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# **VALUATION CASE: BMW**

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## Table of Contents

<b>Motivation</b> .....	<b>6</b>
<b>Methodology</b> .....	<b>6</b>
<b>Objectives</b> .....	<b>7</b>
<b>Part I: Theoretical concepts</b> .....	<b>8</b>
<b>1.1 Introduction to company valuation</b> .....	<b>8</b>
<b>1.2 Valuation Principles</b> .....	<b>8</b>
<b>1.3 Valuation methods: Discounted Cash Flow and multiples</b> .....	<b>10</b>
Balance sheet Valuation .....	11
Mixed (Goodwill).....	11
Options .....	11
Value Creation.....	12
Discounted Cash Flow.....	12
Relative Valuation.....	20
<b>1.4 Automotive industry</b> .....	<b>21</b>
1.4.1. Overview .....	22
1.4.2. Trends .....	22
1.4.3. Opportunities .....	23
<b>Part II: BMW Valuation</b> .....	<b>24</b>
<b>2.1. Qualitative analyses</b> .....	<b>24</b>
2.1.1. BMW Group.....	24
2.2.2 Positioning.....	26
2.2.3. Crisis.....	28
<b>2.2. Quantitative analysis</b> .....	<b>30</b>
2.2.1 Discounted Cash Flow valuation.....	30
2.2.2 Multiple Valuation.....	38
<b>Part III: Conclusions and Investment decision</b> .....	<b>41</b>
<b>Annex</b> .....	<b>46</b>
<b>Bibliography</b> .....	<b>55</b>

## Abbreviations

TVM, Time Value of money

CAPM, capital asset pricing Model

APT, Arbitrage Pricing Theory

EMH, Efficient Market Hypothesis

DCF, Discounted Cash Flow

FCF, Free Cash Flow

CAPEX, Capital Expenditure

EBIT, earnings before interest and tax

NWC, Net working Capital

WACC, Weighted Average Cost of Capital

CAPM, Capital Assets Pricing Model

BMW, Bayerische Motoren Werke AG

## Summary

This study is focused on the valuation of BMW, a premium automotive brand, through two valuation methods, Discounted Cash Flow and Multiple Valuation. This study highlights the importance of precise valuations in today's complex business environment, which is facing a transition face pushed by technology. This report explores the theoretical knowledge needed for a valuation like, Time Value of Money, Risk and Return as well as Market Efficiencies. Additionally, this report looks into the current state of the automotive industry, its trends, opportunities and threats.

The practical portion of this study includes a qualitative and quantitative analysis of the company. The qualitative portion dives into the historical timeline of the company, the market and BMWs positioning within it, as well as the current geopolitical conflicts that are impacting the market. Finally, the quantitative analysis covers the DCF and multiple valuation as the methods for valuing the company, as well as a detailed explanation of the steps taken to reach the final valuation of the company. The study concludes that the market undervalues the company as this study compared the two Equity values obtained with the market value today.

Keywords: BMW, company valuation, Discounted Cash Flow, Capital Asset Pricing Model, Automotive industry, Electric Vehicles, Market Efficiency, Risk and Return, Free Cash Flow, Weighed Average Cost

of Capital, Financial Analysis, Technological Advancements, Geopolitical risk.

## Resumen

Este estudio se centra en la valoración de BMW, una marca automotriz premium, mediante dos métodos de valoración: el Flujo de Caja Descontado y la Valoración por Múltiplos. Este estudio destaca la importancia de valoraciones precisas en el entorno empresarial complejo de hoy, que enfrenta una fase de transición impulsada por la tecnología. Este informe explora el conocimiento teórico necesario para una valoración, como el Valor del Dinero en el Tiempo, Riesgo y Retorno, así como la Eficiencia del Mercado. Además, este informe examina el estado actual de la industria automotriz, sus tendencias, oportunidades y amenazas.

La parte práctica de este estudio incluye un análisis cualitativo y cuantitativo de la empresa. La parte cualitativa profundiza en la línea histórica de la empresa, el mercado y la posición de BMW dentro de él, así como los conflictos geopolíticos actuales que están impactando el mercado. Finalmente, el análisis cuantitativo cubre la valoración por DCF y múltiplos como métodos para valorar la empresa, así como una explicación detallada de los pasos tomados para alcanzar la valoración final de la empresa. El estudio concluye que el mercado subestima la empresa, ya que este estudio comparó los dos valores patrimoniales obtenidos con el valor de mercado actual.

Palabras clave: BMW, valoración de empresas, Flujo de Caja Descontado, Modelo de Valoración de Activos de Capital, industria automotriz, vehículos eléctricos, eficiencia del mercado, riesgo y retorno, flujo de caja libre, costo promedio ponderado de capital, análisis financiero, avances tecnológicos, riesgo geopolítico.

## Motivation

In today's dynamic business environment, it is fundamental that companies are valued accurately. Valuation is an essential tool that aids several stakeholders, such as investors, financial analysts, managers, governments, and many others, in the process of making informed decisions. This study focuses solely on the automotive sector, an industry which is facing significant changes as a result of technological developments, changes in regulation, and a shift in consumer demand and preferences.

Within the automotive sector this study will focus on valuing BMW, one of the most iconic automotive brands in the world, with a long track record and positioned as a premium luxury brand in the market. Over recent years BMW is making a development towards EVs and looking to develop its own autonomous driving technology, which is expected to have a great impact on the organization's future.

Additionally, the recent disruptions on the global trade floor associated with the COVID-19 global pandemic and the ongoing conflicts impacting the global trade such as those between Russia and Ukraine or the one between Israel and Hamas, have underscored the importance of valuation methods that can take into consideration such disruptions and risks that companies face in this globalized environment. This paper looks to contribute to the already existing research by incorporating Discounted Cash Flow Model (DCF) and Multiple Valuation methods in order to reach an accurate valuation.

## Methodology

In order to conduct an accurate study and reach a meaningful conclusion this study follows several key steps:

1. Definition of methods, firstly the definition of analysis techniques, including both quantitative and qualitative analyses are made.
2. Data collection, different reliable sources are used for this study, ranging from academic sources to financial statement of the company. Reliable sources like Bloomberg, audited financial statements as well as Professor Aswath Damodaran datasets are some of the sources utilized.

3. Quantitative Analyses, this part of the study will be divided between multiple valuation and DCF valuation. Through the multiples valuation we will look at comparable companies within the sector in order to obtain market median of financial ratios and reach a valuation according to those. In the DCF valuation we will forecast cash flows to the future and discount them in order to obtain their present value in order to conclude upon the enterprise value of BMW.
4. Qualitative Analyses, this section provides an outlook to the company's history, its commitment to innovation, market positioning and how BMW has evolved and handled recent crisis like the semiconductor shortage or global conflicts.
5. Conclusions, the different valuation results are compared in order to reach investment decision.

## Objectives

The main objective of this study is reaching an accurate valuation of BMW and conclude upon an investment decision regarding the company. To do so, the DCF and multiple valuation approach will be used in order to reach the current market value of BMW, considering several aspects to do so, ranging from financial to current geopolitical scenario. Also, through the relative valuation we seek to analyze how BMW positions itself with their competitors within the market.

Another objective of this study is to analyze the impact of current market trends within the automotive industry. The impact of the shift towards electric vehicles and tech development to differentiate from the competition.

# Part I: Theoretical concepts

## 1.1 Introduction to company valuation

Company valuation provides a quantifiable approach to assess the current worth of a company to assist decision-making, aid strategy creation, as well as ensuring compliance. This process employs several principles and analytic techniques, such as Discounted Cash Flow analysis and comparable, to evaluate the financial health, market position and growth potential for an organization. These evaluations have critically impacted on several stakeholders, such as: shareholders, financial analysts, merger & acquisitions processes, board executives, among others (Damodaran, 2012).

Valuations are necessary and beneficial for a wide range of reasons but can be categorized in three main reasons: resolution of legal conflicts, market opportunities or structural changes within the organization (Álvarez García, García Monsalve, & Borraez Álvarez, 2006). There is a necessity for accurate valuations as they serve as a pillar for efficient decision making. However, this methodology is complex and subjective, valuation being more art than science, which could lead to each stakeholder achieving a different value due to its complexity, the lack of a common approach and objectivity and to the different goals and position of each of the stakeholders of the company. This range in values can stem from stakeholders' interpretations of elements such as economies of scale, growth expectations of the market, or company specific data (Fernández, P., 2002).

## 1.2 Valuation Principles

In order to understand valuations, we must look into the fundamental aspects of valuation principles, which form the structure and drive the valuation methods used in the financial world. These principles-Time Value of Money, Risk and Return, and Market Efficiency-create the basis for all valuation methodologies. Understanding these principles provides us with the knowledge to understand the core mechanism beneath all valuations, as these three aspects provide the basis for much deeper analysis behind valuation methods. Although these principles might seem to be uncorrelated, they are indispensable to one another when demonstrating valuations in practice (Corporate Finance Institute, n.d.).



Time Value of money (TVM) is an essential part in the understanding and calculation of the value of any type of investment or financial instruments and plays a fundamental role in investment decision making. Brealey, Myers and Allen (2009) reiterate the idea of TVM reflecting upon the principle that a dollar today has more value than a dollar in the future due to its capability to generate income. This idea is essential in the calculation of present values from future income, which allows for the valuation of financial instruments which are dependent on future incomes. Such principle is relevant in the case of bonds and stocks, in which future Cash Flow (dividends and coupon payments) are discounted to the present value, through a discount rate that takes into consideration the risk factor. Brealey, Myers and Allen (2009) also state the importance of TVM in decision making as investment decisions with positive Net Present Value provide value to the firm and therefore show a new factor to aid investment decisions. (Brealey et al., 2009).

The significance of risk and return in valuations is based on their essential role in determining the rate of return required for an investment, which is a key variable to determine the value of such investment, being the determination of such rate of return the objective of the Capital Asset Pricing Model (CAPM) theories and Arbitrage Pricing Theory (APT). Brealey, Myers and Allen (2009) reiterate that the expected risk premium of a stock is related to how the stock is influenced by macroeconomic variables that affect returns; this relates to the idea that investors who are exposed to higher risk, require in exchange higher returns from their investments. The level of risk is measured through the beta variable of a stock, which measures the variability of returns of the stock in relation to those of the market, implying that higher stock betas indicate that investors expect higher returns from those stocks.

Arbitrage Pricing Theory (APT) adds a depth in the study of risk and return as it creates a theory that evaluates multiple factors at once, and not only one as in the case of CAPM. When compared to the CAPM, APT creates a more detailed scenario as it shows the effect of several macroeconomic factors on return, including company specific data (Brealey et al., 2009). This theory shows that we can diversify company specific risks, but we are unable to mitigate these macroeconomic factors by which the company is affected by. Thus, when applying the APT in valuations, we must evaluate an asset exposure to economic changes and how those affect the asset under question. APT also relates to CAPM in the essence that assets which have more exposure to shifts in macroeconomic factors, meaning more risk, must offer a higher expected return.

The relationship between risk and return is essential in valuations due to the principle that high risk asks for higher expected returns. This is stated above in the CAPM and APT models, Brealey, Myers, and Allen (2009) reflect upon the risk-return trade-off. Valuations measure risk through the study of a company specific beta and the effect of macroeconomic factors and use this risk to justify the expected return of an asset.

Efficient Market Hypothesis (EMH) proposes a challenge in outperforming the market, as it reflects upon the theory that current securities prices reflect all information available (Fama, 1970). While EMH is a relevant factor for valuations, it does not take into consideration the behavioral finance which might create irregularities in the market. Behavioral finance, looks into the psychological influences which influence the decisions made by investors, which can cause anomalies from estimated prices under EMH. Therefore, under EMH conditions it is difficult to beat the market and achieve higher returns. However, by considering behavioral finance, which examines irrational decisions by investors, it is possible for investors to capitalize from these inefficiencies in the market.

### 1.3 Valuation methods: Discounted Cash Flow and multiples.

There are several valuation methods commonly accepted to establish an accurate value of an asset, with each method's suitability depending on the particular nature of the asset. Balance sheet valuation might be more suitable for companies with large fixed assets accounts, whereas service companies might benefit from a different approach. When choosing the valuation methodology, we must investigate the company's core assets and operation to establish the most beneficial method of valuation, as well as carrying out a second valuation method to contrast results. In his book, "Company Valuation Methods. The most common Errors in Valuations (2002)", Pablo Fernández reflects upon the main valuation methods and established that there are six main methods that must be considered. This study will focus mainly on Cash Flow Discounting and Valuation through multiples, as studies have shown that these are effective methods for companies with BMW's characteristics. DCF provides value to companies which have predictable and future cash flows, allowing for the calculation of its intrinsic value (Kumar, 2016). This valuation method is adequate for BMW's consistent cash flows, as this method relies upon financial projections.

The other chosen valuation method, multiples valuation, is widely accepted in the automotive industry as it inputs relevant market data from competitors and creates a reliable benchmark (Burgess, 2020). Also allows for the consideration of current market conditions that might affect the industry.

This study will also explain the other valuation methods.

### Balance sheet Valuation

Fernández (2002) defines the balance sheet as a valuation method that analyzes a company's financial position through their assets and liabilities that appear in its financial statements, with some adjustments for assets and liabilities to reflect current market values and expectations. This method relies on revealing the net asset value by adjusting the book value of its assets to reflect market value. This valuation method provides a static picture of the company's value and financial health, which could lead to issues in projecting future positions and results. This valuation method could be especially relevant for companies that are under liquidation or companies whose future is subject to substantial uncertainty (no future cash flows or difficult to determine such future cash flows).

### Mixed (Goodwill)

In transactions where companies are highly dependent on brand value and recognition it is fundamental to value intangible values and goodwill. Dunse, Hutchison and Goodacre (2004) reflect about the main issues and complexities when valuing these intangible assets, like brand image, reputation, and intellectual property. They investigate methods that project earnings into the future and discount them to the present to adjust a premium over these intangible assets. This method displays the importance of intangible assets in the future of the company, displaying their importance in the company's ability to produce cash flow and create value.

### Options

There are several methods to value options, the Black-Scholes model gives us the structure and framework to correctly value options. Black and Scholes (1973) provided a clear understanding into how several factors like volatility, time to maturity and others, reflect upon the value of options. This can also be applied to business strategy, by highlighting flexibility and strategic

decisions, we are able to mold our decisions on future market performances, while holding our value.

Used for business strategy, models such as the Black-Scholes model, can be used to value strategic decision if business opportunities are seen as real options. By viewing opportunities as options, they are able to evaluate the different choices-such as expand, defer or abandon the option- basing their decision on changing circumstances. This method investigates the value of flexibility and ability to adapt to changes in different environments, optimizing decision making.

### Value Creation

Value creation for company valuation refers to the initiatives and financial decisions aimed at increasing a company's value for their shareholders. This method encompasses a series of processes like revenue growth, increase in profitability, efficient use of assets, having an optimal capital structure, promoting innovation by investing in R&D, as well as focusing on consumer and market needs. These practices collectively aim to increase a company's financial performance and growth expectations, causing an increase in the intrinsic value of the company, thereby enhancing shareholder value (Koller, Goedhart, & Wessel, 2015).

### Discounted Cash Flow

Discounted Cash Flow (DCF) Valuation is a fundamental and widely relied upon method in financial valuation. It offers a rigorous approach to establish an accurate value for companies, assets, and investments. The basis for this method is that the value of a company asset or investment is reflected upon the accumulation of expected cash flows in their present value, discounted to their present value. This method clearly states the importance of a company's ability to generate cash; in essence, higher future cash flows, appropriately discounted, will result in a higher valuation for the company.

This approach might be considered a universal valuation method, but nonetheless, this valuation technique can show different values due to a series of assumptions that the analyst must consider. These assumptions are the growth rate for the company, its predictions for future results, investments in capex, and the determination of the discount factor for future cash flows.

Moreover, it must be highlighted the importance of the discount factor as it reflects the risk portion associated with the company, and highly impacts on the overall valuation outcome.

After explaining the fundamental aspects of this method, it is necessary to dive deeper in the explanation of several concepts within this method. Free Cash Flow, Terminal Value, Discount factor, Weighted Average Cost of Capital, Capital Asset Pricing Model, Cost of debt, Cost of Equity and Market value of Equity and Debt, all these aspects play a pivotal role in the valuation of companies and therefore should be given a higher consideration.

In order to reach a value for the company we rely on the fundamental discounted Cash Flow formula which is:

$$V_0 = \sum \frac{CF_t}{(1+r)^t} + TV$$

- **V<sub>0</sub>**, refers to the present value of all future cash flows and terminal value of the company.
- **CF** refers to the Free Cash Flow projected for each year.
- **r**, refers to the discount factor used to carry all cash flows to the present value.
- **t**, refers to the number of periods.
- **TV**, refers to the terminal value of the company. This concept will be further developed.

- Free cash flow

Free Cash Flow (FCF) is a fundamental aspect that shows the net amount of cash a company can generate after taking into consideration all cash outflows that take place to support the operating activity of the company, as well as its assets. More precisely, FCF refers to the net total amount of cash coming into the company after deducting the amounts going out of the business in consideration for all the operating expenses and capital expenditures for growth. In financial analysis, especially in DCF, Free Cash Flow is fundamental as it works as one of the

main inputs of information into DCF to work out the value of an organization by discounting future Cash Flows to their present value (Rajesh Kumar, 2016).

The Free Cash Flow a business can generate can be calculated through a formula that looks at EBIT (earnings before interest and tax), taxes, depreciation, Capex and Change in Operating Net Working Capital. The formula is as follows:

$$FCF = EBIT * (1 - Tax) + Dep - Capex - \Delta ONWC$$

EBIT represents the operating benefit a company has produced during its operating period, but it doesn't take into consideration taxes and interest that the company might have to pay. Therefore, in order to have a clear view of a company's ability to produce cash we must adjust EBIT for taxes, that why we should multiply this value by the effective tax rate. In order to simplify the operation, we use 1- Effective tax rate. After taking into consideration taxes and streamlining the operation through the method explained, we arrive at NOPAT (net operating profit after taxes).

Another crucial step is taking into consideration the value of Depreciation that the company has for that given year. We add back depreciation for Free Cash Flow Calculations, and it is a non-cash expense. Depreciation & Amortization reduces the taxable income and the overall profit in the income statement, but it doesn't not affect the cash flow statement. By adjusting NOPAT with the depreciation, we are able to have a cash flow that reflects actual cash movement within the organization. This allows us to see cash generated that is available to support investments, dividends, repayments and many others. Also, this NOPAT value allows us to see the cash available to meet future Capex (Capital expenditure) needs, as well cost attributed to day-to-day operations. (Jennergren, L. P., 2008).

Capex is subtracted when calculating FCF in order to consider the investment that the company needs in assets that are used in the operations of the company, this are considered fixed assets such as property, plant, and equipment. As said before, these types of assets are used in the operations of the company or are needed in order to expand such operations. These investments represent a large outflow of cash and as we want to show what cash is readily available for the company, we must look at how much a company spends in assets in order to carry out their operations each year. Jennergren (2008) reflects upon the idea that Capex might suffer high variations between years but must non-the-less be taken into consideration as we must ensure

that all FCF will not be required for essential business operations. This will provide stakeholders with an accurate value for FCF.

The formula for capex is as follows:

$$Capex = Fixed\ Assets_t - Fixed\ Assets_{t-1} + Depreciation$$

This formula represents what the company spends each year in order to maintain their machinery, equipment, and others, in order to carry out their operations. We must look at net fixed assets and add back depreciation in order to look at the actual cash outflow experienced by the company.

Finally, for FCF we must look at the Net Working Capital, the company's ability to meet short-term financial obligations. The formula is:

$$\Delta ONWC = Operating\ Current\ Assets - Operating\ Current\ Liabilities$$

When referring to operating current assets we talk about assets that are involved in the operations of the company and are to be turned into cash within one year, examples of the accounts are: accounts receivable and inventories. The same case is for Operating Current Liabilities, these liabilities affect the operations of the business, like accounts payable and accrued expenses (Aurora, Hidayat, & Eunike, 2023). Also, FCF is highly dependent on Operating Net Working Capital (ONWC); an increase in Operating Assets without a proportional increase in Operating liabilities would mean that more cash is constrained within the operations of the business, resulting in a lower FCF and vice versa. Another factor to consider is the timing of Cash Flows; lower Accounts Receivable Turnover Ratio means that accounts are turned into cash at a faster pace, resulting in higher FCF and liquidity.

- Discount Factor

Once we have discussed FCF, how it is calculated and all the relevant aspects that must be considered, we must discount the Free Cash Flow value to the present value (e.g., convert Future Cash Flows into Current Free Cash Flows). This will allow us to value future earnings at present, applying the Time Value of Money, as well as Risks and Returns considerations

mentioned previously. The discount rate to be used does not only take into consideration the opportunity cost but also accounts for the risk that is attributed to the investment (and cannot be diversified away).

By considering the opportunity cost we consider the value of the next best option that is not pursued when making a decision. By incorporating this concept into the discount factor, consider the potential return of the chosen investment, but also what is forgone by not choosing another investment.

Through this we are also able to compare the initial investment with future cash flows, which aids decision making. It's essential to understand the importance of the Discount Factor as a series of assumptions need to be made and they will have a significant influence over the valuation result (Schill, 2017).

The Discount Factor used to discount Free Cash Flows to the Firm in the Weighted Average Cost of Capital (WACC), which takes into consideration return expectations for equity as well as debt. This is essential as it considers the cost of financing from the two sources of capital, and proportional to the portion each source represents in the capital structure. By having incorporated the cost of equity and cost of debt, we are able to consider risks and return expectation from both sources of capital. Furthermore, WACC adjusts its value by taking into consideration the tax benefits that are associated with debt financing, WACC follows the following formula:

$$WACC = k_e * \frac{E}{(E + D)} + k_d * (1 - Tax) * \frac{D}{(E + D)}$$

- $k_e$ , is the Cost of equity.
- $k_d$ , is Cost of Debt financing.
- E, refers to the market value of equity.
- D, makes mention to the market value of debt.
- (E+D), is the total value of the company.
- Tax, this is the effective tax rate which the company is subject to.

These aspects need to be further discussed in order to grasp a better understanding over the WACC and its relevance.



- Cost of Equity

The cost of equity is an essential element in corporate finance, it looks to represent the return investors expect from the risk attributed to the investment in a company's equity. As said before, it holds a pivotal role in determining the discount factor that is used to show the present value of a company (Damodaran, 2012).

Fama and French (1997) give an interesting approach towards the cost of equity attributed to industry, highlighting the need for accurate risk measurement and the impact on the calculated cost of equity. They provide insight into the discussion regarding the wide variations of the cost of equity between different industries and sectors, as they are influenced by the leverage structures of the company, as well as the risk profiles which compose those industries (Fama & French, 1997).

There are several factors that must be considered due to their influence on the cost of equity, including market conditions, company specific risk, and macroeconomic trends. Also, this value is affected by the current leverage position of the company, risk, and industry in which it operates, as well as considering the time value of money for the capital employed (Botosan & Plumlee, 2002). Botosan and Plumlee provide further discussion regarding the correlation between the disclosure of information within financial reporting, with the cost of equity associated with the company. They suggest that higher levels of transparency have a severe effect on the cost of equity, due to its influence on investor perception. In order to consider all these variables, we use the Capital Asset pricing Model (CAPM) which takes into consideration the risk-free rate, the market premium which is adjusted to consider the company specific risk through the stocks beta. The formula is as follows:

$$CAPM = r_f + \beta * (Er(Mkt) - r_f)$$

- $r_f$ , is the risk-free rate. Government t bill
- $\beta$ , beta represents the company-specific risk.
- $(Er(Mkt) - r_f)$ , this shows the market risk premium.

The risk-free rate is the return expected from a financial investment that had no risk of financial loss. This rate is essential in the calculations of expected returns as it is used as a reference point in assessing the return on investment which carry higher risk than the risk-free asset. In

most cases the risk-free asset is considered to be a financial asset from the government, like a T-bill from the US treasury. In CAPM it is used as a benchmark for returns in order to calculate what investors should expect and demand from a financial investment over investing in risk-free assets (Mukherji, 2011).

When selecting the appropriate risk-free rate, we need to consider the investment horizon. Mukherji (2011) reflects upon the importance of using short-term government securities such as T-bill, due to their lower market and inflation risk, making them the most suitable baseline for financial modeling and valuations.

Beta measures the volatility of a company's returns and represents the systematic risk attributed to the company. It is a value that compares the company's risk to the overall market. We use it to measure the expected return given the level of risk correlated to that of the market. The value of the beta had different interpretations: a) when beta equals 1 it tells us that the stock price is expected to follow the market; b) value of beta lower than 1 shows us that the stock has a lower volatility than the market, meaning lower systematic risk, resulting in lower expected returns. On the contrary, a value of beta above 1, tells us that the stock is more volatile than the market and we should expect a higher return due to the level of risk attributed to the company.

Finally, the last aspect to consider when calculating the cost of equity through CAPM is the risk premium, which represents the return that investors expect over the risk-free asset to bare the risk in the market. It is a premium for investors that decide to invest in risky markets over the risk-free asset. This value varies over time and with market sentiment, a higher risk premium implies environment is being seen as riskier and investors need a higher return for the risk being taken, the contrary occurs for a lower risk premium.

- Cost of debt

The cost of debt is an essential part in the calculation of the Weighted Average Cost of Capital (WACC) of the company, it shows the effective rate at which a company borrows its debt, showing the average interest payment. As discussed before, the cost of debt helps determine the overall financing cost of the company, encompassing both equity and debt financing for their investments and operations. When compared to the cost of equity, cost of debt is typically lower due to a range of factors such as, the tax deductibility of debt interest, as well as cost of equity having a potential higher cost due to long term potential growth. Also, this is useful data

for companies: firms need to assess and include cost of debt in order to understand their structure and investments, as well as control their cost of debt in order to maintain profitability and stability within the organization.

The value at which the company is able to secure loans reflects the levels of risk that are perceived by lenders towards the company. A higher interest on loans, resulting in a higher cost of debt, shows us that the market perceives a higher risk towards the company and its stability. When using this value there are some complexities, Cooper and Davydenko (2007) reflect upon this and believe that in certain cases adjustments need to be made in order to provide a more accurate and reliable value, by considering the probability of default and expected losses (Cooper & Davydenko, 2007).

- Market value of equity and debt

The final step in WACC calculations is establishing the total value of the company, to do so we must investigate the market values of both debt and equity to create a better fit that represent current market conditions as well as current risk perceptions. Market values provide a realistic idea of the current status of the company and sentiment towards its future. Fernández (2008), also discusses the idea that in some cases we are to use the book value of debt to calculate the WACC due to market and book value being equal or similar.

- Terminal Value (TV)

Finally, we arrive at the terminal value of the company. In our DCF model, we forecast the company's financials over a number of years until we believe the company will stabilize, typically being 5 years. This period could be longer, if necessary, as companies in most cases don't cease to exist after that period, but 5 years is an acceptable number for consolidated companies which don't expect sizeable changes. Therefore, we must add a residual value for future growth and profits that the company might have in the future after the years that are projected. In order to do this, we must use all the data we have previously discusses as inputs towards the terminal value using the perpetuity growth model:

$$TV = \frac{CF_5 * (1 + g)}{r - g}$$

- TV is the terminal value.
- g, is the long-term growth rate.

The only complication that must be addressed within this calculation is the appropriate growth rate that is established for the organization past the study period of 5 years. This is quite complex as it is impossible to accurately predict growth estimates in different market conditions and therefore must look at baseline data. Tengulov, Zechner and Zwibel (2019) reflect upon the importance of data to which we base our approach on. They believe that using generic macroeconomic measures provides a stable foundation to our projection. They believe the most useful metrics are the long-term growth rate of the home country or historical car industry growth rate (Tengulov, Zechner & Zwibel, 2019). This data might need to be adjusted due to company-specific performances.

Doron Nissim discusses the idea that there are multiple ways to calculate the terminal value of an investment. His study researches the use of multiples, centering his focuses on the market average use of EBITDA multiples in order to calculate the terminal value (Nissim, D, 2019).

### Relative Valuation

The relative valuation method is the last method to be considered for this study. It is based upon the foundation of valuing a company or assets through the comparison with similar companies and/or assets. The methodology uses current market prices of similar assets to achieve a valuation for the asset or company under valuation applying a relative comparison. In order for these values to resonate with each other we must consider the following:

- Standardization through multiples

Through this method we are able to simply and standardize complex financial information in order to create a simple and easy comparison. Damodaran (2006) discusses the necessity of standardization for comparison between similar organizations, with different aspects such as growth, profitability, risk, size of operations or market positioning.

- Comparable assets

Brealey, Myers, and Allen (2011), discuss the importance of comparable assets, they discuss the challenges truly comparable assets as different companies have different risks, profitability or growth. They continue to reflect on these issues by highlighting the necessity for adjustments for the multiples to reflect more comparable data.

- Type of multiples

For valuations multipliers can be divided in two types, enterprise values and equity values.

Equity value multiples look to establish the value for shareholders of a company. The most common Equity value multiple is the Price to Earnings which compares the current share price to the earning per share. This ratio helps investors see the value they are receiving from each dollar that the company Earns (Fernandez, 2007).

On the other hand, Enterprise value multiples look to establish the overall value of a company as they take into consideration both debt and equity in their calculations. A common enterprise value multiple is the Enterprise Value to EBITDA, and with this ratio we compare the enterprise value with the company's earning before interest tax and amortization. Another common ratio is the Enterprise value to Sales, which compares the company's value to sales, evaluating the markets value towards the company's ability to generate sales (Fernandez, 2007).

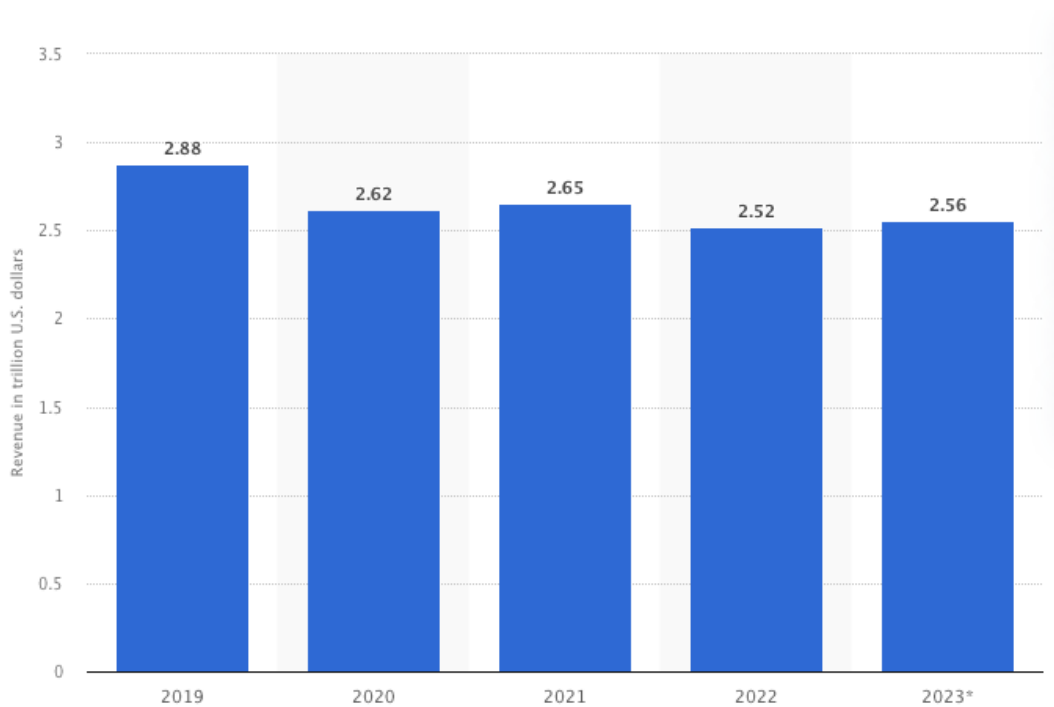
## 1.4 Automotive industry

The automotive industry is one of the largest industrial sectors in the global economy, involving a wide range of companies as well as variety of activities involved in development, production, selling and promotion of this vehicles. This sector holds an important role in economic development, as it is a provider of employment for millions of people globally, contributing significantly to the global GDP. This section will reflect upon trends within the market, current challenges as well as the current state of the sector.

### 1.4.1. Overview

The automotive sector is a highly competitive industry, in constant evolution. In 2022, the sector reached a valuation of approximately \$2.52 trillion, and analysts expect it to grow at a compound annual growth rate (CAGR) of around 3.7% until 2030 (Research and Markets, 2023; Statista, n.d.). These growth estimates are driven by the increase in urbanization, increase in disposable income as well as evolving technology.

*Graph 1: Automotive Industry Revenue 2019 to 2022, 2023 projected*



*Source: statista.com*

The market is divided into several different segments, passenger, commercial and electric vehicles (EVs). The largest one of them all is the passenger car segment which represents 60% of total sales, continued by commercial and finally EVs. The latter, although being the smallest, is experiencing a large surge in demand due to the increasing environmental concerns as well as government subsidies which are boosting sales (International Energy Agency, 2023).

### 1.4.2. Trends

The sector is following a series of trends which, include EVs, autonomous driving and sustainability. The major trend seen globally is the transition to EVs, as governments are enforcing strict emissions regulation as well as providing subsidies to EV productions. Forecast predicts EV sales reaching 31.1 million units in 2030, an increase from 6.6 in 2021 (BloombergNEF, 2023). Also, there are serious advancements in sensor technology and artificial intelligence which are pushing autonomous driving research and development.

Companies like Tesla and Waymo are putting such technology to use in everyday vehicles, making progress into the quality of autonomous driving (KPMG, 2020). Additionally, the sector is being pressured to reduce its impact on the environment, by adopting a series of measures like using recycled materials and energy efficient technology. This push for sustainability is also increasing the need for other energy sources, forcing the development of hydrogen fuel, as well as other energy sources for production.

### 1.4.3. Opportunities

The automotive sector has a growth opportunity within emerging markets which are growing substantially in their demand. Countries in Asia, Africa, and Latin America are experiencing a development in urbanization, as well as an increase in disposable income, subsequently increasing the demand for more technologically advanced vehicles. The groups that find a way to successfully integrate their products within these evolving markets will be able to gain significant market share (McKinsey, 2023).

Additionally, technology is providing manufacturers with the opportunity to differentiate themselves from the competition through EV. Manufacturers who pioneer the development of EV technology paired with autonomous driving, will be able to gain control over a fast-growing segment (McKinsey, 2023).

## Part II: BMW Valuation

### 2.1. Qualitative analyses

#### 2.1.1. BMW Group

Bayerische Motoren Werke AG (BMW) was created in 1916 during World War I by Franz Josef Popp, Karl Rapp and Camillo Castiglioni, in Munich Germany. When BMW was started it focused its production solely on aircraft engines to support Germany during the war period. They created the Illa engine with high performance and altitude capabilities. The creation of such capable engines established a high standard for engineering creations within the company and their clients (BMW Group, n.d.). After World War I there were severe restrictions imposed on Germany through the treaty of Versailles, which limited the production of aircraft and their parts. This created a need for diversification within BMW, and as a solution they began with the creation of the R32 in 1923, the first vehicle to feature BMW iconic engines and driving capabilities. Due to post war restrictions BMW was forced to shift from the skies to the road, as we are able to see now, they excelled at it.

After their first motorcycle in 1923, BMW sought to further diversify itself by beginning their automotive division in 1928 with the acquisition of the Automotive factory Eisenach. BMW used this automotive factory to launch the BMW 3/15 in 1929. This marked the start of BMW presence in the automotive industry, through the 1930s they continued to grow their models with vehicles such as the 328 roadster which was able to win the Mille Miglia race in 1940. This milestone was the beginning of BMW's reputation and prestige for sports cars (Norbye, 1984).

During World War II, BMW had significant involvement in the German war effort. In this dark period of BMW's history, they produced aircraft engines, motorcycles and military vehicles. They produced iconic engines for the German Luftwaffe aircraft or the R75 motorcycle, vehicles that were extensively used by the German army. During this period BMW saw itself using forced labor, something which they have since addressed in their historical assessment. Their action in the war have had a large impact on their post-war strategies and their legacy (Norbye, 1984).



Post-war era provided severe challenges for BMW due to the fact that most of their facilities were highly damaged as well as financial difficulties that it had seen itself involved in. Nonetheless, in the 1950s BMW saw an opportunity to start its recovery with the iconic Isetta microcar, which became very popular due to its low price and fuel efficiency. Due to the harsh post war era in Germany, these factors were essential for any vehicle being sold. This period also saw a shift in BMW direction as they shifted their focus towards luxury and performance, which could be seen through the 507 roadsters, an icon of the brand which had low sales (Norbye, 1984).

The 1960s were a significant milestone in BMW history with the launch of their sedan line, which began with the model 1500 in 1962. This type of vehicles were a demonstration of BMW high engineering capabilities, sporty performance, and high build quality, all of which are pillars for the company's current success in the automotive industry. Thanks to success of this new business line the company continued to develop it through time, with the launch of the 3 series in the 1970s, a model that is still in production due to its high sales, sportiness, and luxury (Vasilash, 2010).

During the late 1990s and early 2000s, BMW Group made two strategic expansions with the acquisition of two major brands, Rolls-Royce and MINI. This expansion further increased their market and product portfolio, trying to place the group as a leader in the luxury automotive industry.

In more recent times like the 21<sup>st</sup> century, BMW has once again shifted its focus to further increasing its product portfolio with the introduction of the X line, a range of SUVs, as well as the I line, a revolutionary line of electric vehicles. The start of this electric line, with the launch of the i3 in 2013 and the i8 in 2014, shows BMW commitment with sustainability as well as their desire for innovation. Through these models the company started looking into ways to shift its core values of luxury, performance and build quality towards the future technology of electric cars. They began to merge performance with environmental responsibility as well as creating a new market in environmentally conscious consumers (BMW Group, n.d.).

Nowadays, BMW Group looks to lead the automotive industry with its core value of luxury performance, quality, which now go hand in hand with innovation. The company has invested large amounts of financial and human capital in the development of new technologies, like

self-driving vehicles, as well as further developing their electric technology in order to meet their objectives of cleaner transportation (BMW Group, n.d.).

### 2.2.2 Positioning

When doing a relative valuation, meaning the use of comparable multiples for the valuation of a company from their competition, we must be accurate in the selection of business that follow a series of criteria defined, in this case by BMW Group. These criteria which we must consider include, the industry, activity in which the companies are involved in, market of operation (there are some legal restrictions in some countries which limit production), as well as size of the organization. Through this selection process we aim to select companies as similar possible in terms of margins, positioning, growth opportunities and risk exposure to that of the BMW Group.

For an initial consideration on comparable companies, we filtered out companies that have little to no presence in BMW's main markets, which are Europe and the United States. Through this initial filter I eliminated most of Chinese companies in the market due to their lesser presence in European and North American market but remained with BYD due to their increasing growth in the European Market. After this initial filter I looked at major automotive producers that could be considered competitors by Market Capitalization, Revenue, Net income and Units Sold.

Through this process a first list of comparable companies was achieved, including Mercedes-Benz Group, Tesla, Nissan, Volkswagen, Stellantis, Toyota Motor Corporation, BYD, General Motors and Tata Motors. I created a table in order to compare these companies with BMW regarding, Market Cap, Revenue, Net income, Units Sold, Market of Operations and Year-on-Year Growth. The following table shows the relevant data:

Table 1: Possible Comparable Companies

Comparable	Company Name	Market cap (Billions)	Revenue (millions)	Net Income (millions)	Units Sold	Primary Market	Yoy Growth (%)	Net Income over Revenue
	Mercedes-Benz Group AG	€ 79.01	151,575.00 €	13,290.00 €	2,491,600.0	USA, Europe	1.5	9%
	Tesla, Inc	€ 614.15	87,309.32 €	12,546.48 €	1,808,581.0	USA, Europe	38	14%
	Nissan	€ 14.65	74,845.72 €	2,517.23 €	3,310,000.0	Japan, USA, China	-14.7	3%
	Volkswagen AG	€ 72.09	321,548.00 €	15,680.00 €	9,300,000.0	USA, Europe	0.5	5%
	Stellantis N.V.	€ 72.92	189,544.00 €	18,596.00 €	6,040,000.0	USA, Europe, South America	5.2	10%
	Toyota Motor Corporation	€ 323.19	266,062.42 €	29,175.10 €	10,480,000.0	Japan, USA, Europe	3	11%
	BYD Company Limited	€ 87.77	78,921.20 €	3,962.34 €	3,024,417.0	China Europe	62.3	5%
	General Motors Company	€ 56.66	161,146.03 €	9,871.31 €	6,200,000.0	USA, China	4.16	6%
	Tata Motors Limited	€ 3,768.78	47,848.25 €	3,453.90 €	963,602.0	India, United Kingdom, South Africa	2.5	7%
	BMW	€ 66.22	155,259.00 €	10,661.00 €	2,555,341.0	USA, Europe	6.5	7%

Source: Own Creation

As a result in major differences in Market Cap, Revenue and Net income, Tata Motors, Nissan, BYD were discarded as comparable companies. Nevertheless, after conducting a qualitative market analysis of the industry, the main companies found most similar to the BMW Group are, Daimler Group, Tesla, Volkswagen AG, Toyota Motor Corporation, General Motors Company and Stellantis.

Stellantis was discarded as a comparable company as the merger between PSA Group and Fiat Chrysler Automobiles has left the group's companies, such as Peugeot, Citroën, Fiat, Chrysler, and Jeep, in an integration phase. Additionally, the range of brand identities dilutes the competition with BMW, as no single brand within Stellantis directly competes in BMW's luxury automotive sector. Other companies with a large range of brands, like Toyota Group and Volkswagen Group, are more established and have clearly positioned their premium brands, Lexus and Audi, as direct competitors to BMW.

The elimination of Stellantis has left Daimler Group, Tesla, Volkswagen AG, Toyota Motor Corporation, Toyota and General Motors Company as comparable companies. Every single one of these competitors has operations in the markets and segments of the automotive industry in which BMW Group operates in. They range from luxury car manufacturing to production of state-of-the-art electric vehicles.

Daimler Group is the owner of luxury brand Mercedes-Benz, which is highly recognized for its high-end luxury vehicles, going head-to-head with BMW luxury vehicles, they are direct competitors in all personal use vehicles. Tesla, on the other hand, stands out for its leadership in innovation towards electric vehicle technology as well as presenting a challenge in the

automotive industry due to its high growth and the shift in the market towards greener transportation. This has highly impacted BMW approach towards electric vehicle production and strategy, causing changes in the prior to overcome Tesla's lead in the electric vehicle market (Ghosal & Nil,2015).

Also, Volkswagen AG and Toyota Motor Corporation, are the largest automotive groups at the moment in both size and range of vehicle they offer through their different brands under the group's names. In international markets they compete directly with BMW, as they offer a wide range of vehicles from luxury to standard models. These two groups are essential in the comparable analysis due to their size of operations as well as product lines (Toma, Marinescu & Burcea, 2015).

Another group we must consider is General Motors, which due to their large presence in the North American market, as well as their presence on a global stage, are direct competitors with BMW. They also offer a range of products with brands that compete with BMW luxury market.

All in all, these competitors bring a singular aspect that differentiates them from their competitors, but they all share similar risk profiles and growth opportunities. These aspects make them excellent companies from which we can create a relative valuation for BMW. Also, through the analysis of this companies we are able to better understand BMW positioning within the global automotive industry, which will allow us to create a more precise valuation, through the use of comparable that have similar operations and financial proportions.

### 2.2.3. Crisis

#### a) COVID-19 and Semiconductor disruption

The global pandemic severely affected the automotive and semiconductor production globally. The COVID-19 pandemic caused sever supply chain disruptions as well as an increase in demand for technological products that came as a result of the movement to remote work, and overall digitalization of several industries (JP Morgan, 2023). BMW is not a semiconductor manufacturer, but its operations are highly dependent on this product for their vehicles as these electric vehicles and higher-end models employ a large number of this items due to the technology evolved in them. This dependence created an uncomfortable position for the

company and the industry as the shortage significantly affected production (McKinsey, 2023; BCG, 2023).

The pandemic caused a shortage in production due to forced lockdowns and the reduction in the workforce available to work, remarking emerging issues within the supply chain. TSMC, the company which supplies BMW with many of their semiconductors, was unable to scale production to meet demand from diverse sectors in need of such limited semiconductors, sectors like consumer electronics and the automotive industry (JP Morgan, 2023). As a result of this imbalance in supply and demand, production faced delays and a surge in costs, affecting BMW ability to comply with their consumer demand.

#### b) Global Conflicts

In recent years global trade has been severely affected by international conflicts which have caused important disruptions in global trade. The Russian invasion on Ukraine in 2022 is a clear example of changing economic environment that are affecting the automotive industry. This conflict disrupted the supply of neon gas and palladium, essential raw materials in the manufacturing of semiconductors (World Economic Forum, 2024). Ukraine is responsible for 50% of global supply of neon gas in the world stage, while Russia controls 35% of palladium reserves globally. This conflict has caused an increase in production costs as well as delayed production due to the impact on global supply chain.

Another global conflict that has indirectly impacted BMW is the conflict between Israel and Hamas which contributes to an unstable economic scenario. Neither or the two sides in the conflict are significant oil producers, but the conflict created fear of a broader regional instability, which could affect other nations in the Middle East that supply a large percentage of oil to the global economy (Al Jazeera, 2023). Initially the conflict caused a rise in oil prices which shows the importance of the conflict on a global level. The conflict has potential to draw other regional players like Iran which could cause mayor instability on the global stage and oil production and increase the stress on global economy (IMF, 2023).

There are also economic sanctions on Russia that paired with the energy crisis have caused an increase the price for oil, gasoline, and other commodities, with affected the overall cost structure of BMW. Europe was highly affected due to their high dependence on Russian energy, due to this impact there has been increased inflation and economic instability in the

region (Financial Times, 2023). These conflicts and events have put strain on the overall global ecosystem which in turn affect BMW capabilities to meet demand in an effective and profitable manner, while maintaining a strong financial performance.

The crises mentioned have impacted BMW's margins and production ability. The semiconductor shortage and increased production costs, followed by the supply chain disruptions have disrupted BMW's ability to meet consumer demands and maintain profit margins. Having caused significant decrease in revenue and profitability as well as decreasing BMW units produced (BMW Group, 2020).

## 2.2. Quantitative analysis

### 2.2.1 Discounted Cash Flow valuation

This section of the analysis displays a detailed Discounted Cash Flow analysis of BMW. We will project future cash flows that the company is expected to generate in the future, as well as discounting them in order to obtain their present value through the use of the Weighted Average Cost of Capital (WACC). For the elaboration of the DCF we took advantage of the BMW being a public company and used the large amount of data available in order to create an accurate valuation of the company.

#### 1. Weighted Average Cost of Capital

As said before we must calculate an adequate discount factor for future cash flows and to do so we used the following formula:

$$WACC = k_e * \frac{E}{(E + D)} + k_d * (1 - Tax) * \frac{D}{(E + D)}$$

- $k_e$ , is the Cost of equity.
- $k_d$ , is Cost of Debt financing.
- E, refers to the market value of equity.
- D, makes mention to the market value of debt.

- (E+D), is the total value of the company.
- Tax, this is the effective tax rate which the company is subject to.

a. Cost of Equity

The cost of equity was estimated using the Capital Asset Pricing Model (CAPM) which follows the formula:

$$CAPM = r_f + \beta * (Er(Mkt) - r_f)$$

- $r_f$ , is the risk-free rate. Government t bill
- $\beta$ , beta represents the company-specific risk.
- $(Er(Mkt) - r_f)$ , this shows the market risk premium.

The risk-free rate is the 10 yr. German Long Term Treasury bond rate which at the time of the calculations had a value of 2.53%. This value was extracted from Bloomberg at the time of the calculations.

The Beta ( $\beta$ ) was based using the average unlevered beta from the Automotive Industry which was taken from the NYU database from Professor Aswath Damodaran. We used the following for the Levered Beta of BMW that rose from market:

$$\beta_l = \beta_{un} * (1 + \frac{D}{E} * (1 - Tax))$$

- $\beta_l$ , is beta levered of the company.
- $\beta_{un}$ , is the beta unlevered from the market.
- E, refers to the market value of equity.
- D, makes mention to the market value of debt.
- Tax, this is the effective tax rate which the company is subject to.

As BMW and its main competitors have Europe as one of their main markets of operation, I will use the unlevered beta for the European automotive market that Aswath Damodaran has calculated. The beta was calculated from 31 companies in the industry and was last updated on January 5, 2024. The unlevered beta for the European automotive market was 0.78 which translated to a levered beta of 1.48. This value reflected the higher volatility of the stock

compared to the market. This levered beta is expected as BMW stock has outperformed the market on average.

Lastly, for the Risk Premium, we used the Europe Risk Premium, which represents the additional return investors require for investing in equities rather than the risk-free asset. As calculated by Aswath Damodaran, it includes countries like France, Spain, Germany, Italy, and others. Due to the global nature of the company, with Europe being the largest market by units sold, representing almost 40% of worldwide sales, it was believed that the European Risk Premium was a better fit than the German Risk Premium (BMW Group, 2024). Therefore, the Risk Premium of 5.89% was used for the study.

With these data the CAPM model was as follows:

$$CAPM = 2.53\% + 1.44 * 5.89\% = 11.03\%$$

#### b. Cost of Debt

The cost of debt was calculated using the interest paid and the total debt by the company. We calculated this for the last fiscal year in order to have an accurate value for BMW's cost of debt as previous years showed an unrealistic cost of debt for it was negative. BMW cost of Debt is 2.58%.

#### c. Capital Structure

In order to calculate the appropriate capital structure for the company we must calculate the market value of equity and net debt of the company. To do so we must establish the current number of shares outstanding and their market value, by looking at the BMW group page in order to obtain this information. We concluded that BMW has 639 million shares outstanding between ordinary and preferred shares. At the time of DCF calculation the stock price was 101.6 €. Therefore,

$$\text{Market value of Equity} = 101.6 * 639 = 64,894 \text{ € million}$$



For debt we calculated the net debt value for the last available year. This was done by adding both the long-term debt and short term and subtracting the cash and cash equivalent account.

$$\text{Net Debt} = 77,683 \text{ € million}$$

This shows that the company finances its operations mainly from debt, using 54% of debt financing and 46% from equity financing.

#### d. WACC

With these data we reach the discount factor of 6.0%, Bloomberg<sup>1</sup> estimates the WACC for BMW at 6.3, therefore there isn't much difference between what this study predicts to what analysts believe. In order to achieve the present value of future cash flows:

$$\text{WACC} = 11.23 * 46\% + 2.6 * (1 - 25\%) * 54\% = 6.0\%$$

Table 2: WACC for DCF

4. WACC	
Beta BMW	1.44
Ke	11.01%
Kd	2.6%
tax	25%
E/(D+E)	46%
D/(D+E)	54%
<b>WACC</b>	<b>6.0%</b>

Source: Own Creation

## 2. Free Cash Flow

BMW Group has shown a strong financial performance in recent years, achieving a constant growth rate as well as profitability and return for shareholders. In 2023, thanks to the strong increase of electric vehicles and their high-end models, the company was able to achieve a 9% revenue growth as well as maintaining a strong EBIT margin between 8-10% (BMW Group, 2024). The strong financial position by the company will be the basis to forecast BMW's future

<sup>1</sup> Look at Annex 6 for Bloomberg's WACC calculations

cash flows, a five-year projection period (2024, 2025, 2026, 2027, 2028) was selected, as a typical business cycle last 3-7 years, allowing for the forecast of full business cycle.

The company's CEO has commented that BMW has shown good momentum in 2024 in all business lines, mainly in electric vehicles which showed large revenue increases in 2023. Unit sales rose to 2,555,341 units which reflect an increase of 6.5% compared to 2022. Also, last fiscal year reflected a large increase of 74.4% increase in electric vehicle sales. A strong growth trend is expected with the introduction of new electric models of both BMW and Mini (BMW Group, 2024). Thanks to the nature of the company, I have considered a 4% annual growth rate for revenues, following market trends as well as historic performance. Growth for the organization in the last 5 years was impacted by the abnormal COVID year so some adjustments were carried out to reflect a more realistic growth.

Historically the company was able to achieve a significant gross margin and expect this margin to continue and improve with rising material cost and supplier payments as the company expects a strong demand for their products as well as an efficient cost management to maintain gross margin around 20% (BMW Group, 2024). We must consider possible increases in production cost with the current world situation which have caused supply chain disruptions, therefor a gross margin of 17% of sales was used to forecast which also coincides with historic average.

Table 3: Income Statement Forecast

Timeline	12/31/2022	12/31/2023	12/31/2024	12/31/2025	12/31/2026	12/31/2027	12/31/2028
<b>1. Top Line: Sales - Income:</b>							
<b>1.2 Net Revenue</b>	<b>142,610 €</b>	<b>155,498 €</b>	<b>161,718 €</b>	<b>168,187 €</b>	<b>174,914 €</b>	<b>181,911 €</b>	<b>189,187 €</b>
			4%	4%	4%	4%	4%
% Growth YoY	28%	9%	4%	4%	4%	4%	4%
	Average	11%					
<b>2. COGS</b>							
<b>2.1 COGS (Ex. Add Ons)</b>	<b>118,042 €</b>	<b>125,809 €</b>	<b>133,534 €</b>	<b>138,875 €</b>	<b>144,431 €</b>	<b>150,208 €</b>	<b>156,216 €</b>
			83%	83%	83%	83%	83%
<b>Gross Margin</b>	<b>24,568 €</b>	<b>29,689 €</b>	<b>28,184 €</b>	<b>29,311 €</b>	<b>30,484 €</b>	<b>31,703 €</b>	<b>32,971 €</b>
% Revenue	17%	19%	17%	17%	17%	17%	17%
	Average	17%					
<b>3. OPEX</b>							
<b>3.1 Labor OPEX</b>							
<b>Labor OPEX</b>	<b>10,616 €</b>	<b>11,025 €</b>	<b>13,166 €</b>	<b>13,693 €</b>	<b>14,241 €</b>	<b>14,810 €</b>	<b>15,403 €</b>
% Revenue	7%	7%	8%	8%	8%	8%	8%
	Average	8%					
<b>3.2 Other OPEX</b>							
<b>Other OPEX</b>	<b>1,330 €</b>	<b>1,227 €</b>	<b>1,664 €</b>	<b>1,729 €</b>	<b>1,796 €</b>	<b>1,866 €</b>	<b>1,939 €</b>
% Revenue	1%	1%	1%	1%	1%	1%	1%
	Average	1%					

Source: Own creation

Once we created an accurate forecast for the income statement we had to focus on the balance sheet, estimating accounts such as accounts receivable, account payable, inventory CAPEX and depreciation. To achieve an accurate forecast of these elements we calculated average days sales outstanding for the Receivable accounts, average days payable outstanding for the payable accounts and finally average days outstanding for the inventory accounts. For forecasting we generally followed historic trends by calculating the average over the last 5 years, but there is one exception, Receivable (Clients), which gave a misleading image as the company has shown a decreasing trend in days sales outstanding and such trends should be expected in the following years, but in order to maintain conservative trends we followed last year's days sales outstanding. Therefore, we used last year's days sales outstanding.

Table 4: Balance Sheet Forecast

Timeline	12/31/2022	12/31/2023	12/31/2024	12/31/2025	12/31/2026	12/31/2027	12/31/2028
<b>1. WC Ex. Add. Ons</b>							
<b>Receivables (Clients)</b>	<b>35,340 €</b>	<b>36,828 €</b>	<b>37,660 €</b>	<b>39,167 €</b>	<b>40,733 €</b>	<b>42,363 €</b>	<b>44,057 €</b>
Days Sales Outstanding (DSO)	90 Days	86 Days	85 Days	85 Days	85 Days	85 Days	85 Days
Average		115 Days					
<b>Other Receivables</b>	<b>4,127 €</b>	<b>4,162 €</b>	<b>3,991 €</b>	<b>4,151 €</b>	<b>4,317 €</b>	<b>4,490 €</b>	<b>4,669 €</b>
Days Sales Outstanding (DSO)	11 Days	10 Days	9 Days	9 Days	9 Days	9 Days	9 Days
Average		9 Days					
<b>COGS Payables</b>	<b>7,316 €</b>	<b>9,240 €</b>	<b>10,280 €</b>	<b>10,691 €</b>	<b>11,119 €</b>	<b>11,563 €</b>	<b>12,026 €</b>
Days Payables Outstanding (DPO)	23 Days	27 Days	28 Days	28 Days	28 Days	28 Days	28 Days
Average		28 Days					
<b>Creditors Payables</b>	<b>14,120 €</b>	<b>15,547 €</b>	<b>15,626 €</b>	<b>16,251 €</b>	<b>16,901 €</b>	<b>17,577 €</b>	<b>18,280 €</b>
Days Payables Outstanding (DPO)	44 Days	45 Days	43 Days	43 Days	43 Days	43 Days	43 Days
Average		43 Days					
<b>Inventories</b>	<b>20,005 €</b>	<b>23,719 €</b>	<b>23,912 €</b>	<b>24,868 €</b>	<b>25,863 €</b>	<b>26,897 €</b>	<b>27,973 €</b>
Days Inventories Outstanding (DIC)	62 Days	69 Days	65 Days	65 Days	65 Days	65 Days	65 Days
Average		65 Days					

Source: Own creation

BMW has communicated that there will be substantial spending for research and development; to further develop technology and manufacturing, this will translate in a high CAPEX spending for 2024. This large investment plays a fundamental role in the development of BMW new line Neue Klasse which is dependent on sixth-generation batteries. This has caused an increase of planned capex of 25% from 2023 in order to reach development goals. After this unusual spending we forecast capex to return to average spending. New CAPEX is forecasted to depreciated over 20 years adding this new depreciation to the already existing one.

No new debt is estimated in the future which might be a limitation to the forecast accuracy of the valuation, but as we assume a conservative approach to financial management this could be the case for BMW<sup>2</sup>.

Via the computation of BMW's cash flows, we carried out an extensive examination of its financial performance. The efficient forecasting of the financial accounts made these computations simple to understand<sup>3</sup>. For assessing a company's operational effectiveness and financial stability, it is essential to comprehend and analyze its cash flows.

<sup>2</sup> For more information on debt forecast look at Annex 1, 2, 3, 4 , 7and 8.

<sup>3</sup> For more information on Free Cash Flow Calculations Look at Annex 2.

Given that this is a capital-intensive business, BMW will be able to raise the necessary funds from its operations to cover its short-term liabilities. Strong liquidity is also necessary to maintain and upgrade the infrastructure and to weather any setbacks brought on by the dynamic and quickly changing environment in which the company operates.

Table 5: Estimated Free Cash Flow

Free Cash Flow				
2024e	2025e	2026e	2027e	2028e
€ 4,327	€ 5,386	€ 5,847	€ 6,475	€ 6,960

Source: Own creation

### 3. Enterprise Value and Equity Value

After calculating both, the Weighted Average Cost of Capital for the organization, as well as the Free Cash Flow for the next five years, a terminal value must be calculated. To do a long-term growth rate had to be established. Due to the international nature of the operations of the company we saw fit to base our long-term growth in global growth estimates, the World Bank estimates that the economy in 2024 will have lower growth than expected, expecting growth to slow down to 2.4% globally (World Bank, 2024). Based on this initial expected slowdown and the nature of the organization a conservative approach was taken and a long-term growth rate of 1.5% was deemed fit in order to provide a reliable valuation of the organization. Once we established an appropriate long-term growth rate, we were able to estimate a terminal value for the company:

$$TV = \frac{CF_{2028} * (1 + g)}{WACC - g} = \frac{6,956 * (1 + 1.5\%)}{6.0\% - 1.5\%} = 156,737 \text{ € million.}$$

Finally, with the Free Cash Flow calculated for the forecasted period, as well as determining a fair terminal value for the company, we were able reach the Enterprise Value for the organization, also as we had calculated the net debt for the organization, we are able to reach the Equity Value for BMW. Concluding with an EV value of 175,207€ million and an Equity Value of 180€ per share.

Table 6: Enterprise and Equity Value for BMW

Timeline	12/31/2024	12/31/2025	12/31/2026	12/31/2027	12/31/2028
<b>Free Cashlow</b>					
> Ebit	11,610 €	11,378 €	10,949 €	10,759 €	10,373 €
> Depreciation	15,508 €	16,357 €	17,205 €	18,054 €	18,903 €
> Capex	18,860 €	16,974 €	16,974 €	16,974 €	16,974 €
> Op. WC	564 €	2,075 €	2,158 €	2,244 €	2,334 €
<b>FCF</b>	4,327 €	5,386 €	5,847 €	6,475 €	6,960 €
TV					156,737 €
Year	1	2	3	4	5
WACC	6.0%				
Present Value	4,081 €	5,081 €	5,516 €	6,108 €	154,421 €
<b>ENTERPRISE VALUE</b>	175,207 €				
NET DEBT	60,356 €				
<b>EQUITY VALUE</b>	114,851 €				
<b>PRICE PER SAHRE</b>	180 €				

Source: Own Creation

### 2.2.2 Multiple Valuation

A complex step in this relative valuation was the selection of comparable companies as it was fundamental to select companies that were direct competitors to BMW in the automotive industry. It was imperative to select individual companies or groups that operated in the same sector, size, and geographic location. Because of these criteria we have selected Mercedes-Benz Group, Tesla, General Motors, Volkswagen Group and Toyota. There are a few discrepancies to address, Toyota has the largest operation of them all in revenue, also Tesla provides high margins due to the large valuation and price but low sales and other financial metrics. Nonetheless these companies were included within the study due to their direct competition and position within the global automotive industry. No geographic distinctions were made as all companies operate globally but trade in different exchanges. Furthermore, a detailed explanation on the selection process was done previously in the study.

For the relative valuation of BMW, we have chosen the most relevant data and multiples to reach an accurate valuation. In this table you are able to the ratios used, Enterprise Value to Sales, Enterprise Value to EBITDA, Price to earnings. In the ratios selected we have three for the Enterprise Value of the organization and one for the Equity Value. Price to earning being the responsible for the Equity Value. We don't use Enterprise value to EBIT in order to reduce

the effect of different amortization and depreciation methods used by the different comparable companies.

A table was created in order to clearly show the current ratios and forward ratios of the comparable companies. In the table it can be clearly seen that the values have a significant standard deviation in the result, therefore it will be more representative to use the median rather than the mean.

*Table 7: Comparable Companies*

Ticker	Company Name	Valuation EV/Sales x	Forward EV/Revenue x	EV/EBITDA x	Forward EV/EBITDA x	P/E x	Forward Forward P/E x
MBG.DE	Mercedes-Benz Group AG	0.870x	0.900x	5.115x	6.200x	5.390x	5.790x
TSLA	Tesla, Inc	5.795x	5.600x	39.794x	29.400x	45.500x	53.100x
VOW3.DE	Volkswagen AG	0.570x	0.900x	3.394x	7.000x	4.010x	3.970x
TM	Toyota Motor Corporation	1.520x	1.800x	7.510x	16.100x	9.270x	10.120x
GM	General Motors Company	0.852x	0.900x	6.177x	6.500x	5.590x	4.680x
BMW.DE	BMW	0.716x	0.900x	4.320x	5.600x	5.710x	5.520x
<b>Standard Deviation</b>		<b>2.0223</b>	<b>1.8801</b>	<b>14.1537</b>	<b>9.4782</b>	<b>16.2227</b>	<b>19.3418</b>

*Source: Own creation*

In table number 7 it can be clearly see one tendency within the comparable ratios of the companies, it is that Tesla always holds the maximum value for the ratios, this is due to the fact that the company has an extremely high valuation in the market causing such high ratios<sup>4</sup>.

In the following table, table 8, I will implement the median values of the ratios in order to calculate the average equity value for BMW. To do so I will use the estimated values of sales, net income, EBITDA and net debt, all of which can be found in annexes 3 and 4. Also, I used the current number of shares to calculate the share price to be later compared with the current market price and reach an investment decision.

<sup>4</sup> For more information about the comparable ratio's calculations look at Annex 5.

Table 8: Relative Valuation

Relative Valuation					
Valuation	Average		Median		
	2023	2024e	2023	2024e	
<b>EV / Sales</b>	1.921x	2.020x	0.870x	0.900x	
<b>EV / EBITDA</b>	12.398x	13.040x	6.177x	7.000x	
<b>P / E</b>	13.952x	15.532x	5.590x	5.790x	
<b>EV/ Sales valuation</b>	<b>Revenue</b>	<b>Ratio</b>	<b>EV</b>	<b>Net Debt</b>	<b>Equity Value</b>
<b>2023</b>	155,259.00	0.870x	135,116.05	60,356.00	74,760.05
<b>2024e</b>	161,717.92	0.900x	145,546.13	78,818.40	66,727.73
<b>Average</b>					70,743.89
<b>EV/ EBITDA</b>	<b>EBITDA</b>	<b>Ratio</b>	<b>EV</b>	<b>Net Debt</b>	<b>Equity Value</b>
<b>2023</b>	25,718.00	6.177x	158,853.69	60,356.00	98,497.69
<b>2024e</b>	27,117.55	7.000x	189,822.85	78,818.40	111,004.45
<b>Average</b>					104,751.07
<b>P / E</b>	<b>Earnings</b>	<b>Ratio</b>			<b>Equity Value</b>
<b>2023</b>	10,661.00	5.590x			59,594.99
<b>2024e</b>	6,610.94	5.790x			38,277.35
<b>Average</b>					48,936.17
<b>Average Equity Value</b>					<b>74,810.38 €</b>
<b>Average Price Per Share</b>					<b>117.13 €</b>

Source: Own creation



## Part III: Conclusions and Market Value comparison

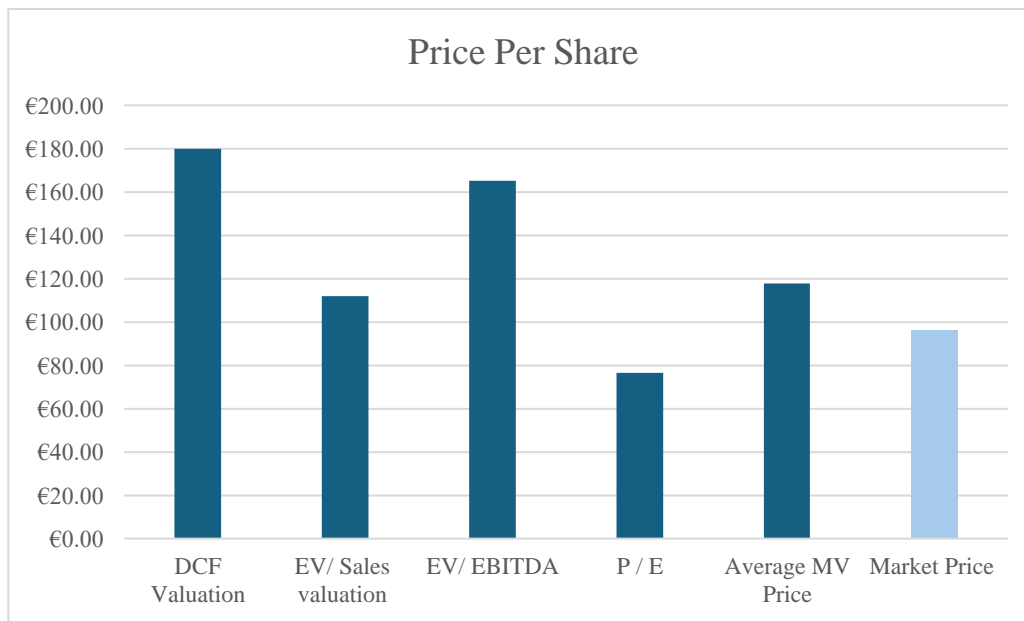
### 3.1 Conclusions

Through the thorough analysis of BMW's financial performance this study was able to reach a valuation through two different methods, Discounted Cash Flow (DCF) and Multiple Valuation method. The DCF valuation estimated that the Enterprise Value at €175,207 million, and the Equity Value at €114,851 million or €180 per share. These values were obtained using a conservative approach to DCF valuation, with a long-term growth rate of 1.5%, as well as a Weighted Average Cost of Capital of 6.0%. The DCF valuation revealed BMW's consistent ability to generate Free Cash Flow as well as displaying financial health to meet financial obligations.

For the Multiple Valuation, BMW was paired to its main competitors: Tesla, Mercedes-Benz, Toyota, General Motors and Volkswagen. In this comparison, I used the median values of Price to Earnings, Enterprise Value to EBITDA and Enterprise Value to Revenue, to establish a benchmark for BMW's valuation. I used the median due to the high standard deviation between the ratios. By using the median, I estimated the Equity Value of BMW to be €75,278 million, which translates to €117.89 per share. This valuation displays some discrepancies with the DCF valuation in the price of the shares but follows the general guideline that the stock is undervalued as it currently trades at €96.2 (Yahoo Finance, 2024).

In the following graph it can be clearly seen the comparison between the different Price per Share that were obtained through DCF, and the different ratios of comparable companies can be clearly seen. In all cases except one, the Price to Earnings ratio (P/E), the valuations conclude that the market is undervaluing the company. This difference can be attributed to a range of things like the fact that the automotive industry is of a highly cyclical nature, and demand fluctuates on the basis of economic conditions. Also, the low valuation through the P/E ratio could suggest that the market doesn't see the industry with high growth potential as opposed to the newer and revolutionary brand like Tesla, which is valued at a high P/E ratio of 45x, while BMW trades at 4.7x.

Graph 2: Price per share comparison



Source: Own creation

It is also worth mentioning that the relative valuation estimates the value that the company should have today with current market sentiment and economic conditions. On the other hand, DCF valuations measure what the company could be worth with current earnings and future growth potential, but without considering the current market perceptions.

Currently, the automotive industry is going through a transition phase, pushed by technology, changes in emission regulations, and a shift in demand towards more sustainable transportation (electric vehicles). Additionally, events like the COVID-19 pandemic and the shortage of semiconductors have caused severe supply chain disruptions that have caused an increase in production cost as well as delayed production timelines. Ongoing geopolitical conflicts like the Russia-Ukraine conflict are causing disruptions in global trade, limiting access to necessary raw materials like palladium and neon gas, which are essential for the already disrupted production of semiconductors. These events have increased productions costs and reduced BMW profitability and production capacity, as well as disrupted BMW's main market with rising energy prices and economic instability.

### 3.2 Analysis of results and Market Value comparison

After a comprehensive analysis of BMW, the company presents a favorable investment opportunity. The current market price of €96.2 is well below the value per share of € 180 per share that was calculated through the DCF method and the value of € 117.8 calculated by Multiple Valuation. There is potential upside to a buy recommendation due to the differences between market prices and this study's estimates.

Through the two valuation methods this study assessed and understood BMW's financial health and position within the market. The increased spending in EVs and autonomous driving technology positions BMW favorably in the race for market share during this transition period. Also, the historic performance of the company and its ability to grow while maintaining good profit margins suggest that the organization will continue with this trend in the future.

Currently there are supply chain disruptions that have caused changes in the cost structure and increased production periods, despite this, BMW has mitigated this risk with its strong financial position. Even in this complex geopolitical scenario BMW continues to focus on new technologies and sustainability which can ensure that the company remains competitive in the future, following consumer demands for new products.

Another factor to consider is the industry's highly cyclical nature which poses a risk for investments. Also, it should be noted the dependency of the industry on economic conditions. Therefore, there should be continuous monitoring of BMW's achievement on EV, R&D and production objectives, is necessary to confirm the validity of growth assumptions that were used for the valuation.

In comparison with historic share price over the last five years, BMW's share price has fluctuated significantly, affected by several market conditions and internal business results. For instance, the stock peaked at € 112.5 per share in June 2023, which lower than the estimated value of € 180. The two share values calculated with the different valuation methods reflect the idea that the market hasn't fully recognized BMW's value. The differences in values reflect a clear undervaluation by the market towards the company.

In conclusion, the analysis of the industry as well as Discounted Cash Flow valuation and Multiple valuation method, suggests that BMW is undervalued by the market. The company's

focus on innovation, technology, premium positioning in the market as well as its historic financial performance and financial health, places the company in a favorable position for potential investment. The relative valuation share price of €117.8 per share, paired with the higher DCF price per share of €180, reflect the potential upside of this stock.

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Por la presente, yo, Nicholas Tidd Martinez, estudiante de Administración y Dirección de Empresas Bilingüe de la Universidad Pontificia Comillas al presentar mi Trabajo Fin de Grado titulado "Valuation Case: BMW", declaro que he utilizado la herramienta de Inteligencia Artificial Generativa ChatGPT u otras similares de IAG de código sólo en el contexto de las actividades descritas a continuación [el alumno debe mantener solo aquellas en las que se ha usado ChatGPT o similares y borrar el resto. Si no se ha usado ninguna, borrar todas y escribir "no he usado ninguna"]:

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Afirmo que toda la información y contenido presentados en este trabajo son producto de mi investigación y esfuerzo individual, excepto donde se ha indicado lo contrario y se han dado los créditos correspondientes (he incluido las referencias adecuadas en el TFG y he explicitado para que se ha usado ChatGPT u otras herramientas similares). Soy consciente de las implicaciones académicas y éticas de presentar un trabajo no original y acepto las consecuencias de cualquier violación a esta declaración.

Fecha: 06/03/2024

Firma: \_\_\_\_\_Nichols Tidd Martinez\_\_\_\_\_

# Annex

## 1. Debt Repayment Table

Timeline	12/31/2019	12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	12/31/2025	12/31/2026	12/31/2027	12/31/2028
<b>0. Historical P&amp;L</b>										
Interests	-	293 €	392 €	2,660 €	9,510 €	-	1,386 €			
<b>1. Senior Debt (Banks &amp; Equivalents)</b>										
<b>1.1 Long Term Senior Debt (Banks &amp; Equivalents)</b>										
"Deudas con Entidades de Crédito LP"	70,647 €	67,390 €	62,342 €	53,469 €	52,880 €					
Cost of Debt										
Repayment schedule										
Repayment schedule										
BoP						52,880 €	47,592 €	42,304 €	37,016 €	31,728 €
Payment (-)						5,288 €	5,288 €	5,288 €	5,288 €	5,288 €
EoP					52,880 €	47,592 €	42,304 €	37,016 €	31,728 €	26,440 €
<b>Interests</b>						<b>1,206 €</b>	<b>1,079 €</b>	<b>952 €</b>	<b>825 €</b>	<b>698 €</b>
<b>2. Short Term Senior Debt (Banks &amp; Equivalents)</b>										
"Deudas a C/P con entidades de crédito"	46,093 €	38,986 €	41,121 €	40,727 €	42,130 €					
Cost of Debt										
Repayment schedule										
Monthly Repayment										
BoP						42,130 €	37,917 €	33,704 €	29,491 €	25,278 €
Payment (-)						4,213 €	4,213 €	4,213 €	4,213 €	4,213 €
EoP					42,130 €	37,917 €	33,704 €	29,491 €	25,278 €	21,065 €
<b>Interests</b>						<b>961 €</b>	<b>859 €</b>	<b>758 €</b>	<b>657 €</b>	<b>556 €</b>
<b>2. Leasing and operating financing</b>										
<b>2.1 Long Term Leasing and operating financing</b>										
"Arrendamiento financiero L/P"	5,100 €	5,095 €	5,676 €	6,199 €	7,065 €					
Cost of Debt										
Repayment schedule										
Repayment monthly										
BoP						7,065 €	6,359 €	5,652 €	4,946 €	4,239 €
Payment (-)						707 €	707 €	707 €	707 €	707 €
EoP					7,065 €	6,359 €	5,652 €	4,946 €	4,239 €	3,533 €
<b>Interests</b>						<b>161 €</b>	<b>144 €</b>	<b>127 €</b>	<b>110 €</b>	<b>93 €</b>
<b>2.2 Short Term Leasing and operating financing</b>										
"Arrendamiento financiero C/P"	963 €	747 €	921 €	1,224 €	1,401 €					
Cost of Debt										
Repayment schedule										
Repayment										
BoP						1,401 €	1,261 €	1,121 €	981 €	841 €
Payment (-)						140 €	140 €	140 €	140 €	140 €
EoP					1,401 €	1,261 €	1,121 €	981 €	841 €	701 €
<b>Interests</b>						<b>32 €</b>	<b>29 €</b>	<b>25 €</b>	<b>22 €</b>	<b>18 €</b>

2.

Timeline	12/31/2019	12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	12/31/2025	12/31/2026	12/31/2027	12/31/2028
<b>3. Other Debt</b>										
<b>3.1 Long Term Other Debt</b>										
"Otras deudas financieras L/P"	3,335 €	3,693 €	1,247 €	339 €	427 €	- €	- €	- €	- €	- €
<b>Other Debt</b>										
Cost of Debt	2.4%									
Repayment schedule	10.0 Years									
Repayment	3.6 €									
BoP						427 €	384 €	342 €	299 €	256 €
Payment (-)						43 €	43 €	43 €	43 €	43 €
EoP					427 €	384 €	342 €	299 €	256 €	214 €
<b>Interests</b>						10 €	9 €	8 €	7 €	6 €
<b>3.2 Short Term Other Debt</b>										
"Otras deudas financieras C/P"	17,966 €	16,092 €	16,744 €	21,034 €	18,683 €	- €	- €	- €	- €	- €
<b>Other Debt</b>										
Cost of Debt	2.4%									
Repayment schedule	10.0 Years									
Repayment	155.7 €									
BoP						18,683 €	16,815 €	14,946 €	13,078 €	11,210 €
Payment (-)						1,868 €	1,868 €	1,868 €	1,868 €	1,868 €
EoP					18,683 €	16,815 €	14,946 €	13,078 €	11,210 €	9,342 €
<b>Interests</b>						426 €	381 €	336 €	291 €	247 €
<b>Total Debt</b>	<b>144,104 €</b>	<b>132,003 €</b>	<b>128,051 €</b>	<b>122,992 €</b>	<b>122,586 €</b>	<b>110,327 €</b>	<b>98,069 €</b>	<b>85,810 €</b>	<b>73,552 €</b>	<b>61,293 €</b>
<b>Total Interests</b>	<b>- 293 €</b>	<b>392 €</b>	<b>2,660 €</b>	<b>9,510 €</b>	<b>- 1,386 €</b>	<b>2,795 €</b>	<b>2,501 €</b>	<b>2,207 €</b>	<b>1,912 €</b>	<b>1,618 €</b>
<b>% Kd</b>	0.20%	-0.30%	-2.08%	-7.73%	1.13%	2.53%	2.55%	2.57%	2.60%	2.64%
										<b>2.58%</b>

## 2. Free Cash Flow Calculations

### 3. Free Cash Flow

> Ebit	11,610 €	11,378 €	10,949 €	10,759 €	10,373 €
> Depreciation	15,508 €	16,357 €	17,205 €	18,054 €	18,903 €
> Capex	18,860 €	16,974 €	16,974 €	16,974 €	16,974 €
> Op. WC	564 €	2,075 €	2,158 €	2,244 €	2,334 €
<b>FCF</b>	4,327 €	5,386 €	5,847 €	6,475 €	6,960 €
TV					156,737 €
Present Value	4,081 €	5,081 €	5,516 €	6,108 €	154,421 €
Long term Growth	1.5%				

### 4. WACC

Germany Long Term Treasury bond rate =	2.53%
Risk Premium to Use for Equity =	5.89%
BMW Share price	101.6 €
BMW shares outstanding 2023	639 €
Net Debt 2023	77,683 €
Market cap	64,894 €

4. WACC	
Beta BMW	1.44
Ke	11.01%
Kd	2.6%
tax	25%
E/(D+E)	46%
D/(D+E)	54%
<b>WACC</b>	6.0%



### 3. Income Statement

Timeline	12/31/2024	12/31/2025	12/31/2026	12/31/2027	12/31/2028
<b>1. P&amp;L Statement</b>					
<b>Net Revenue</b>	161,718 €	168,187 €	174,914 €	181,911 €	189,187 €
<i>YoY Growth (%)</i>	<i>n.a.</i>	4%	4%	4%	4%
<b>COGS</b>	134,226 €	139,595 €	145,179 €	150,986 €	157,025 €
<b>Gross Margin</b>	<b>27,492 €</b>	<b>28,592 €</b>	<b>29,735 €</b>	<b>30,925 €</b>	<b>32,162 €</b>
<i>%Revenue</i>	17%	17%	17%	17%	17%
<b>Labor Opex</b>	13,166 €	13,693 €	14,241 €	14,810 €	15,403 €
<i>% Revenues</i>	8%	8%	8%	8%	8%
<b>Other Operating Opex</b>	1,664 €	1,729 €	1,796 €	1,866 €	1,939 €
<i>% Revenue</i>	1%	1%	1%	1%	1%
<b>Other Income</b>	- €	- €	- €	- €	- €
<b>Other Results</b>	14,456 €	14,565 €	14,456 €	14,565 €	14,456 €
<b>Aids</b>	- €	- €	- €	- €	- €
<b>EBITDA</b>	<b>27,117.55 €</b>	<b>27,734.89 €</b>	<b>28,154.57 €</b>	<b>28,813.39 €</b>	<b>29,276.21 €</b>
<i>% Revenue</i>	17%	16%	16%	16%	15%
<b>D&amp;A</b>	15,508 €	16,357 €	17,205 €	18,054 €	18,903 €
<b>EBIT</b>	<b>11,610 €</b>	<b>11,378 €</b>	<b>10,949 €</b>	<b>10,759 €</b>	<b>10,373 €</b>
<i>% Revenue</i>	7%	7%	6%	6%	5%
<b>Financial P&amp;L</b>	- 2,795 €	- 2,501 €	- 2,207 €	- 1,912 €	- 1,618 €
<b>EBT</b>	<b>8,815 €</b>	<b>8,877 €</b>	<b>8,743 €</b>	<b>8,847 €</b>	<b>8,755 €</b>
<i>%Revenue</i>	5%	5%	5%	5%	5%
<b>Taxes</b>	2,204 €	2,219 €	2,186 €	2,212 €	2,189 €
<b>Net Income</b>	<b>6,611 €</b>	<b>6,658 €</b>	<b>6,557 €</b>	<b>6,635 €</b>	<b>6,566 €</b>
<i>%Revenue</i>	4%	4%	4%	4%	3%

#### 4. Balance Sheet

Timeline	12/31/2024	12/31/2025	12/31/2026	12/31/2027	12/31/2028
<b>2. Balance Sheet</b>					
<b>Fixed Assets</b>	<b>159,270 €</b>	<b>159,887 €</b>	<b>159,656 €</b>	<b>158,576 €</b>	<b>156,647 €</b>
> Intangible Assets	21,559 €	23,715 €	26,086 €	28,695 €	31,565 €
> Leased Products	43,118 €	43,118 €	43,118 €	43,118 €	43,118 €
> Property Plant and Equipment	38,602 €	37,046 €	34,427 €	30,721 €	25,906 €
> Receivables from Sales Financing	50,517 €	50,517 €	50,517 €	50,517 €	50,517 €
> Subsidiarie Investments	1,656 €	1,673 €	1,690 €	1,707 €	1,724 €
> Long Run Financial Investments	1,387 €	1,387 €	1,387 €	1,387 €	1,387 €
> Deferred Tax Asset	2,431 €	2,431 €	2,431 €	2,431 €	2,431 €
<b>Current Assets</b>	<b>87,215 €</b>	<b>82,039 €</b>	<b>77,652 €</b>	<b>74,235 €</b>	<b>71,643 €</b>
> Inventories	23,903 €	24,859 €	25,854 €	26,888 €	27,963 €
> Receivables (Clients)	38,301 €	39,833 €	41,426 €	43,084 €	44,807 €
> Receivables (Others)	3,991 €	4,151 €	4,317 €	4,490 €	4,669 €
> Other Currrent Assets	8,795 €	8,795 €	8,795 €	8,795 €	8,795 €
> Other Current Assets "Financial Assets"	4,131 €	4,131 €	4,131 €	4,131 €	4,131 €
> Cash & Cash Equivalentents	8,093 €	269 € -	6,872 € -	13,152 € -	18,722 €
<b>TOTAL Assets</b>	<b>246,485 €</b>	<b>241,926 €</b>	<b>237,308 €</b>	<b>232,811 €</b>	<b>228,290 €</b>
<b>TOTAL Equity</b>	<b>99,524 €</b>	<b>106,182 €</b>	<b>112,739 €</b>	<b>119,374 €</b>	<b>125,941 €</b>
> Capital Social	43,439 €	43,439 €	43,439 €	43,439 €	43,439 €
> Other Equity	- 2,571 € -	- 2,571 € -	- 2,571 € -	- 2,571 € -	- 2,571 €
> Retained Earnigs	58,656 €	65,314 €	71,871 €	78,506 €	85,073 €
	0				
<b>Long Term Debt</b>	<b>64,928.80 €</b>	<b>58,891.60 €</b>	<b>52,854.40 €</b>	<b>46,817.20 €</b>	<b>40,780.00 €</b>
> Long Term Financial Liabilities	47,592 €	42,304 €	37,016 €	31,728 €	26,440 €
>Other Long Term Liabilities	6,359 €	5,652 €	4,946 €	4,239 €	3,533 €
> Pension Provisions	384 €	342 €	299 €	256 €	214 €
> Other Provisions	7,797 €	7,797 €	7,797 €	7,797 €	7,797 €
> Deferred Tax liabilities	2,797 €	2,797 €	2,797 €	2,797 €	2,797 €
<b>Short Term Debt</b>	<b>82,032.27 €</b>	<b>76,852.46 €</b>	<b>71,714.31 €</b>	<b>66,619.49 €</b>	<b>61,569.73 €</b>
> Short Term Financial Liabilities	37,917 €	33,704 €	29,491 €	25,278 €	21,065 €
> Current tax	1,261 €	1,121 €	981 €	841 €	701 €
> Other short term liabilities	16,815 €	14,946 €	13,078 €	11,210 €	9,342 €
> Short Term Other Provisions	10,333 €	10,746 €	11,176 €	11,623 €	12,088 €
> Trade Payables	15,707 €	16,335 €	16,988 €	17,668 €	18,374 €
<b>TOTAL Equity &amp; Liabilities</b>	<b>246,485 €</b>	<b>241,926 €</b>	<b>237,308 €</b>	<b>232,811 €</b>	<b>228,290 €</b>
<i>Check</i>	<i>- €</i>	<i>- €</i>	<i>- €</i>	<i>- €</i>	<i>- €</i>

## 5. Comparable companies

Company Name	Last	# Shares Outstanding	Company Market Capitalization 2023	Enterprise Value 2023	Revenue 2023	EBITDA 2023	EBIT 2023	Country of Exchange	Net Debt 2023	P/E 2023	Net Income 2023
Mercedes-Benz Group AG	\$68.32	1,069,837,450.00	\$72.81	\$131.91	€ 151,575,000,000.00	€ 25,788,000,000.00	€ 19,133,000,000.00	Germany	€ 69,082,000,000.00	5.390x	€ 13,290,000,000.00
Tesla, Inc	\$174.84	3,185,000,000.00	\$565.95	\$549.00	\$94,745,000,000.00	\$13,796,000,000.00	\$8,929,000,000.00	United States	-\$17,287,000,000.00	45.500x	\$13,615,000,000.00
Volkswagen AG	\$120.35	501,295,260.00	\$66.43	\$183.31	€ 321,548,000,000.00	€ 54,008,000,000.00	€ 25,627,000,000.00	Germany	€ 144,030,000,000.00	4.010x	€ 15,680,000,000.00
Toyota Motor Corporation	\$215.63	16,314,987,460.00	\$297.83	\$442.28	€ 266,062,417,500.00	€ 54,019,574,000.00	€ 41,705,884,600.00	United States	€ 126,302,397,400.00	9.270x	€ 29,175,104,700.00
General Motors Company	\$45.87	1,200,000,000.00	\$52.21	\$148.94	\$174,870,000,000.00	\$24,113,000,000.00	\$12,239,000,000.00	United States	\$102,888,000,000.00	5.590x	\$10,712,000,000.00
BMW	\$96.02	638,716,080.00	\$61.02	\$111.11	€ 155,259,000,000.00	€ 25,718,000,000.00	€ 16,836,000,000.00	Germany	€ 51,682,000,000.00	5.710x	€ 10,661,000,000.00

Company Name	EV/Revenue	EV/EBITDA	Forward P/E
Mercedes-Benz Group AG	0.900x	6.200x	5.790x
Tesla, Inc	5.600x	29.400x	53.100x
Volkswagen AG	0.900x	7.000x	3.970x
Toyota Motor Corporation	1.800x	16.100x	10.120x
General Motors Company	0.900x	6.500x	4.680x
BMW	0.900x	5.600x	5.520x

## 6. Bloomberg WACC

### Weighted Average Cost of Capital

Company: Bayerische Motoren Werke AG

Ticker: BMW GR Equity

Period: Current (2024 Q1)

Filing Status: Most Recent

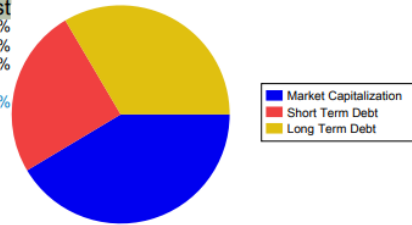
#### Cost of Capital

	Weight	Cost	Weight x Cost
Equity	41.40%	11.50%	4.80%
Debt	58.60%	2.60%	1.50%
Preferred Equity	0.00%	0.00%	0.00%

WACC

6.3%

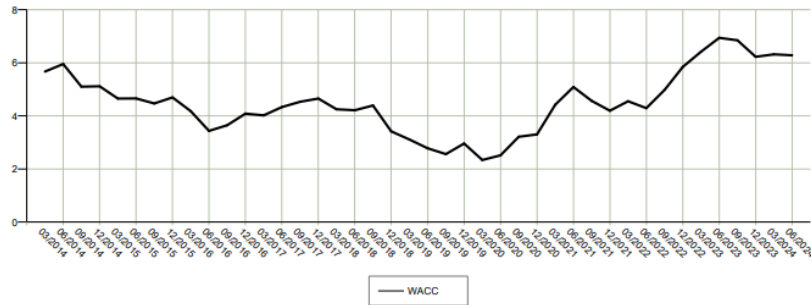
#### Capital Structure Graph



#### Capital Structure

	Millions of EUR	
Market Capitalization	67,309.60	41.40%
Short Term Debt	40,752.00	25.10%
Long Term Debt	54,386.00	33.50%
Preferred Equity	0.00	0.00%
<b>Total</b>	<b>162,447.60</b>	<b>100.00%</b>

#### Historical Graph



#### Economic Value Added

	Millions of EUR
Net Operating Profit	17,133.00
Cash Operating Taxes	5,607.01
NOPAT	11,525.99
Total Investment Capital	192,849.00
Capital Charge	12,118.75
<b>Economic Value Added</b>	<b>-592.76</b>
ROIC	5.98%
EVA Spread	-0.31%

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7.

Timeline	31/12/19	31/12/20	31/12/21	31/12/22	31/12/23
<b>1. P&amp;L Statement</b>					
<b>Net Revenue</b>	104,210 €	98,990 €	111,239 €	142,610 €	155,498 €
<i>YoY Growth (%)</i>	<i>n.a.</i>	<i>-5%</i>	<i>12%</i>	<i>28%</i>	<i>9%</i>
<b>COGS</b>	86,147 €	85,408 €	89,253 €	118,042 €	125,809 €
<b>Gross Margin</b>	<b>18,063 €</b>	<b>13,582 €</b>	<b>21,986 €</b>	<b>24,568 €</b>	<b>29,689 €</b>
<i>%Revenue</i>	<i>17%</i>	<i>14%</i>	<i>20%</i>	<i>17%</i>	<i>19%</i>
<b>Labor Opex</b>	9,367 €	8,795 €	9,233 €	10,616 €	11,025 €
<i>% Revenues</i>	<i>9%</i>	<i>9%</i>	<i>8%</i>	<i>7%</i>	<i>7%</i>
<b>Other Operating Opex</b>	2,316 €	873 €	1,055 €	1,330 €	1,227 €
<i>% Revenue</i>	<i>2%</i>	<i>1%</i>	<i>1%</i>	<i>1%</i>	<i>1%</i>
<b>Other Income</b>	1,031 €	916 €	1,702 €	1,377 €	1,045 €
<b>Other Results</b>	10,749 €	11,976 €	11,758 €	14,456 €	14,565 €
<b>Aids</b>	- €	- €	- €	- €	- €
<b>EBITDA</b>	<b>18,160.00 €</b>	<b>16,806.00 €</b>	<b>25,158.00 €</b>	<b>28,455.00 €</b>	<b>33,047.00 €</b>
<i>% Revenue</i>	<i>17%</i>	<i>17%</i>	<i>23%</i>	<i>20%</i>	<i>21%</i>
<b>D&amp;A</b>	10,749 €	11,976 €	11,758 €	14,456 €	14,565 €
<b>EBIT</b>	<b>7,411 €</b>	<b>4,830 €</b>	<b>13,400 €</b>	<b>13,999 €</b>	<b>18,482 €</b>
<i>% Revenue</i>	<i>7%</i>	<i>5%</i>	<i>12%</i>	<i>10%</i>	<i>12%</i>
<b>Financial P&amp;L</b>	- 293 €	392 €	2,660 €	9,510 €	- 1,386 €
<b>EBT</b>	<b>7,118 €</b>	<b>5,222 €</b>	<b>16,060 €</b>	<b>23,509 €</b>	<b>17,096 €</b>
<i>%Revenue</i>	<i>7%</i>	<i>5%</i>	<i>14%</i>	<i>16%</i>	<i>11%</i>
<b>Taxes</b>	2,140 €	1,365 €	3,597 €	4,927 €	4,931 €
<b>Net Income</b>	<b>4,978 €</b>	<b>3,857 €</b>	<b>12,463 €</b>	<b>18,582 €</b>	<b>12,165 €</b>
<i>%Revenue</i>	<i>5%</i>	<i>4%</i>	<i>11%</i>	<i>13%</i>	<i>8%</i>
<b>Retained earnings</b>	4,978 €	8,835 €	21,298 €	39,880 €	52,045 €

## 8.

Timeline	31/12/19	31/12/20	31/12/21	31/12/22	31/12/23
<b>2. Balance Sheet</b>					
<b>Fixed Assets</b>	<b>137,404 €</b>	<b>134,851 €</b>	<b>143,354 €</b>	<b>154,722 €</b>	<b>155,918 €</b>
> Intangible Assets	13,054 €	13,558 €	14,282 €	22,806 €	21,559 €
> Leased Products	42,609 €	41,995 €	44,700 €	42,820 €	43,118 €
> Property Plant and Equipment	23,245 €	21,850 €	22,390 €	32,126 €	35,266 €
> Receivables from Sales Financing	51,030 €	48,025 €	51,712 €	50,368 €	50,517 €
> Subsidarie Investments	3,902 €	4,320 €	6,353 €	1,771 €	1,640 €
> Long Run Financial Investments	1,370 €	2,644 €	1,715 €	3,073 €	1,387 €
> Deferred Tax Asset	2,194 €	2,459 €	2,202 €	1,758 €	2,431 €
<b>Current Assets</b>	<b>90,630.00 €</b>	<b>81,807 €</b>	<b>86,173 €</b>	<b>92,204 €</b>	<b>94,962 €</b>
> Inventories	15,891 €	14,896 €	15,928 €	20,005 €	23,719 €
> Receivables (Clients)	41,407 €	36,252 €	35,705 €	35,340 €	36,828 €
> Receivables (Others)	2,518 €	2,298 €	2,261 €	4,127 €	4,162 €
> Other Current Assets	12,823 €	9,716 €	10,470 €	10,698 €	8,795 €
> Other Current Assets "Financial Assets"	5,955 €	5,108 €	5,800 €	5,164 €	4,131 €
> Cash & Cash Equivalents	12,036 €	13,537 €	16,009 €	16,870 €	17,327 €
<b>TOTAL Assets</b>	<b>228,034 €</b>	<b>216,658 €</b>	<b>229,527 €</b>	<b>246,926 €</b>	<b>250,880 €</b>
					- €
<b>TOTAL Equity</b>	<b>59,907 €</b>	<b>61,520 €</b>	<b>75,132 €</b>	<b>91,288 €</b>	<b>92,913 €</b>
> Capital Social	56,092 €	54,203 €	54,159 €	52,803 €	43,439 €
> Other Equity	- 1,163 € -	1,518 € -	325 € -	1,395 € -	2,571 €
> Retained Earnings	4,978 €	8,835 €	21,298 €	39,880 €	52,045 €
<b>Long Term Debt</b>	<b>85,502 €</b>	<b>83,175.00 €</b>	<b>77,929.00 €</b>	<b>71,217.00 €</b>	<b>70,966.00 €</b>
> Long Term Financial Liabilities	70,647 €	67,390 €	62,342 €	53,469 €	52,880 €
> Other Long Term Liabilities	5,100 €	5,095 €	5,676 €	6,199 €	7,065 €
> Pension Provisions	3,335 €	3,693 €	1,247 €	339 €	427 €
> Other Provisions	5,788 €	6,488 €	7,206 €	8,445 €	7,797 €
> Deferred Tax liabilities	632 €	509 €	1,458 €	2,765 €	2,797 €
<b>Short Term Debt</b>	<b>82,625 €</b>	<b>71,963.00 €</b>	<b>76,466.00 €</b>	<b>84,421.00 €</b>	<b>87,001.00 €</b>
> Short Term Financial Liabilities	46,093 €	38,986 €	41,121 €	40,727 €	42,130 €
> Current tax	963 €	747 €	921 €	1,224 €	1,401 €
> Other short term liabilities	17,966 €	16,092 €	16,744 €	21,034 €	18,683 €
> Short Term Other Provisions	7,421 €	7,494 €	6,748 €	7,316 €	9,240 €
> Trade Payables	10,182 €	8,644 €	10,932 €	14,120 €	15,547 €
<b>TOTAL Equity &amp; Liabilities</b>	<b>228,034 €</b>	<b>216,658 €</b>	<b>229,527 €</b>	<b>246,926 €</b>	<b>250,880 €</b>

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