14837	15307	15776
<b>Financial Services</b>	2497	2566	1509	1594	1645	1697	1749
<b>Motorcycles</b>	229	254	244	259	275	293	312
<b>Other Entities</b>	5	5	5	5	5	5	5
<b>Reconciliations</b>	12108	13391	14728	16198	17816	19595	21552
<b>Gross Profit Margin</b>	21,1%	20,2%	18,6%	19,0%	19,5%	20,1%	20,8%
<b>Growth</b>	33,0%	6,5%	-5,0%	4,8%	5,2%	5,4%	5,5%

## Equity Valuation of the BMW Group

	2011	2012	2013E	2014E	2015E	2016E	2017E
<b>- Selling and Administrative Expenses</b>	6177	7007	7791	7982	8162	8342	8511
<b>- Research and Development Expenses</b>	3610	3993	4213	4316	4413	4511	4602
<b>- Other Operating Expenses</b>	1132	1016	1354	1387	1418	1450	1479
<b>+ Other Operating Income</b>	782	829	879	900	920	941	960
<b>Profit before financial result (Operating Income)</b>	8018	8300	6450	6955	7571	8262	9030
<b>Growth</b>	57%	4%	-22%	8%	9%	9%	9%
<b>PBFR Margin</b>	12%	11%	8%	9%	9%	10%	10%
<b>Amortization and Depreciation</b>	3646	3541	5163	5573	6015	6491	7006
<b>EBITDA</b>	11664	11841	11613	12528	13586	14753	16036
<b>Growth</b>	32,7%	1,5%	-1,9%	7,9%	8,4%	8,6%	8,7%
<b>EBITDA margin</b>	16,9%	15,4%	14,6%	15,4%	16,3%	17,4%	18,5%
<b>EBIT</b>	8018	8300	6450	6955	7571	8262	9030
<b>Growth</b>	57%	4%	-22%	8%	9%	9%	9%
<b>EBIT margin</b>	12%	11%	8%	9%	9%	10%	10%
<b>- Interest and similar Expense</b>	943	913	848	746	554	374	296
<b>Interest and similar income</b>	-763	-753	-688	-742	-807	-881	-963
<b>Result from Equity Accounted Investments</b>	-162	-271	-170	-184	-200	-218	-239
<b>Other financial Result</b>	617	592	636	683	734	788	846
<b>Financial Result</b>	635	481	626	504	280	63	-59
<b>Income before Income Taxes</b>	7383	7819	5824	6451	7291	8199	9089
<b>Income tax expense</b>	2476	2697	2040	2199	2394	2613	2856
<b>Tax Rate</b>	30,9%	32,5%	31,6%	31,6%	31,6%	31,6%	31,6%



## Equity Valuation of the BMW Group

	2011	2012	2013E	2014E	2015E	2016E	2017E
<b>Net Profit/Loss</b>	4907	5122	3784	4252	4897	5587	6233
<b>Attributable to minority interest</b>	26	26	26	26	26	26	26
<b>Attributable to shareholders of BMW</b>	4881	5096	3758	4226	4871	5561	6207

Source: Bloomberg, company reports and own calculations

### 10.2. FREE CASH FLOW TO THE FIRM (IN € MILLION)

	2011	2012	2013	2014	2015	2016	2017
<b>EBIT</b>	8018	8300	6450	6955	7571	8262	9030
<b>Tax Rate (%)</b>	30,9%	32,5%	31,6%	31,6%	31,6%	31,6%	31,6%
<b>- Taxes on EBIT</b>	2476	2697	2040	2199	2394	2613	2856
<b>+ Depreciation &amp; Amortization</b>	1578	1613	1755	1821	1889	1960	2033
<b>+ Provisions (Change)</b>	620	1782	70	191	200	209	219
<b>- Other non cash items</b>	85	118	488	509	530	552	575
<b>Income for the Reversal of provisions</b>	71	114	213	223	234	245	256
<b>Income from the reversal of impairment losses and write downs</b>	14	4	275	286	296	307	319
<b>= Cash Flow from Operations</b>	7655	8880	5747	6258	6735	7266	7851
<b>- Investment in Working Capital</b>	304	-1559	2766	141	140	144	142
<b>- Capital Expenditures</b>	3692	5240	6346	5689	5817	5946	6066
<b>= Free cash Flow from operations</b>	3659	5199	-3365	428	778	1176	1643
<b>+ Cash flow from non-operational sources</b>	0	0	0	0	0	0	0
<b>=FCFF</b>	3659	5199	-3365	428	778	1176	1643
<b>Discounted Cash Flow</b>			-3.364	405	695	992	1.310

Source: Bloomberg, company reports and own calculations

**10.2. DCF VALUATION OUTPUT (IN € MILLION)**

<b>Terminal Value</b>	87 216 380 750
<b>Sum PV</b>	3 403 309 393
<b>Enterprise Value</b>	90 619 690 143
<b>Equity</b>	60 606 462 019
<b>Debt</b>	30 013 228 124
<b>Number of shares</b>	658 154 631
<b>Price</b>	92,1 €

Source: Bloomberg, company reports and own calculations

**10.3. EPS CALCULATION (IN € MILLION, EXCEPT FOR PRICES AND EPS)**

	2011	2012	2013	2014	2015	2016	2017
<b>Dividend Price - common stock (€)</b>	2,30	2,50	2,00	2,25	2,59	2,96	3,30
<b>Number of shares - common stock</b>	601,9	601,9	601,9	601,9	601,9	601,9	601,9
<b>Total dividends - common stock (€)</b>	1 384	1 504	1 206	1 355	1 561	1 781	1 987
<b>EPS - common stock (€)</b>	7,45	7,77	5,73	6,43	7,41	8,45	9,43
<b>Dividend Price - preferred stock (€)</b>	2,32	2,52	2,01	2,26	2,60	2,97	3,31
<b>Number of shares - preferred stock</b>	53,5	53,9	54,4	54,8	55,2	55,7	56,2
<b>Total dividends - preferred stock</b>	124,2	136,0	109,4	123,9	143,8	165,3	185,8
<b>EPS - preferred stock (€)</b>	7,47	7,79	5,75	6,45	7,43	8,47	9,45

Source: Company reports and own calculations

**10.4. DDM VALUATION OUTPUT**

<b>Terminal Price – Common Equity</b>	82,20 €
<b>PV terminal price</b>	82,19 €
<b>Sum PV Dividends</b>	11,15 €
<b>Total Price - Common Equity</b>	93,35 €
<b>Terminal Price – Preferred Equity</b>	82,37 €
<b>PV terminal price</b>	82,37 €
<b>Sum PV Div</b>	12,35 €
<b>Total Price - Preferred Equity</b>	94,7 €

Source: Company reports and own calculations

**10.5. BMW'S BONDS OUTSTANDING**

<b>Maturity Date</b>	<b>Amount ( € Mln)</b>	<b>Interest ( € Mln)</b>
<b>2013</b>	764	69
<b>2014</b>	7010	746
<b>2015</b>	6369	554
<b>2016</b>	4747	374
<b>2017</b>	3692	296
<b>2018</b>	3563	190
<b>2019</b>	1250	73
<b>2020</b>	750	33
<b>2021</b>	0	18
<b>2022</b>	0	18
<b>2023</b>	750	18
<b>Total</b>	28895	2389

Source: Bloomberg

## 10.6. PEER GROUP DEFINITION WITH CENTROIDS

	Distance to 1	Distance to 2	Distance to 3	Minimum	Allocation	
<b>BAYERISCHE MOTOREN WERKE AG</b>	0,654	1,950	3,202	0,654	Centroid I	OK
<b>DAIMLER AG- REGISTERED SHARES</b>	0,613	2,184	3,028	0,613	Centroid I	OK
<b>VOLKSWAGEN AG</b>	1,521	1,646	3,163	1,521	Centroid I	OK
<b>RENAULT SA</b>	0,775	2,328	3,109	0,775	Centroid I	OK
<b>FIAT SPA</b>	2,999	1,891	3,831	1,891	Centroid II	OK
<b>PEUGEOT SA</b>	1,692	3,399	4,567	1,692	Centroid I	OK
<b>HONDA MOTOR CO LTD</b>	2,156	0,595	2,445	0,595	Centroid II	OK
<b>TOYOTA MOTOR CORP</b>	1,751	0,882	2,196	0,882	Centroid II	OK
<b>SUZUKI MOTOR CORP</b>	3,103	2,298	0,991	0,991	Centroid III	OK
<b>GENERAL MOTORS CO</b>	3,524	2,636	3,333	2,636	Centroid II	OK
<b>FORD MOTOR CO</b>	0,888	2,571	3,088	0,888	Centroid I	OK
<b>NISSAN MOTOR CO LTD</b>	0,675	1,883	2,590	0,675	Centroid I	OK
<b>MAZDA MOTOR CORP</b>	2,791	1,885	1,207	1,207	Centroid III	OK
<b>AUDI AG</b>	4,146	3,843	3,075	3,075	Centroid III	OK
<b>TOFAS TURK OTOMOBIL FABRIKA</b>	3,982	3,778	1,667	1,667	Centroid III	OK
<b>HYUNDAI MOTOR CO</b>	3,934	3,223	1,559	1,559	Centroid III	OK

Source: Bloomberg, company reports and own calculations

**10.7. MULTIPLES VALUATION**

	2013E	2014E
<b>Price to Earnings Ratio</b>	63 €	59 €
<b>EV/EBITDA</b>	94 €	95 €
<b>EV/EBIT</b>	111 €	98 €

Source: Bloomberg, company reports and own calculations

**10.8. REAL GDP FORECASTS**

<b>GDP Growth (%)</b>				
	2013E	2014E	2015E	2016-2018E
<b>Global</b>	2,0	2,5	2,8	2,8

Source: The Economist Intelligence Unit

**10.9. GDP DEFLATOR FORECASTS**

<b>GDP Deflator (%)</b>					
	2013E	2014E	2015E	2016E	2016E
<b>Eurozone</b>	1,6	1,2	1,3	1,4	1,4

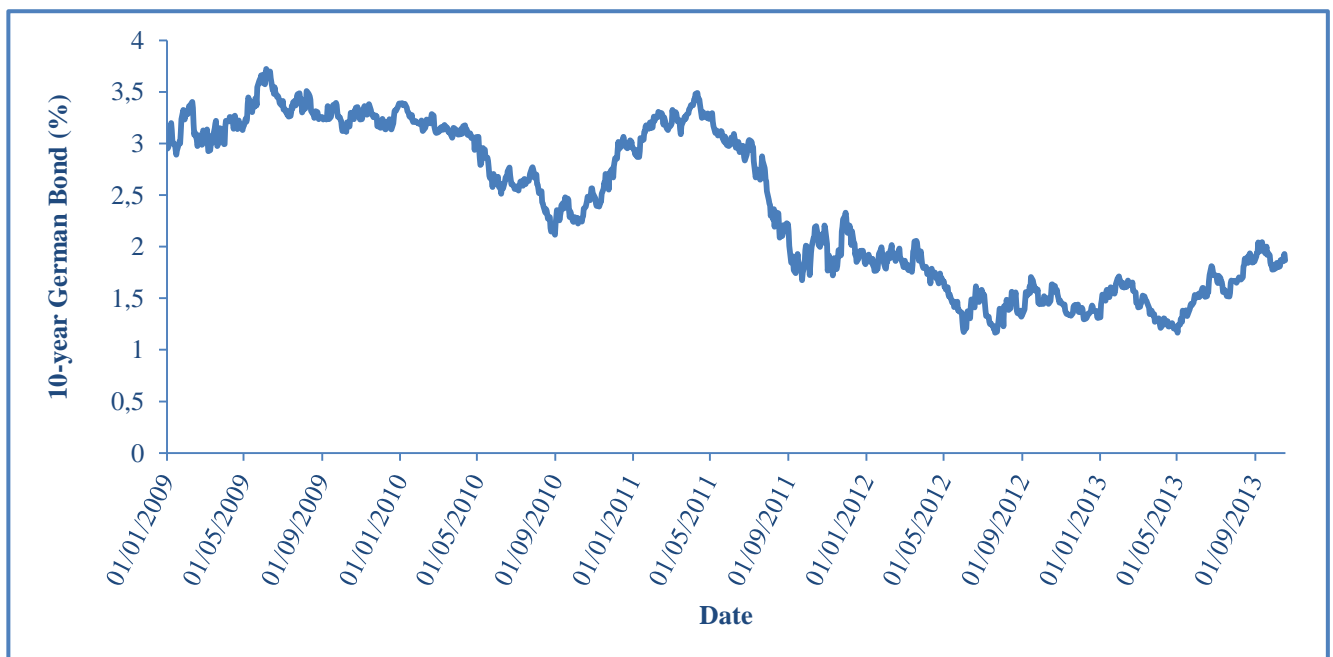
Source: E&Y Eurozone Forecasts

### 10.10. BMW AG RATING HISTORY

	Short-term Rating		Long-term Rating		Outlook	
	S&P	Moody's	S&P	Moody's	S&P	Moody's
<b>2005</b>	A-1	P-1	A+	A1	Stable	Stable
<b>2006</b>	A-1	P-1	A+	A1	Stable	Stable
<b>2007</b>	A-1	P-1	A+	A1	Stable	Stable
<b>2008</b>	A-1	P-1	A	A2	Stable	Negative
<b>2009</b>	A-2	P-2	A-	A3	Negative	Negative
<b>2010</b>	A-2	P-2	A-	A2	Stable	Stable
<b>2011</b>	A-2	P-1	A-	A2	Positive	Stable
<b>2012</b>	A-1	P-1	A	A2	Stable	Stable

Source: Company's Reports

### 10.11. 10-YEAR GERMAN BOND EVOLUTION



Source: Bloomberg

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## 11. ACRONYMS

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<b>APV</b>	Adjusted Present Value
<b>CapEx</b>	Capital Expenditures
<b>CAPM</b>	Capital Asset Pricing Model
<b>CF</b>	Cash Flow
<b>COGS</b>	Cost of Goods Sold
<b>D&amp;A</b>	Depreciation and Amortization
<b>DCF</b>	Discounted Cash Flow
<b>DDM</b>	Dividend Discount Model
<b>DSI</b>	Days Sales to Inventory
<b>DSO</b>	Days Sales Outstanding
<b>DPO</b>	Days Payable Outstanding
<b>DPS</b>	Dividend per share
<b>EBIT</b>	Earnings Before Interest and Taxes
<b>EBITDA</b>	Earnings Before Interest, Taxes, Depreciation and Amortization
<b>ECF</b>	Equity Cash Flow
<b>EV</b>	Enterprise Value
<b>EVA</b>	Economic Value Added
<b>FCFE</b>	Free Cash Flow to the Equity
<b>FCFF</b>	Free Cash Flow to the Firm
<b>G</b>	Growth Rate
<b>GDP</b>	Gross Domestic Product
<b>PER</b>	Price to Earnings Ratio
<b>Rd</b>	Return on Debt
<b>Re</b>	Return on Equity
<b>Rf</b>	Risk-Free Rate
<b>Rm</b>	Return on the Market
<b>PV</b>	Present Value
<b>R&amp;D</b>	Research and Development
<b>S&amp;A</b>	Selling and Administrative
<b>TV</b>	Terminal Value
<b>T</b>	Taxes
<b>VAR</b>	Value at Risk
<b>WACC</b>	Weighted Average Cost of Capital
<b>YTM</b>	Yield to Maturity

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