

A Work Project, presented as part of the requirements for the Award of a Master Degree in Economics / Finance / Management from the NOVA – School of Business and Economics.

Bayerische Motoren Werke: An Assessment of the Electric Path to Future Mobility

Bruno Miguel Carvalho de Carvalho
51409

A Project carried out on the Master in Finance Program, under the supervision of:

Francisco Antunes da Cunha Martins

December 2023

Abstract

The purpose of this Master's Thesis is to determine an appropriate valuation for BMW's stock price as of December 31st 2024. On a period of profound economic uncertainty, after the disruption of the supply chains and the overall shutdown of the global economy caused by the covid-19 pandemic and the more recent interest rate hikes, the Automotive industry is going through a transformative shift toward electrification. It is in this global macroeconomic and sectorial context that BMW is making the necessary efforts to remain a relevant player globally.

Our final recommendation is to **HOLD**, as we expect a 9.16% Total Shareholder Return and a 108.26 € stock price for December 2024.

Keywords: Automotive, Motorcycle, Financial Services, Inflation.

Acknowledgements

This thesis is the culmination of a demanding learning process, and I would like to express my gratitude to my family and friends for their encouragement, understanding, and unwavering support throughout this academic journey.

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

This report is part of the Bayerische Motoren Werke report (annexed), developed by António Lopes Carvalho e Kuster Filipe and Bruno Miguel Carvalho de Carvalho should be read has an integral part of it.

Table of Contents

INTRODUCTION.....	6
COMPANY OVERVIEW.....	6
OPERATING SEGMENTATION	6
▪ <i>Automotive</i>	6
▪ <i>Motorcycle</i>	7
▪ <i>Financial Services</i>	7
GEOGRAPHIC SEGMENTATION	8
CORPORATE GOVERNANCE: MANAGEMENT AND SUPERVISORY BOARDS	8
OWNERSHIP STRUCTURE.....	8
BMW'S STRATEGY.....	9
BMW BRILLIANCE AUTOMOTIVE (BBA)	10
COMPETITIVE LANDSCAPE.....	10
BENCHMARKING BMW AGAINST EUROPEAN AUTOMOTIVE GIANTS.....	10
BMW VS. ELECTRIC VEHICLE GIANTS.....	11
RELATIVE VALUATION.....	11
VALUATION	12
REVENUES FORECAST	12
▪ <i>Automotive</i>	12
▪ <i>Motorcycle</i>	13
▪ <i>Financial Services</i>	13
OPERATING MARGINS	14
▪ <i>Industrial Segments</i>	14
▪ <i>Financial Services</i>	14
CAPITAL EXPENDITURE	15
NWC REQUIREMENTS	16

Introduction

The purpose of the annexed report is to determine the fair value of BMW AG. On this regard, we estimated a price of 108.26€ for December 2024, leading to a 9.16% Total Shareholder Return and a corresponding recommendation to HOLD.

The report starts with a detailed company overview that focuses on fundamental matters regarding the group's operations and structure, followed by an assessment of the current macroeconomic and sector conditions and a SWOT analysis of the firm. To finalize the first component of the report, we conducted a comparative analysis of BMW's current situation against its main competitors. The second part of the report is composed of an extensive explanation of the crucial elements of the intrinsic valuation model, detailing the methodology used to value each core business unit.

This individual report contains the Company overview and its competitive landscape as well as the Forecasts for the future Revenues, Operating Margins, Capital Expenditures, and the Net Working Capital Requirements. Lastly, the sections covered by António's individual report concern the Macroeconomic and sector analysis, the SWOT analysis on BMW and several topics regarding the Valuation model as well as the final recommendation.

Company Overview

BMW's origins are intertwined with the names of Karl Rapp and Gustav Otto. The year 1916 saw the merger of Flugmaschinenfabrik Gustav Otto into Bayerische Flugzeug-Werke AG (BFW) a pioneering German aircraft producer. One year later, Rapp Motorenwerke transformed into Bayerische Motoren Werke GmbH, later becoming a public limited company (AG) in 1918. The crucial shift that gave origin to the group as we know it today, happened when BMW AG shifted its engine construction operations, along with its company and brand identities, to BFW, defining 1916 as the official inception year for the group.

The transfer occurred in 1922, during a period marked by the prohibition of aero-engine production in Germany after the war, which led to a shift in focus compelling BMW to explore other avenues. It was within this context that the company introduced its inaugural motorcycle model, the R32, in 1923, and eventually transitioned into automobile production in 1928.¹

Currently, the group operates globally in three main segments: Automobile, Motorcycle and Financial Services.

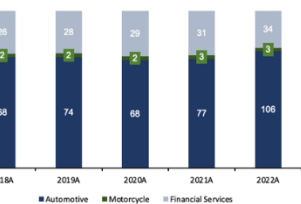
Operating segmentation

- Automotive

The Automotive segment holds the highest significance within the group, accounting for more than 74% of the total sales volume in the fiscal year of 2022. This segment encompasses the production of the three car brands under the group's control, namely BMW, MINI, and Rolls-Royce.

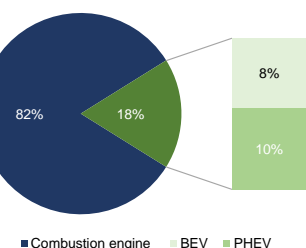
Within the segment, the BMW brand boasts an extensive line-up of vehicles, spanning from the

Graph 1: BMW revenues by segment in billion €.



Source: BMW Financial Reports.

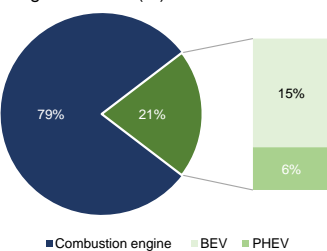
Graph 2: BMW deliveries by type of engine in 2022 (%).



Source: BMW Financial Reports.

¹ BMW Group. BMW Group History. Accessed in December 2023. <https://www.bmwgroup.com/en/company/history.html>

Graph 3: MINI deliveries by type of engine in 2022 (%)



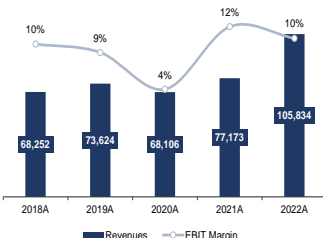
Source: BMW Financial Reports.

Graph 4: Automotive Segment: Deliveries (in 1000 units).



Source: BMW Financial Reports.

Graph 5: Automotive Segment: Revenues (in million €) and EBIT Margin.



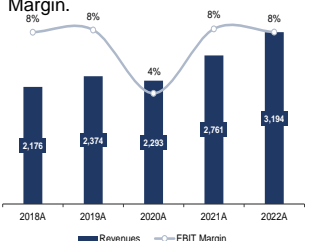
Source: BMW Financial Reports.

Graph 6: Motorcycle Segment: Deliveries (in 1000 units).



Source: BMW Financial Reports.

Graph 7: Motorcycle Segment: Revenues (in million €) and EBIT Margin.



Source: BMW Financial Reports.

premium compact to the luxury class. This range constitutes the predominant portion of cars sold, with over 2.1 million units delivered in 2022, comprising more than 87% of the group's total automotive sales. BMW embarked on its electric mobility journey as early as 2013, with the launch of the i3 and i8 series. This commitment was further solidified in 2020 with the introduction of several fully electric models. In 2022, the brand delivered a total of 172,008 Battery Electric Vehicles (BEVs) and 200,945 Plug-In Hybrid Vehicles (PHEVs), which corresponds to 8% and 9% of the brand's total deliveries, respectively.

In the premium compact segment, MINI is also actively embracing the shift towards electric mobility. The all-electric MINI Cooper SE emerged as the top-selling model within the brand's line-up in 2022. Overall, MINI delivered 292,922 vehicles in the last reported period. Notably, 15% of these were BEVs, while 8% were PHEVs. These figures highlight MINI's commitment to sustainable transportation and lay the foundation for the brand's ambitious goal of achieving 100% electrification by 2031.

The last automotive brand within the BMW group's portfolio is the epitome of ultra-luxury, Rolls-Royce. With an extensive global presence of over 150 dealerships, Rolls-Royce delivered 6,021 vehicles in the most recent reporting year. Furthermore, 2023 marked a significant moment for the prestigious British luxury brand, as it introduced its inaugural all-electric model, the SPECTRE.

Overall, the number of vehicles delivered has remained relatively consistent over the years. The company attributes this stability to the ongoing challenges posed by semiconductor component supply constraints and the impact of local lockdowns, especially in China. These factors have hindered the company's ability to meet the strong demand for vehicles. Despite this inertia in the volume of cars sold, the total sales value of the segment has consistently increased (except in 2020), with the EBIT margin remaining relatively stable and close to 10% (except in 2020).

Motorcycle

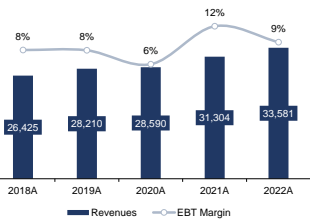
This segment comprises BMW Motorrad, which is an integral part of the company's historical heritage. The brand is focused on the premium segment of motorcycles and scooters with a wide range of models. Recently, the brand has been increasingly directing its focus towards electrification with the introduction of several new models, reinforcing the group's overarching commitment to the transition to electric mobility.

Within the group, this segment constitutes the smallest share of the total sales volume, generating approximately 3.2 billion € in revenue for the fiscal year of 2022. The segment's revenue has been steadily increasing over the past few years, maintaining a relatively constant EBIT margin of around 8%, except for 2020, when this margin reduced significantly. This sales outcome reflects the increasing number of deliveries that BMW Motorrad has been executing for the last few years in over 90 countries worldwide.

Financial Services

BMW Financial Services is a division within the BMW Group that specializes in providing a comprehensive array of financial products and services. It serves both individual and corporate customers within the automotive sector. The primary focus is on offering innovative financing, leasing, and insurance solutions designed to meet BMW customers' demands. Overall, the segment enhances accessibility to BMW vehicles while contributing to the company's global success in the automotive industry.

Graph 8: Financial Services Segment: Revenues (in million €) and EBT Margin.



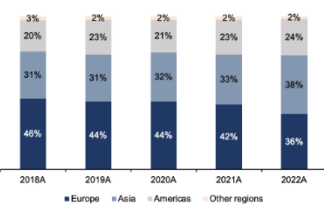
Source: BMW Financial Reports.

Financial Services' revenues accounted for more than 23% of the group's total revenues as of 2022, totalizing more than 33.5 billion €. The segment's sales have increased gradually throughout the period with the Pre-tax earnings margin throughout the period being moderately stable, going from 8.3% in 2018 to 9.4% in 2022. Much of this increase in sales, reflects the increase of sales for the industrial segment, consequently leading to an increase in the demand for financing and leasing contracts of BMW vehicles.

Geographic segmentation

Historically, Europe has stood as the most important market for BMW, where nations such as Germany and the UK accounted for 10.6% and 6.6%, respectively, of the automotive sales in 2022. Similarly, in the motorcycle sector, Germany, France, Italy, and Spain had a major contribution, representing 11.9%, 10.5%, 7.7%, and 6.2% of the group's sales, respectively. However, in recent years, there has been a surge in the group's presence in Asia, particularly in China, marking a significant shift in geographical revenue distribution. In 2022, Asia emerged as the region with the biggest contribution to the group's revenues for the first time.

Graph 9: Group revenues by region.



Source: BMW Financial Reports.

This shift reflects a broader and sustained trend of diminishing reliance on European markets for revenue, coupled with a significant growth in Asia, primarily driven by China, and in the Americas, with the USA representing around 82% of the region's revenues.

Corporate Governance: Management and Supervisory Boards

Table 1: BMW Group Board of Management.

Board of Management	
Chairman	Olivier Zipse
Customer, Brands, Sales	Jochen Goller
People and Real Estate, Labour Relations Director	Iika Horstmeier
Finance	Walter Mertl
Production	Dr Milan Nedeljkovic
Purchasing and Supplier Network	Dr Joachim Post
Development	Frank Weber

Source: BMW website.

BMW follows the European corporate governance model, commonly known as the Continental or German model. This structure comprises a Supervisory Board and a Management Board.² The General Meeting of Shareholders (10 members) and the employees (10 members) elect the Supervisory Board, adhering to the German Co-determination Act (Mitbestimmungsgesetz).³

The board of managers is composed of 7 members, with Oliver Zipse being the Chairman since October 2019 and its members are appointed for 3 to 5 years. The board has suffered changes in 2023 with two new members entering it, Jachen Goller, responsible for Customer, Brands, and sales as well as Walter Mertl, who is responsible for the financial department.

The Supervisory Board is composed of 10 shareholder representatives elected by the AGM and 10 employee representatives elected by employees of BMW and other Group companies located in Germany, which is in line with the German Co-Determination Act according to which companies with more than 2000 employees need to have half the supervisory board being representatives of workers. Norbert Reithofer was elected the Chairman as of 2015 and the term will finish in 2025.

Ownership Structure

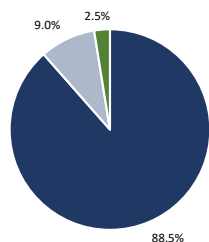
Following Herbert Quandt's death in 1982, the majority owner at the time, his shares were divided between his son Stefan Quandt, holding 26.8% of BMW's stock as of November 2023 through his investment holding AQTON SE, and Susanne Klatten, Herbert's daughter, who owns 21.7% of the company via direct and indirect holdings. The outstanding 51.5% is split between the company's

² BMW Corporate Governance Code. Accessed in November 2023.

https://www.bmwgroup.com/content/dam/grpw/websites/bmwgroup_com/company/downloads/en/2018/CGC_BMW_A

³ German Corporate Governance Code. Accessed in November 2023. <https://www.dcgk.de/en/code.html>

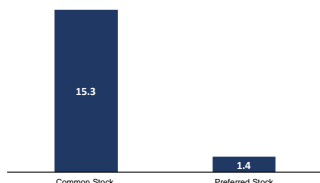
Graph 10: Shares issued on 31 December 2022.



■ Common Stock ■ Preferred Stock ■ Treasury Shares

Source: BMW Financial Reports.

Graph 11: Shares Repurchased during 2022 (in million shares).



Source: BMW Financial Reports.

Treasury Shares (0.1%) and Free Float (51.4%). Institutional investors represent nearly a 23% stake in the company ordinary stock. Geographically wise, these investors are mostly located in Europe (50.7%) and North America (41.2%), with the 3 main countries of origin being the US (35.4%), the UK (20.5%) and Germany (13%). Asian investors own 5.8% of the company's shares with the remaining 2.3% being held by investors from the rest of the world.

By the end of 2022, BMW's share capital amounted to € 662,839,475 (each share at a par value of 1€). It is subdivided into common stock, non-voting preferred stock, and Treasury Shares (more detailed explanation on this matter below), which account for 88.5%, 9% and 2.5% of the subscribed capital respectively.

Within the context of the Employee Share Programme for the financial year 2022, eligible BMW Group employees were granted non-voting shares of BMW AG preferred stock on preferential terms. The shares of preferred stock acquired through this program are subject to a vesting period of four years from the date of acquisition. In the reporting year, a total of 1,439,975 shares of preferred stock were transferred to employees. As of December 31, 2022, personnel expenses related to the Employee Share Programme amounted to €23 million. The decision to continue the program is made annually by BMW AG's Board of Management.

At the Annual General Meeting of BMW AG on May 11, 2022, shareholders approved the inaugural implementation of a measure enabling the Board of Management to acquire treasury shares through the stock exchange.⁴ And for the first time, in 2022 the group repurchased 15,312,007 shares of common stock for € 1,172 million and 1,448,950 shares of preferred stock for € 106 million. The buyback authorisation is valid until 2027 and allows the BoM to acquire a maximum of 10% of the share capital.

BMW's Strategy

BMW's strategic vision revolves around a strong emphasis on electrification and a commitment to sustainable mobility. The company has set ambitious targets for the production and sales of electric vehicles (EVs), with models like the BMW i Vision Circular and BMW Vision Dee highlighting their dedication to exploring eco-friendly practices.

Focusing on constant innovation, BMW aims to introduce cutting-edge technologies that redefine the driving experience. The NEUE KLASS, anticipated in 2025, is positioned as a symbol of a new era in products, embodying BMW's vision of "Next Level Mobility." This commitment extends beyond features, encompassing autonomous driving capabilities and digital advancements aligning with consumer expectations.

Addressing geopolitical uncertainties, BMW adopts a "local for local" strategy to reduce dependencies by increasing localized production and enhancing supply chain resilience. The strategic expansion of battery electric vehicle (BEV) production across different locations reflects BMW's effort to navigate geopolitical complexities while maintaining efficiency and flexibility in response to market shifts.

In a transformative move in their sales approach, BMW plans to introduce a direct sales model in Europe, starting with MINI in 2024 and expanding to BMW in 2026. This customer-centric approach aims to enhance the overall buying experience and bring the brand closer to consumers, showcasing BMW's commitment to staying ahead of industry trends and meeting evolving buyer

⁴ Annual General Meeting of BMW AG. Accessed in November 2023. <https://www.bmwgroup.com/en/investor-relations/annual-general-meetings.html>

expectations.

BMW Brilliance Automotive (BBA)

BMW Brilliance Automotive Ltd. is a long-term joint venture established between the BMW Group and Brilliance Group on May 2003. For the last few years, this joint venture played an important role for the group's presence in China with its operations including R&D, procurement, production, sales, and after-sales services in China, the country that recently became the leading market in terms of automotive sales volume for the German group.⁵

On 11 February 2022, BMW Group increased its stake in the BMW Brilliance, becoming for the first-time, the controlling partner of the joint venture since its inception. This strategic acquisition created a strong impact on the consolidated financial statements of the group, due to the need of incorporating both the financial activity of the joint venture on the overall group income statement and the joint venture's assets and liabilities in the consolidated balance sheet.⁶

All these accounting adaptations significantly impacted several key sections of the consolidated financial statements. For instance, the Group's automotive revenues increased by 37%, while the corresponding cost of sales surged by 179% year-over-year, despite a decrease in the total number of car deliveries during the same period.

This impact is also evident in certain balance sheet items, such as Property, Plant, and Equipment, and Intangible Assets, which saw an increase of over €7.0 billion and €9.5 billion, respectively, as a direct result of the acquisition.

Competitive Landscape

Benchmarking BMW Against European Automotive Giants

Table 2: BMW's profitability against European Competitors.

Profitability	BMW	Mercedes	Volkswagen	Stellantis
Market Cap	59.8 B€	65.9 B€	59.6 B€	71.2 B€
Revenues	105,834	150,000	279,200	179,600
EBITDA Margin	32.51%	16.60%	18.09%	14.92%
EBIT Margin	15.4%	12.3%	8.0%	11.14%
Profit Margin	17.6%	13.50%	7.90%	10.70%

Source: Own Estimates; Bloomberg.

Table 3: BMW's Liquidity and Capital Structure compared with European competitors.

Liquidity & Capital Structure	BMW	Mercedes	Volkswagen	Stellantis
Current Ratio	1.09	1.20	1.20	1.30
Quick Ratio	0.86	0.80	0.80	0.80
Debt/Assets	34.9%	45.80%	35.40%	14.60%
EBIT/Total Interest Expense	18.3	50.1	20.1	19.6

Firstly, it is fundamental to assess BMW's competitiveness against the competitors in the most similar conditions. Hence, we decided to compare some of BMW's metrics with Mercedes, Volkswagen and Stellantis, given their similarities regarding market cap and location, with their headquarters being located in Germany, except for Stellantis, located in the Netherlands. Revenues wise, Volkswagen had the most revenues in 2022, totalizing € 279 thousand million, while BMW's revenues amounted to almost 106 thousand million euros. In terms of market cap, their similarities are even clearer, with Stellantis' capitalization being € 71,239 thousand million, followed by € 65,863 thousand million from Mercedes, with BMW in the third place at 62,400 thousand million. Operational efficiency is another fundamental component when it comes to comparing companies, with both EBITDA, EBIT and profit margins being our metrics of choice. When it comes to the EBITDA margin, our estimate for BMW places it at 21.53%, being the most efficient out of these, with the second being Volkswagen 3.44 percentage points below, while for the EBIT margin BMW is still the first one, at 13.4%, closely followed by Mercedes at 12.3%. Concerning profit margins, we estimated BMW's value to be at 17.6%, once again being the leader, with Mercedes coming in second, at 13.5%. Therefore, when it comes to the European automotive giants, BMW has shown to have outstanding operational efficiency. However, while profitability cannot be overlooked, it cannot be the only concern either, so a comparison regarding

⁵ BMW Brilliance. Company Introduction. Accessed in December 2023. <http://www.bmwbrilliance.cn/cn/en/pr/bba.html>

⁶ BMW Brilliance. Company Introduction. Accessed in December 2023. <http://www.bmwbrilliance.cn/cn/en/pr/bba.html>

capital structure and liquidity provides a proper complement.

As to liquidity, our estimate for BMW's current and quick ratio provides values of 1.09 and 0.86, respectively. It is the lowest current ratio among them, while the quick ratio is the biggest one, suggesting that the firm's liquidity situation is aligned with competition, having a slightly worse overall liquidity but being less dependent of its inventories in in the event of a liquidity crisis. Relative to the capital structure, our estimated Debt/Assets is 34.9% and EBIT over interest expense is 15.9, indicating that the firm's indebtedness as a function of the value of assets is very similar to Volkswagen's, at 35.4%, with Mercedes presenting the highest value, 45.8%. With respect to EBIT's capacity to cover interest expenses, BMW has the worst value, at 40% of Mercedes value, indicating that despite the company's earnings before interest being enough to cover the interest expenses 15 times, it is a low value relative to the European competition.

BMW vs. Electric Vehicle Giants

Considering our prospects of the electric vehicles, it is crucial to evaluate BMW's competitiveness against some major EV players. We opted to compare BMW to Tesla, General Motors and Toyota as these are major players in the electrified cars' sector.

Profitability wise, BMW is only behind Tesla, which has an EBITDA margin of 22.33% and an EBIT margin of 16.81%, with BMW being placed 0.8 and 3.37 percentage points below, respectively.

With respect to liquidity, the three competitors have a quick ratio of 0.9, with the German company presenting a very similar value. As to the current ratio, BMW has the lowest estimate among them, at 1.09, with Tesla being the clear first, with a ratio of 1.5.

Moving on to the capital structure, Debt/Assets and EBIT/Total interest expense will be compared between the four. BMW's indebtedness is the second lowest, with only Tesla coming in first, with an outstanding value of 7%. In terms of the capacity to pay the interest expenses using the EBIT, BMW has the third better capacity between them, with Tesla being able to repay its total interest expenses more than 71 times with its EBIT.

In summary, BMW's comparative analysis against both European automotive giants and prominent electric vehicle players portrays a company with commendable strengths in operational efficiency and strategic positioning. It is also important to mention that BMW cannot aim at replicating Tesla's performance given that the later only produces electric vehicles. Nonetheless, BMW has a well-established position within the automotive industry both when compared to other European giants and to some of the biggest EV producers.

Relative Valuation

When assessing BMW's worth, we are using practical measures that complement the complex automotive industry with BMW's own situation. We are looking at key ratios like EV/EBITDA, EV/EBIT, and P/E. As BMW's peer we chose Mercedes, Stellantis, Porsche, Volkswagen, Volvo, Renault and Ferrari. Then, an average multiple was computed for each ratio, excluding outliers.

Firstly, we analysed the EV/EBITDA, with the average of the peers yielding a multiple of 2.80x. Then, by multiplying the multiple by our estimated EBITDA and adjusting for our estimated Net Debt of € 41,078 million we achieved a share price of € 94.2.

Secondly, we proceeded similarly for the EV/EBIT multiple. This time, the multiple arising from

Table 4: BMW's profitability against EV references.

Profitability	BMW	Toyota	Tesla	General Motors
EBITDA Margin	32.51%	15.29%	22.33%	13.98%
EBIT Margin	15.43%	8.60%	16.81%	6.57%
Profit Margin	17.6%	9.90%	16.80%	7.40%

Source: Own Estimates; Bloomberg.

Table 5: BMW's Liquidity and Capital Structure compared with EV references.

Liquidity & Capital Structure	BMW	Toyota	Tesla	General Motors
Current Ratio	1.09	1.10	1.50	1.10
Quick Ratio	0.86	0.90	0.90	0.90
Debt/Assets	34.9%	40.10%	7.00%	43.80%
EBIT/Total Interest Expense	18.3	51.6	71.5	10.5

Source: Own Estimates; Bloomberg.

Table 6: EV/EBITDA.

EV/EBITDA	94.2
Multiple	2.80
EBITDA	34,408
EV	96,342
Equity Value	55,264

Source: Own Estimates; Bloomberg.

Table 7: EV/EBIT.

EV/EBIT	131.7
Multiple	4.58
EBIT	25,842
EV	118,356
Equity Value	77,278

Source: Own Estimates; Bloomberg.

the average of the peers without the outliers was 4.58x. Considering our estimated EBIT of € 25,842 million, our computed Net Debt and an amount of nearly 587 million common stock shares outstanding, the resulting share price was € 131.7.

Thirdly, the multiple for the P/E ratio obtained was 4.6x. Considering a BMW basic EPS of € 27.31 and multiplying it by the multiple the estimated share price lies at the € 125.6 mark.

Table 8: P/E.

P/E	125.6
Multiple	4.60
Basic EPS	27

Source: Own Estimates; Bloomberg.

As we are comparing companies with different capital structures, we decided to give importance to the EV/EBITDA ratio given that it is less sensitive to variations in capital structure as it excludes interest, taxes and non-cash items such as depreciation and amortization. Nonetheless, as the automotive industry is capital intensive, and depreciation represents a significant portion of capex, we also consider the EV/EBIT approach to be suitable. Therefore, we believe that the BMW share price should be traded at a range close to the average of both methods, between € 105.96 and € 119.96.

Valuation

Revenues Forecast

BMW Group's operations are divided in three core segments (Automotive, Motorcycle and Financial Services), each characterized by distinct market conditions, growth drivers and geographic segmentation. Therefore, and due to the independent nature of the three segments, the projection of the group's revenues is delineated accordingly.

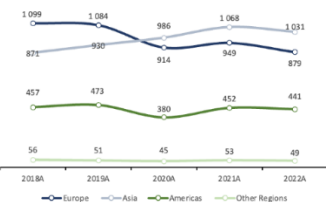
- Automotive

As previously detailed in the Company Overview chapter, the Automotive segment represents the largest stake of Revenues, which comprises the sales of the three brands under the group's control.

Historically, the group's automotive sales are more concentrated in developed markets as Germany and USA, with the European and American continents representing 46.2% and 20.2%, respectively in 2018. This geographic segmentation is a clear reflection of the market segment where BMW, MINI and Rolls-Royce are integrated. However, due to the fast development of Asian economies, with a particular emphasis on China, this region is becoming increasingly more relevant for the group's car sales. In a notable shift, China emerged as the largest country in terms of vehicles delivered by the three car brands in 2021, surpassing the USA for the first time.

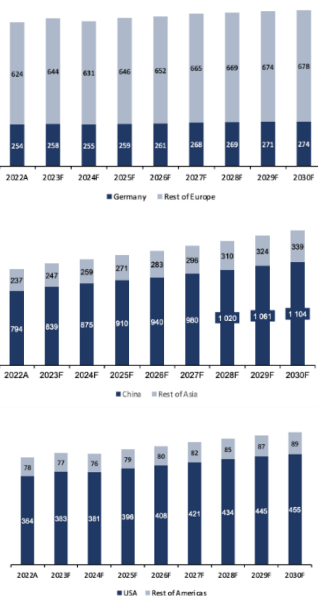
Given the distinctive characteristics of each region where BMW operates as well as the dimension of the revenues in each country/region, the forecast model is set to project automotive revenues in 7 different regions - Germany, Rest of Europe, China, Rest of Asia, USA, Rest of Americas, and Others. In each region, we consider three fundamental drivers for the increase of deliveries. Firstly, we account for the real GDP growth (IMF projections) to reflect the region's expected overall evolution in terms of purchasing power as well as its economic development in the foreseeable future. Then we consider the projections of car registrations in each of the analysed regions, drawing upon the forecast of specialised local institutions as the "Association des Constructeurs Européens d'Autos" for European countries, "China Association of Automobile Manufacturers" and the US "Bureau of Economic Analysis", which reflects the future overall market trends in the automotive sector. Lastly, we considered the group's historic evolution of deliveries in each region, in order to account for the company local positioning and the current market trends.

Graph 21: Total car deliveries by region in thousand units.



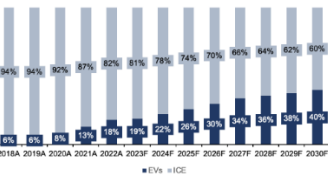
Source: BMW Financial Reports.

Graph 22: Forecast of total deliveries in Europe, Asia, and Americas (in thousand units).



Source: Own Estimates.

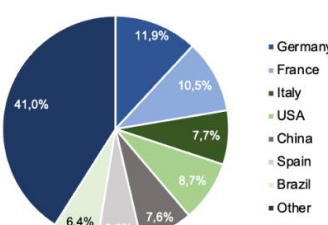
Graph 23: Forecast of car sales by type of engine.



Source: BMW Financial Reports; Own Estimates.

The automotive industry is undergoing a transformative period, where established market leaders and numerous international newcomers are competing for a prominent position in the Electric Vehicle segment. With growing concerns about CO2 emissions and global government initiatives promoting the shift towards electric alternatives over traditional Internal Combustion Engine (ICE) vehicles, we anticipate that the adoption of Electric Vehicles (EVs) will persist as the predominant trend in the automotive sector. Therefore, in the revenue forecast model, we incorporate local projections concerning future EV sales as a percentage of total car sales. This consideration influences the Average Revenue per Unit sold (ARPU), given that this segment is still priced above the traditional ICE vehicles. To estimate the “EV premium”, we compared the market prices practiced in Portugal of several ICE models and their EV equivalent, reaching an estimated 19.1% markup for the electric configurations. As these technologies keep evolving and the segment becomes more saturated, we estimate that this premium will reduce over the long term, such that the model projects the ARPU to grow at the expected long-term inflation.

Graph 24: BMW Motorrad deliveries by region in 2022.



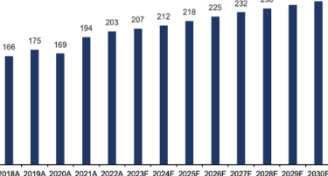
Source: BMW Financial Reports.

▪ **Motorcycle**

manufacturing premium motorcycles and scooters. Despite embodying BMW's historical heritage and consistently delivering robust financial performances, the motorcycle business unit remains The Motorcycle segment includes BMW Motorrad, the group's brand exclusively focused on the smallest in terms of revenues for the German group, with around 2% of the total revenues.

Aligned with the Automotive segment model, the Motorcycle revenue forecast model is geographically divided, with a particular focus on the seven largest markets for BMW Motorrad in terms of total deliveries – Germany, France, Italy, USA, China, Spain, and Brazil.

Graph 25: Total deliveries forecast – Motorcycle segment.



Source: BMW Financial Reports; Own Estimates.

Regarding the forecast for the motorcycle deliveries by region, the model accounts for two main drivers. Firstly, and as in the Automotive segment, we consider the IMF projections for the real GDP growth reflecting the expected economic development of each country. Additionally, to address specifically the overall motorcycle segment in each country, we use The Economist Intelligence Unit projections for the change in market demand for “Motor Vehicles and parts”.

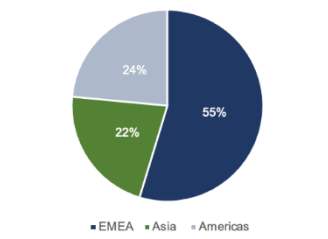
Lastly, to define the annual change in the Average Revenue per Unit sold (ARPU) by geography we considered IMF projections for the inflation in each country for the foreseeable future.

▪ **Financial Services**

In addition to the Automotive and Motorcycle segment, BMW group also provides financial services focused in the automotive sector, through credit financing and leasing of vehicles from the group brands both for retail and large business clients. As of 2022, this was the second largest segment for the overall revenues of the german group, with Revenues amounting to 33.6 billion € in the last reported year (around 24% of BMW revenue).

As a supplementary service offered by the group, the Financial Services segment’s revenue is closely tied to the other operating activities, mainly the number of vehicles delivered by the company on an annual basis. Therefore, the projected revenues for the segment have the number of automotive vehicles delivered by region each year as the main revenue growth driver.

Graph 26: Total Number of Contracts under management by region in 2022



Source: BMW Financial Reports

Firstly, we started by analysing the composition of the group’s total number of credit financing and leasing contracts under management by geography. EMEA region has the largest stake in contacts under management, followed by Americas and lastly the Asia region. This composition

reflects the different consumer behaviours from each region, for instance when comparing China's stake on the the number of cars delivered in 2022 (around 33% of the total annual deliveries), with the percentage of financing contracts from Chinese customers (13.5% of the contracts under BMW group's financial services management), one can notice that the a considerable share of the car purchases is still funded through savings, conversely to the European region.

Regarding the forecasted number of financing contracts under management, we used the projected growth of automotive vehicles as the main driver for determining the future portfolio of contracts.

Lastly, to determine the average revenue generated by each contract we determined the historical value, and then projected this amount to increase at the same rate as the average ARPU from the automotive segment within the respective region.

Operating Margins

Industrial Segments

Operating margins exhibited a pronounced response to the Covid-19 pandemic, experiencing a significant decline in 2020 followed by a robust rebound in 2021. Anticipating a long-term trajectory, we project the margins to achieve stability and approach levels reminiscent of the pre-pandemic period.

The cost of sales of the two industrial segments (Automotive and Motorcycle) are separated between manufacturing costs and all the other costs associated with the goods sold and services provided by the respective segment.

The manufacturing costs are projected to grow in line with the inflation of the countries where the company has production plants, reflecting the expected dynamic of changes in the price of materials and salaries for the long-term in such regions.

The remaining costs are forecasted by applying a consistent percentage of total revenues, thereby capturing the proportional escalation of costs in relation to the overall growth of the enterprise.

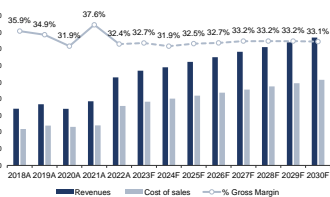
Financial Services

Due to the operating nature of the segment, interest expenses represent a significant portion of Financial Services operating costs. With the current macroeconomic environment of high interest rates, we expect the cost of sales of the segment to increase accordingly. The remaining costs of sales are projected to increase in line the revenues, once again reflecting the overall growth of the enterprise.

Research and Development Expenses

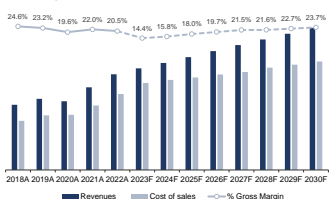
The transition to Electric mobility created a significant challenge to long-standing automotive manufacturers accustomed to operating in a mature industry. The need to embrace and develop disruptive technologies, coupled with the emergence of several new competitors from different geographies, has been pressuring traditional automotive producers as BMW to swiftly adapt to the dynamic shifts in market conditions.

Graph 27: Forecast of the Automotive Segment Operating Margin.



Source: Own Estimates.

Graph 28: Forecast of the Motorcycle Segment Operating Margin



Source: Own Estimates.

Graph 29: Projected R&D expenses.



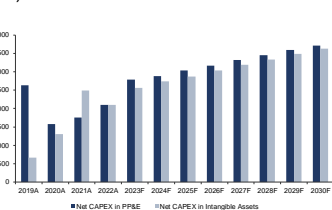
Source: BMW Financial Reports; Own Estimates.

Therefore, we expect that the expenditure in R&D will keep increasing for BMW to face the current market challenges concerning the surge of such a transformative transition in the automotive industry.

The two drivers for the increase of R&D expenses are the average of the projected inflation for the countries where BMW has research and development centres and the forecasted automotive deliveries growth in the following year, implying the need of such investment to be able to keep appealing within a more competitive context.

Capital Expenditure

Graph 30: Projected Net Capex in Intangible Assets and PP&E (million €)



Source: BMW Financial Reports; Own Estimates.

As described in the “BMW Brilliance Automotive (BBA)” section, the acquisition of a majority stake in BBA created a major impact in the Group’s Property, Plant and Equipment (PP&E) as well as in its Intangible Assets.

From January 1st of 2022 until December 31st of 2022, the group’s net PP&E grew from 22,390 million € to 32,126 million €, an increase of 9,736 million €. These changes can be explained by the additions arising from business combination (7,072 million €), Net Capex (2,101 million €), Depreciation and Amortisation (-4,827 million €) and other changes in PP&E (5,556 million €).

Regarding the forecast for the future amount of capex in PP&E we considered a fixed percentage of revenues as the main driver for the additions of this type of assets in the future, assuming the continuous need of high-end equipment and infrastructures necessary to increase the vehicles production.

To determine the amount of PP&E disposed yearly, we analysed the correlation between the historical values of disposed PP&E and its new additions, assuming a consistent proportionality (aligned with the historical trends), to estimate the future annual disposition of PP&E.

As well as for the fixed assets, the net value of Intangibles asserts within the balance sheet increased sharply from 2021 to 2022 due to the impact of BBA. To forecast the future net capex in this type of assets we started by separating the total amount of Intangible assets in 3 main categories: Capitalised development costs, Goodwill and other.

The increase of Capitalised development costs is dependent on the R&D investments (more details in the previous section), by considering that a constant percentage (aligned with the historical figures) of the overall R&D expenditure will be allocated to Capitalised development costs.

Goodwill has remained consistent over the years, with the only change occurring in 2022, primarily due to the acquisition of the majority stake in BBA. Consequently, we have considered a constant amount for this category in the long term.

Lastly, Other Intangible Assets were projected to grow as a steady percentage of the company’s revenues.

NWC Requirements

To determine an appropriate projection for the three different segments concerning its Net working capital requirements we considered an average number of days for Inventories, Trade Payables and Trade Receivable.

Table 9: Average Holding Period, Average Collection Period and Average Payable Period in number of days

	2018A	2019A	2020A	2021A	2022A
Automotive Segment					
Average Holding Period (# days)	109	110	105	113	95
Average Collection Period (# days)	12	11	11	10	13
Average Payable Period	70	67	58	73	65
Automotive Segment					
Average Holding Period (# days)	126	136	136	111	115
Average Collection Period (# days)	28	29	35	12	16
Average Payable Period (# days)	77	83	75	64	71
Financial Services Segment					
Average Holding Period (# days)	11	13	13	6	7
Average Collection Period (# days)	1	1	1	1	1
Average Payable Period (# days)	17	15	14	13	12

In the context of Inventories, we predicted the Average Holding Period in terms of the number of days for each segment. For Trade Payables and Receivables, we projected the future Average Payable and Collection Periods, respectively, for each segment. These forecasts were made by considering the firm's historical figures related to the specific financial captions.

Regarding the Operating Cash, we forecasted this amount to be 2% of the segment's annual revenue, since it's traditionally considered an appropriated proxy of the cash needed, on average, to run the core business of a firm⁷.

Source: BMW Financial Reports; Own Estimates.

⁷ T. Opler, et al. 1999. "The Determinants and Implications of Corporate Cash Holdings", Journal of Financial Economics 52 (1): 3-46