



INSTITUTO
UNIVERSITÁRIO
DE LISBOA

Equity Valuation Mercedes-Benz Group AG

Duarte Rafael Gomes Miranda

Master in Management

Supervisor:

PhD Luís Miguel da Silva Laureano, Assistant Professor

Iscte - Instituto Universitário de Lisboa

January, 2025

Department of Marketing, Operations and General
Management

Equity Valuation Mercedes-Benz Group AG

Duarte Rafael Gomes Miranda

Master in Management

Supervisor:

PhD Luís Miguel da Silva Laureano, Assistant Professor

Iscte - Instituto Universitário de Lisboa

January, 2025

Agradecimentos

Gostaria de expressar a minha mais profunda gratidão a todos aqueles que me apoiaram ao longo do meu percurso académico e que tornaram esta tese possível.

Aos meus pais, o meu profundo agradecimento, pelo constante incentivo para alcançar os meus objetivos. A vossa confiança nas minhas capacidades e o vosso apoio nos momentos mais desafiantes foram fundamentais para que eu pudesse chegar até aqui.

Aos meus colegas que me acompanharam no programa Double Degree em França, agradeço pela partilha de experiências, pelo espírito de união e pelo companheirismo ao longo desta aventura académica. Juntos, superámos desafios e crescemos tanto pessoal como profissionalmente, e serei sempre grato por ter feito parte deste grupo de amigos que espero levar para a vida.

Ao meu orientador, professor Luís Laureano, um agradecimento especial pela sua disponibilidade, paciência e valiosos conselhos.

A todos vocês, o meu mais sincero obrigado. Este percurso não teria sido o mesmo sem o vosso apoio e contribuição.

Resumo

Fundada em 1926 a Mercedes Benz é uma empresa alemã com sede em Estugarda, pioneira na indústria automóvel e uma das marcas mais respeitadas e reconhecidas a nível mundial.

Cotada na bolsa de Frankfurt com o símbolo MBG, a empresa integra o DAX 40, que reúne as 40 maiores empresas da Alemanha. Fechou o ano de 2023 com uma cotação por ação de 62.55€, e uma capitalização de mercado superior a 65 mil milhões de euros.

O principal objetivo desta dissertação é estimar o justo valor das ações da Mercedes Benz Group AG a 31 de Dezembro de 2023 e emitir uma recomendação de comprar, deter ou vender as ações.

Este projeto começa com uma análise interna da empresa, onde foram consultados os relatórios disponibilizados aos investidores bem com outras fontes para suportar a avaliação. O primeiro método utilizado é a avaliação dos fluxos de caixa descontados (DCF) utilizando como taxa de desconto o WACC, seguido de uma análise relativa para complementar a avaliação.

Com base nos resultados obtidos por ambos os métodos, a recomendação para os investidores é comprar as ações da empresa, dado que o modelo DCF apresenta um preço de 111.73€, superior ao registado a 31 Dezembro 2023. Esta subvalorização pode indicar que o mercado não reconhece integralmente o justo valor da Mercedes, possibilitando futuras oportunidades de investimento.

Palavras-Chave: Avaliação Relativa, Fluxos de Caixa Descontados, Justo Valor, WACC

Sistema Classificação JEL: G30, G32

Abstract

Mercedes Benz is a German company with its headquarters in Stuttgart that was founded in 1926. It is a pioneer in the automotive industry and one of the most reputable and well-known brands worldwide.

The company is listed under the symbol MBG on the Frankfurt stock exchange and is a member of the DAX 40, which is composed of the leading 40 German companies. At the end of 2023, its market capitalization was over 65 billion euros, and its share price turned out €62.55.

This dissertation's primary goal is to determine the shares of Mercedes Benz Group AG's fair value as of December 31, 2023, and then recommend whether to buy, hold, or sell the shares. To support the valuation, the reports that were made available to investors and other sources were consulted during the project's initial interim analysis of the business.

The WACC is used as the discount rate in a discounted cash flow (DCF) valuation, which is followed by a relative analysis to support the valuation.

Given that the DCF model indicates a price of €111.73, which is higher than the price recorded on December 31, 2023, investors are advised to purchase the company's shares based on the results obtained by both methods. This undervaluation might suggest that Mercedes's fair value is not fully recognized by the market, opening possible investment opportunities.

Keywords: Relative Valuation, Discounted Cash Flows, Fair Value, WACC

JEL Classification System: G30, G32

Table of Contents

Introduction	1
Chapter 1 Literature Review	3
1.1 Valuation	3
1.2 Discounted Cash Flow Valuation.....	4
1.2.1 Weighted Average Cost of Capital.....	6
1.2.2 Cost of Equity.....	7
1.2.3 Risk-free Rate.....	8
1.2.4 Market Risk Premium	8
1.2.5 Beta.....	9
1.2.6 Cost of Debt	10
1.3 Relative Valuation.....	10
1.3.1 Enterprise Value (EV) Multiples.....	11
1.3.2 Price Multiplies	12
1.3.3 Peer Group.....	12
Chapter 2 Company Overview	15
2.1 History	15
2.2 Business Segments	16
2.3 Shareholder Structure.....	17
2.4 Stock Performance	18
2.5 Mercedes Benz Financial Analysis	19
2.5.1 Profitability.....	19
2.5.2 Liquidity	20
2.6. SWOT Analysis.....	21
Chapter 3 Market Overview	25
3.1 Macroeconomic Outlook.....	25
3.1.1 Gross Domestic Product (GDP)	25
3.1.2 Inflation Rate.....	26

3.2 Automotive Industry	28
3.2.1 Electric Vehicle Sector.....	29
3.2.2 Challenges of Automotive Industry	30
3.2.3 Competition.....	30
Chapter 4 Valuation	33
4.1 Valuation Assumptions	33
4.1.1 Revenues	33
4.1.2 EBITDA	34
4.1.3 Depreciation and Amortization Expenses	35
4.1.4 Effective Tax Rate.....	35
4.1.5 Earnings before Interest and taxes (EBIT).....	35
4.1.6 Capital Expenditures – Capex	36
4.1.7 Working Capital	37
4.1.8 Terminal Growth Rate.....	38
4.2 Discounted Cash Flow	39
4.3 The weighted Average Cost of Capital (WACC).....	40
4.3.1 Market Value of Equity and Debt	40
4.3.2 Cost of Equity.....	40
4.3.2.1 Risk free rate	40
4.3.2.2 Market Risk Premium	40
4.3.2.3 Beta.....	41
4.3.3 Cost of Debt	41
4.3.4 WACC Calculation	41
4.4 FCFF Valuation.....	42
4.5 Sensitivity Analysis.....	43
4.6 Relative Valuation.....	44
4.7 Discussion of the Valuation Results.....	45
4.8 Analyst Coverage	46
Chapter 5 Conclusions	49
References	51

Table of Figures

Figure 1.1 Relationship between Balance Sheet and multiples	11
Figure 2.1 % Shares by Ownership.....	17
Figure 2.2 % Shares by Region.....	17
Figure 2.3 Mercedes-Benz Stock Performance from 1998 until 2023.....	18
Figure 3.1 Growth of GDP (in %) by region.....	25
Figure 3.2 Inflation rate (in %) by region	27

Table Index

Table 2.1 Operating Indicators 2020-2023	19
Table 2.2 Mercedes's Profitability Ratios (2020-2023)	20
Table 2.3 Mercedes's Liquidity Ratios (2020-2023)	21
Table 4.1 Mercedes's Revenue Projection (2024-2028)	34
Table 4.2 Mercedes's EBITDA Projection (2024-2028)	34
Table 4.3 Mercedes's D&A Projection (2024-2028)	35
Table 4.4 Mercedes's EBIT Calculation (2024-2028)	36
Table 4.5 Mercedes's Capex Calculation (2024-2028)	37
Table 4.6 Mercedes's Net Working Capital Calculation (2024-2028)	38
Table 4.7 Mercedes's TGR Calculation	39
Table 4.8 Mercedes's FCFF Calculation	39
Table 4.9 Mercedes's Target Price	42
Table 4.10 Sensitivity Analysis	43
Table 4.11 Relative Valuation	44
Table 4.12 Mercedes's Fair Value	45
Table 4.13 Analyst Coverage	47

Glossary

CAGR – Compound Annual Growth Rate

CapEx – Capital Expenditures

CAPM – Capital Asset Pricing Model

CF – Cash Flow

CN – China

CRP – Country Risk Premium

D – Debt

D/E – Debt to Equity Ratio

D&A – Depreciation and Amortization

DCF – Discounted Cash Flow

DDM – Dividend Discount Model

E – Equity

EBIT – Earnings Before Interest and Taxes

EBITDA – Earnings Before Interest Taxes, Depreciation and Amortization

E/D – Equity to Debt Ratio

ERP – Equity Risk Premium

EV – Enterprise Value

EV/EBITDA – Enterprise Value/EBITDA

FCFE – Free Cash Flow to Equity

FCFF – Free Cash Flow to Firm

g – Constant Growth Rate in Perpetuity

GDP – Gross Domestic Product

GER – Germany

IT – Italy

JPN – Japan

MVD – Market Value of Debt

MVCE – Market Value of Equity

NOA – Non-Operating Assets

NYSE – New York Stock Exchange

NWC – Net Working Capital

R_d – cost of Debt

R_e – cost of Equity

P/E – Price to Earnings
P/BV – Price to Book Value
pp – Percentage points
PV – Present Value
R&D – Research and Development
 r_f – risk free rate
ROA – Return on Assets
ROE – Return on Equity
ROIC – Return on Invested Capital
t – Tax Rate
TGR – Terminal Growth Rate
TV – Terminal Value
USA – United States of America
WACC – Weighted Average Cost of Capital
WWI – First World War
YTM – Yield to Maturity

Introduction

The main objective of this thesis is to estimate the fair value of Mercedes-Benz shares on December 31, 2023, and compare it with the price at which the shares were being traded on the market, thus making a recommendation to buy, hold, or sell the company's shares.

Mercedes-Benz Group AG, is a prominent player in the global automotive sector, is renowned for its sophisticated automobiles, innovative technology, and commitment to sustainability. The company, which employs over 166 000 people worldwide, operates in three main segments: Mercedes-Benz Cars, Mercedes-Benz Vans, and Mercedes-Benz Mobility. In 2023, Mercedes-Benz Cars generated €112.8 billion in revenue, focusing on transforming its vehicle lineup to electric models by 2030. The company's primary markets include China, the United States, and Germany.

In 2023, Mercedes-Benz's stock price displayed a relatively stable performance despite facing several global challenges, including an unpredictable energy supply in Europe and ongoing semiconductor shortages. The company closed the year with a share price of €62.55, marking an increase of 1.87 percentual points compared to the same period in 2022.

This master's project begins with a review of the literature, where different corporate valuation approaches are examined. The second part of the project examines Mercedes-Benz, covering key recent events, the company's current business plan, and its latest financial performance. It also includes a macroeconomic analysis of the automotive industry, highlighting the problems and patterns that have an impact on Mercedes-Benz's operations. Finally, the project concludes with the valuation of Mercedes-Benz, where all the assumptions used in the valuation process are outlined. This includes the estimation methods, and the presentation of the results obtained through the Discounted Cash Flow Valuation approach and the Relative Valuation approach. A sensitivity analysis is also carried out to evaluate the reliability of the valuation results and gain a better understanding of the possible variances in the estimated value of the company based on modifications to important assumptions.

CHAPTER 1

Literature Review

In the words of Brealey et al. (2011), finance is the art of managing money, which comprises financial activities including forecasting, budgeting, investing and saving. The financial stability of individuals, businesses, and entire economies is directly impacted by the ability to make prudent financial choices.

Business growth and profitability are impacted by decisions made regarding capital investments, financing options, and operating expenses. Employing resources wisely guarantees that money is allocated to the most beneficial viable applications fostering growth, innovation, and a competitive advantage.

1.1. Valuation

Analysts use valuation methods to determine the intrinsic value of an asset or a project. Valuation techniques are used to make investment decisions in different areas of corporate finance, by analyzing the company financial situation, investors can make informed decisions either if they should buy or sell the stocks.

Since valuation is a complex process and not an exact science, the choosing valuation methods and the assumptions made about future can lead to a range of different values.

Damodaran (2006) presents three mainly valuation approaches. The discounted cash flow, establishes the fair value of an asset by estimating the present value (PV) of the expected cash flows generated, discounted back at a rate that reflect the risk of these cash flows. The relative valuation, estimates the value of an asset by analyzing the price of equivalent assets related to a common variable such cash flows, earning or sales. Last, the contingent claim valuation uses option pricing models to compute the value of assets with similar characteristics.

According to Ratner et al. (2009) the use of more than one valuation methods is encouraged when we are forming a valuation opinion. If notable disparities exist between approaches may be advised give weights to each methodology reflecting the analyst level of confidence in each one of them.

The next sections will focus on the Discounted Cash Flow (DCF) and Relative Valuation (RV), with a focus on Free Cash Flow to Firm and Multiple valuation since they will be the methods used to perform the valuation of the Mercedes-Benz Group AG.

1.2 Discounted Cash Flow Valuation

As mentioned before the DCF method computes the PV of the cash flows by applying an estimated cost of capital. Giving the fact that most companies have infinite lives, and it is impossible to make a valuation for unlimited horizon, these cash flows normally are calculated in a period of five or ten years, assuming that they will continue to grow at the same rate in perpetuity (Schmidlin, 2014).

This method is considered as the foundation on which all other approaches to valuation are built (Damodaran, 2012) and, according to Fernandez (2007), the only valuation methods that are conceptually correct are the ones built based on the cash flow discounting.

Bruner and Perella (2004) emphasize that some of the strengths of this method are that it is not linked to historical accounting values, reflects the time value of money, and values intangible assets better than other methods. Although, despite this being the most widely used valuation model, it has accuracy issues due to its reliance on future projections, which makes it susceptible to subjectivity and bias (Damodaran, 2006).

There are mainly two approaches for this method: Free Cash Flow to the Firm (FCFF) and Free Cash Flow to Equity (FCFE). The FCFF is the amount of cash flow generated by the company after accounting for taxes, depreciations & amortization cost, changes in the Net Working Capital (NWC), and capital investments (CapEx) (Bodie et al., 2017).

Essentially, represents the capital available for all company investors, after all capital expenditures (Brealey et al., 2011). The formula can be defined as in Equation (1):

$$FCFF = EBIT \times (1 - t) + DeA - CAPEX \pm \Delta WC \quad (1)$$

As indicated by Pinto et al. (2010), FCFE is the cash flow that the business has available to its shareholders after paying for fixed capital investments and operating expenses, interest, and other expenses. This model works well, when a company debt-to-equity ratio is known and presumed to remain constant over the valuation horizon.

Fernandez (2007), presents a way to calculate the FCFE based on FCFF, by adding new debt and subtracting the after-tax interest expenses, as mentioned in Equation (2):

$$FCFE = FCFF - [\text{Interest Expenses} \times (1 - \text{tax}_{\text{rate}})] + \Delta \text{Debt} \quad (2)$$

According to Damodaran (2012) both approaches should present the same values for the equity in a business. Since cash flows to equity are after net debt payments, they become considerably more challenging to predict when financial structure of the company is fluctuating over time, while the free cash flows to firm are pre debt, are not affected by the financial leverage. The discount rate will depend on the chosen model, if utilizing the FCFE, the suitable discount rate will be the cost of equity, if the cash flow is the FCFF, the discount rate is the cost of capital. Given the characteristics of the company under review and the fact that the FCFF model is one of the most widely accepted models among authors, it will be the model selected for the evaluation.

To calculate the value of the company, we need to discount the free cash flows to the firm at the weigh average cost of capital (WACC), as described in Equation (3):

$$EV = \sum_{t=1}^n \frac{FCFF_t}{(1 + WACC)^t} + \frac{TV_n}{(1 + WACC)^n} \quad (3)$$

where:

- EV = Enterprise Value
- FCFF = Cash Flow generated by the company in the period t
- WACC = Weighted Average Cost of Capital
- TV_n = Terminal value of the company in the period n

For its calculation we must divide the equation in two sections. The first, corresponds to the FCFF discounted at the WACC, corresponding to all the periods to be forecasted using specific growth rates (Forecast Period). The second includes the TV discounted at the WACC. The TV estimates the company's value after the forecast period assuming the FCFF will grow at a constant rate in perpetuity.

We can compute Terminal Value using Equation (4):

$$TV_n = \frac{FCFF_{n+1}}{(WACC - g)} \quad (4)$$

where:

- TV_n = Terminal Value at the end of the forecast period
- $FCFF_{n+1}$ = First Free Cash Flow to Firm after the forecast period
- WACC = Discount Rate used to discount the cash flows
- g = Constant growth rate in perpetuity

1.2.1. Weighted Average Cost of Capital

To calculate the PV of the FCFF generated, we need to discount them with a rate that reflects the risks that company's faces as well as its capital structure. By other words, is the rate of return that investors demand on an investment portfolio that includes all the firms outstanding debt and equity.

The cost of capital is mostly calculated using the after-tax WACC. According to Brealey et al. (2011), this is the correct discount rate for all projects that have the same risk as the one in which the company operates. The organization cost of capital structure should depend on how the capital will be used, as presented in Equation (5) by Pinto et al. (2015).

$$WACC = \frac{MVD}{MVD + MVCE} \times R_d \times (1 - \text{tax}_{\text{rate}}) + \frac{MVCE}{MVD + MVCE} \times R_e \quad (5)$$

where:

- MVD = market value of Debt.
- MVCE = market value of Equity.
- R_d = cost of Debt.
- R_e = cost of Equity.

When dividing the MVD or MVCE by the total market value of the company, we have the proportion of the firm total capital from debt or equity, respectively. The cost of Debt (R_d) should be multiplied by $(1 - \text{tax_rate})$ to indicate the deductibility of corporate interest payments, as there is no such deduction in equity distributions, no adjustments need to be made in the second part of the equation.

1.2.2 Cost of Equity

A few models can be used to determine the cost of equity, but the two most popular models among managers and investors are the Capital Asset Pricing Model (CAPM) and the Dividend Discount Model (DDM).

The Dividend Discount Model (DDM) was introduced by Gordon and Shapiro (1956) and serves as a foundational technique in equity valuation. The model determines the intrinsic value of a stock by calculating the PV of all expected future dividends. The fundamental idea behind it is that a stock's value is inextricably linked to the dividends it produces for shareholders. The DDM is especially relevant for valuing established businesses with consistent dividend payments since it presumes a direct relationship between a company's ability to generate earnings and its distribution policy.

The CAPM is a financial model used to estimate the expected return on an investment by analyzing its risk relative to the market overall (Sharpe, 1964). The model incorporates three components, risk-free rate, market risk premium and the beta.

Despite the critics of being a model built on many assumptions it is still one of the most used methods to estimate the cost of equity capital (Pratt & Grabowski, 2014).

The CAPM can be described as in Equation (6):

$$R_e = r_f + \beta_L \times [E(R_m) - r_f] \quad (6)$$

where:

- R_e = Cost of Equity
- r_f = Risk-free rate
- β_L = Beta Levered
- $E(R_m)$ = Expected Market Return
- $E(R_m) - r_f$ = Market Risk Premium

1.2.3. Risk-free Rate

In theory when an investment has no default risk, its projected return is referred to as the risk-free rate. By other words, it represents the expected return on an entirely risk-free investment that an investor could expect.

According to Damodaran (2014) for an investment to be consider risk free must comply with two conditions. First, it cannot have default risk, which means that long term securities issued by the governments are the only ones with these characteristics. The second condition states that it cannot have uncertainty regarding reinvestment rates, since that majority of coupons paid by the bonds, will be reinvested at rates that are unpredictable, there is still a risk associated of not knowing what this rate will be in the future. Thus, Damodaran presents that the risk-free rate needs to be the return on a government bond with zero coupon.

1.2.4 Market Risk Premium

Also known as equity risk premium (ERP), is the extra return an investor anticipates receiving because of the increased risk associated with investing in a stock market portfolio (Ratner et al., 2009).

In a perspective of investment, is commonly define as the average annual return that an investor has on a diversified portfolio of securities, usually compared to the S&P 500 or NYSE index, subtracting the expected return on a risk-free asset (Pratt & Grabowski, 2014). There is no universal method for estimating the ERP, however, according to these authors, the most widely used method in cost of capital models for discounting the expected cash-flows is the comparison of historical returns.

Damodaran (2014) presents this method as the comparison between the long-term returns on stock investments and with the real returns on risk-free securities. By doing the difference between these two returns we obtain the historical premium.

1.2.5 Beta

Beta (β) is a statistical measure of the volatility of a security or portfolio compared to the market. As a whole, investors use the value of beta to evaluate the risk involved when establishing an investment portfolio.

According to Bernstrom (2014) the CAPM divides a firm's risk into systematic and unsystematic. The systematic risk influences all stocks and companies simultaneously, is the proportion of the asset's risk associated with general stock market movements, this risk cannot be avoided and depends on the macroeconomic outlook.

The unsystematic risks are not correlated with the market movements, but with specific internal characteristics of the company. These risks can be avoided by having a diversified portfolio of shares, if a company's share price drops due to internal factors, this can be compensated by another company in the same portfolio that increases its share price. For this reason, the investor must be only concerned about the systematic risk. The objective of beta is to quantify the systematic risk exposure that cannot be avoided.

The stock market has a beta of 1.0. If a company's beta is superior to 1.0, this means that its stock returns are more volatile than the market, and in turn riskier. Conversely, if the asset beta is inferior to 1.0, it means that it has less risk. When a stock has the same volatility as the stock market, the expected returns will be in line with the market. For public listed companies the Beta can be calculated with the formula below:

$$\beta_L = \frac{\text{Cov}(R_i, R_m)}{\sigma^2(R_m)} \quad (7)$$

where:

β_L = Beta levered

R_i = Returns on security i

R_m = Returns on the market

$\text{Cov}(R_i, R_m)$ = Covariance between the security returns and the market return

$\sigma^2(R_m)$ = Variance of market return

1.2.6 Cost of Debt

To finalize the calculation of the WACC it is necessary to determine the cost of debt (R_d) which represents the cost that the company has when borrowing funds for new investments with debt, according to the predefined financial structure of the firm (Massari et al., 2016).

Damodaran (2012) states that the simplest method for estimating the cost of debt occurs when a company's bonds are regularly traded. The (R_d) is the sum of two components, the base rate formed by the government bond yield, and the spread which is calculated on long-term yields to maturity (YTM) of businesses in different risk classes (Massari et al., 2016).

Furthermore, these criteria can only be applied for investment-grade businesses, rated as BBB or above (Koller et al., 2015). If the organizations are not rated, the cost of debt is calculated by estimating a rating or by examining recent borrowing data (Damodaran, 2012).

1.3. Relative Valuation

The relative valuation method determines a company's value by multiplying the price paid in transactions for similar companies or their trading values, then applying those multiples to the relevant financial metric of the subject company to determine its value. The basis of this method is the idea that stocks of businesses with comparable financial and operational features should trade at comparable market multiples on open markets (Ratner et al., 2009).

When utilizing this method, the process starts by choosing a peer group of companies with similar operational and financial characteristics. Some of the aspects to consider are the industry, the size of the companies, competitive position, capital structure or growth prospects.

Based on Damodaran (2012), the reason this method is so popular is that it can be completed faster and with fewer assumptions than the discounted cash flow method.

Another benefit is that it is simpler to comprehend and present to clients, it precisely reflects how the market values the stock at different levels. It does, however, have certain drawbacks. Given that it is simple to implement, factors like risk and potential growth may be neglected. This method can be easily manipulated since any value presented can be justified in the absence of transparency and a thorough understanding of the assumptions made.

According to Massari et al. (2016) there are two types of multiples used in the valuation of companies, the multiples computed regarding the market value of equity, and multiples calculated regarding the value of the company - Enterprise Value (EV).

By deducting the market value of debt from the company value, the value of equity is indirectly estimated using multiplies associated with the overall enterprise value, as shown in Figure 1.1

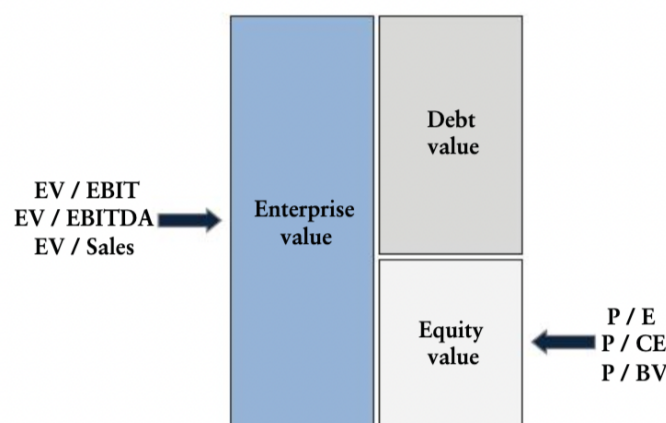


Figure 1.1 Relationship between Balance Sheet and multiples, Massari et al. (2016)

1.3.1. Enterprise Value (EV) Multiples

The EV multiples connect a company's enterprise value in relation to some value metric of choice, such as revenue, EBITDA or net income.

One of the reasons appointed to use these methods instead of the price multiples, is that price multiples only consider a company's equity value, enterprise values provide a global perspective of the organization by accounting for their debt and cash levels.

The EV/EBITDA is the most used method in this category, this is an indicator of the company as a whole and not just of their stock.

Massari et al. (2016) refer that one of the reasons investors prefer EV/EBITDA over other multiples is that represents the value of the gross cash flows from the company, its most used in industries where are significant differences between EBITDA and EBIT.

According to Pinto et al. (2015) this multiple is more appropriate than P/E to compare companies with different debt levels, because EBITDA is a pre interest indicator, while the P/E ratio is after interest.

Despite being the most utilized, there are also other multiples that can be used together or to replace these multiples, some alternatives to use in the denominator are the FCFF or the EBIT. The use of EV/Sales is a valid alternative to the price to sales ratio, it is useful when we are comparing companies with different capital structures.

1.3.2. Price Multiplies

Price multiples express the market value of each outstanding share in relation to a suitable base metric selection, such as earnings, book value or sales

The P/E is one of the most used multiples in relative valuation and determines the share price of a company relative to its earnings per share. According to Kumar (2015) the P/E vary with different growth projections, where companies with higher equity costs typically have lower P/E ratios than companies with lower equity costs. However, the author states that the P/E ratio can have disadvantages since the multiple may vary depending on the capital structure and the accounting rules used by the company.

Another commonly used metric is the price-to-book value (P/BV) ratio, which compares a company's market price per share to its book value per share. This ratio is particularly valuable for investors and analysts because it illustrates how the market perceives a company's value compared to its accounting value. The P/BV ratio is particularly helpful when assessing companies with negative earnings because, in contrast to the P/E ratio, it concentrates on book value rather than earnings. This focus makes it possible to evaluate these companies more precisely, offering substantial data for investment choices.

1.3.3. Peer Group

Selecting the appropriate peer group is one of the most crucial phases in the market approach. The conclusions reached may be misleading or incorrect if the comparable companies exhibit different traits from the company being valued.

Bernstorm (2014) states that if a good peer group is identified in terms of structure and quality of available data, 5–10 firms can be a sufficient sample. However, the number of comparable companies to analyze may vary. A smaller, more precise group is preferable to a larger, less pertinent one. For a more reliable comparison, a smaller set of carefully chosen peers guarantees that the valuation is based on businesses with comparable operational characteristics, financial profiles, and risks.

The companies should operate in the same geography, however, if this is not possible, the analyst should look for peers in regions with similar economic characteristics, risks, and market

conditions as those in which the company under valuation operates. For example, if the company operates in an emerging market, peers from other emerging markets with similar economic factors and growth potential should be considered.

The historical performance of the companies should also be considered, as past financial results are the foundation for making forecasts. The analyzed period depends on the specific circumstances of the firms being compared. If the firms experience frequent changes in their structure, such as fluctuating financial margins or significant capital expenditure variations, the analyst should expand the historical period to capture the full impact of these changes. The most important consideration is that the chosen period reflects the company's future growth potential and sustainability. It should encompass enough time to identify trends but not be so long that it dilutes relevance to the current market conditions.

The existence of outliers can be a problematic, Baker et al. (2020) defends that the best approach to avoid an inaccurate average is to exclude the outliers from calculations or using the median value instead. By doing this, the analysis is kept concentrated on the most representative data elements, allowing for more accurate and meaningful comparisons that reflect the true value of the company under consideration.

CHAPTER 2

Company Overview

2.1. History

In 1926 the merger between two main competitors Daimler-Motoren-Gesellschaft (DMG) and Benz & Cie. led to the establishment of the Mercedes-Benz Group AG as we know it nowadays.

The Benz & Cie was founded in 1883 in Mannheim by Carl Benz with his business partners Max Kaspar Rose and Friedrich Esslinger to produce gas engines. The company rapidly became the second biggest engine manufacturer in Germany. In 1886 Benz applied for a patent for his vehicle with gas engine operation, that is recognized as the world's first automobile. With the construction and success of the four-wheeled motorized Velocipede in 1897, the company increase their producing capacity.

Founded in 1890 by Gottlieb Daimler, DMG was initially created to produce lightweight and high-speed internal combustion engines. However, after the huge cost of the operations, he is forced to find new business partners, Max Duttendorfer and Wilhelm Lorenz. Later, Wilhelm Maybach a Daimler's long-term friend joins the company as head of design, he would be later responsible for the belt-driven car, the first automobile produced in large quantity by DMG. The Mercedes 35PS car designed by Maybach was presented in 1901 at the "Nice Race Week", and after its huge success, DMG starts a new era of contemporary cars. After WWI, due to economic reasons the two business rivals start to arrange strategies between the "Mercedes" and "Benz" brands to tackle the market.

The merge took place in June 1926, with a new established company, Mercedes-Benz Automobil GmbH. The newly formed company joint their innovations, and presented their automobiles in 1926 Berlin Show, starting from that moment one of the most recognized and prestigious automotive brands in the world.

The following decades were of global expansion, Mercedes presented high sales numbers being one of the leaders in European Automotive Industry. To continue expanding their operations the company made partnerships with several distributors and set production facilities in several countries around the world. In 1998 due to the globalization and the evolution of the car production industry, took place the merge with Chrysler Corporation, an American corporation, giving rise to DaimlerChrysler AG. In 2010, due to low trading volume, the

company announced the withdrawal of its shares from the New York Stock Exchange (NYSE) where they had been publicly traded since 1993. The next years were of expansion, the company launch the new fleet of electric automobiles, with the aim of making all its vehicles completely electric by the end of 2030. In 2021 the company launch the spin-off between the truck and bus business, and the passenger cars, making two separate entities, the Daimler Truck Holding AG and the Mercedes Benz Group, respectively, the latter being the company under evaluation in this report.

By December 31, 2023, Mercedes had more than 166,000 employees on over four continents. That year the company sold 2,491,841 vehicles, reporting revenues of over 153,218 million euros. On top of this positive year, the Mercedes brand was also considered the most valuable luxury automotive brand worldwide (*Mercedes-Benz - Interbrand*, 2024)

2.2. Business Segments

Mercedes-Benz is today one of the most successful automotive companies worldwide, known by its quality, luxury design and technology. The company has production facilities in more than 30 localizations, providing services and vehicles to almost every country. It is currently divided in three segments: Mercedes-Benz Cars, Mercedes-Benz Vans, and Mercedes Benz Mobility.

The Mercedes-Benz Cars is the segment that generates substantially more revenue (2023: €112,756 million), with the objective to become the vehicles all electric until the end of the decade. The company rebranded its portfolio into three categories, Top End that contains the models Mercedes-AMG, Mercedes-Maybach, the G-Class, the S-Class, the EQS Sedan and the GLS. The Core with C-Class and E-Class, and the Entry with A- and B-Classes models. In 2023 the most significant markets were China with 36% of units sold, followed by the United States with 15%, Germany 11%, Other European Markets 21%, and South Korea 4%.

The Mercedes-Benz Vans offers a comprehensive range of vans globally, including the following models, Sprinter large, Vito mid-Size and Citan urban for the commercial segment, and for the private sector the V-Class, Marco Polo camper vans and T Class models. The implementation of electric vehicles in this segment has been a priority has well, having today already 4 all electric vans. In 2023, achieved a revenue of €20,288 million, in this segment the markets with more units sold were Germany with 25%, Other European Markets with 37%, United States with 17%, and China with 7%.

To support the worldwide sales of the vehicle brands owned by the Mercedes-Benz Group, the Mercedes-Benz Mobility division provides a comprehensive range of customized mobility and financial services. These services include fleet management services, flexible subscription and rental models, leasing, financing, and insurance. In 2023 had around 4.3 million leased vehicles across 34 markets. The group launch their own charging service, this network has more than 1.5 million public charging points that provides the easy accesses for the company clients, and the plan is continuing to expand this service by performing contracts with different partners. For this segmented revenue amounted to €26,718 million in 2023.

2.3. Shareholder Structure

Mercedes Benz Group AG as of December 31, 2023, had 1,041 million shares outstanding at a price of 62.55 € each. The Institutional investors have the highest percentage of shares with 43.66%. The largest individual shareholder is the BAIC Group with 9.98% of the voting rights, followed by the Chinese investor Li Shufu and the Kuwait Investment Authority. The shareholder structure is presented in below:

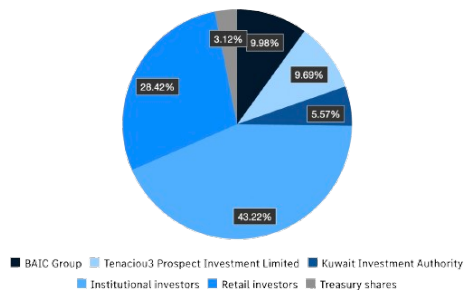


Figure 2.1 % Shares by Ownership, Source: Mercedes’s Institutional Website

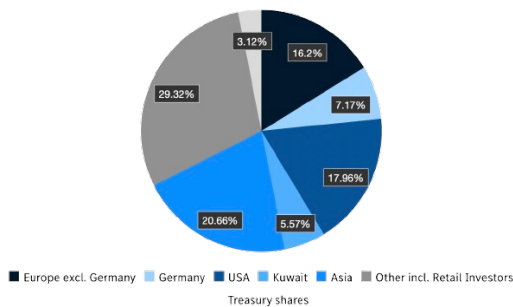


Figure 2.2 % Shares by Region, Source: Mercedes’s Institutional Website

2.4. Stock Performance

Mercedes-Benz shares (MBG.DE) are listed in Frankfurt and Stuttgart stock exchange. Since has been traded, the company stock price has registered significant variations in price along the years (see Figure 2.3).

In 2009 the global financial and economic crisis led to a slowdown of the automotive industry leading Mercedes to the lowest share price in its history (14.44€).

The following years were of recovery, until 2015 the general trend in share prices was upward, the company recorded the highest share value of its history (80.65€). The growth of around 30% in the first quarter was mainly due to the confidence that investors showed in the positive results of the group in the previous year.

From 2016 Mercedes's stock began a downward decline in value, following the trend of stock exchanges worldwide. The main reasons were the instability in the Middle East and the fall of commodities prices.

In 2020 regarding the coronavirus, Mercedes announced the suspension of production activities in Europe, resulting in a drop of the share price to the lowest value of the year 21.84€ on March 19.

The year 2023 was characterized by the unpredictable and expensive energy supply in Europe and the ongoing semiconductor supply shortages, regardless, Mercedes continued its strategy to increase electric mobility strengthening their supply chain. The company closed the year at a share price of 62.55€, an increase of 1.87p.p compared to the homologous day of 2022.



Figure 2.3 Mercedes-Benz Stock Performance from 1998 until 2023, Source: Mercedes-Benz Group AG Institutional Website

2.5. Mercedes Benz Financial Analysis

2.5.1. Profitability

Analyzing Table 2.1 we can see that the company's revenue in 2020 due to the pandemic fell sharply. However, in recent years it has been recovering with a CAGR of 7.96% (2020-2023). Gross margin has remained relatively stable over this period, in 2023 was 22.44%, the improvement in the pricing strategy combined with a slight increase in sales volume had a positive impact on gross profit. On the other hand, the significant increase in the price of raw materials, one-time expenses paid to suppliers and additional costs related to inflation prevented gross profit from being higher.

The operating margin has not fluctuated much because of the company's ability to control its operating costs over the years, in 2023 was 12.83%. The net margin also fluctuated over the period under analysis, having recently stabilized at 9.48% in 2023, indicating that the company has become more efficient at converting sales into profit.

Table 2.1 *Operating Indicators 2020-2023*

	2020	2021	2022	2023
Revenues	121 778	133 893	150 017	153 218
<i>YoY (%) Growth</i>	-29.5%	9.95%	12.04%	2.13%
Gross Profit	21 186	30 675	34 020	34 379
<i>Gross Margin (%)</i>	17.4%	22.91%	22.68%	22.44%
Operating Income	6 091	16 028	20 458	19 660
<i>Operating Margin (%)</i>	5.0%	11.97%	13.64%	12.83%
Net Income	4 009	23 396	14 809	14 531
<i>Net Margin (%)</i>	3.29%	17.47%	9.87%	9.48%

Source: Adapted from Mercedes-Benz Company Reports

Looking to the profitability ratios (see Table 2.2) all increased in the period 2020-2023. In 2023, Mercedes-Benz's profitability ratios showed a continued decline from the peak performance in 2021, indicating challenges in maintaining high efficiency and profitability. The ROA was 5.50%, a slight decrease compared to previous years, reflecting a reduction in asset utilization efficiency. Similarly, the ROIC was 7.10%, which, while still positive, showed a decline from 2021's strong performance of 11.20%, indicating that the company faced more

difficulty generating high returns from its invested capital. ROE also decreased to 16.10% in 2023, down from the remarkable 34.70% in 2021, signaling that Mercedes-Benz was generating less profit relative to shareholders' equity.

These declines in profitability ratios suggest that Mercedes-Benz experienced operational and market challenges in 2023, such as higher costs, increased competition, or the effects of investments that have not yet yielded strong returns. While the company remained profitable, the decrease in these key profitability metrics highlights the difficulties in sustaining the exceptional levels of performance seen in 2021. Despite this, Mercedes-Benz continues to generate positive returns, indicating a relatively stable financial position, though the focus should be on addressing the factors contributing to the decline in profitability.

Table 2.2 Mercedes's Profitability Ratios (2020-2023)

	2020	2021	2022	2023
Return on Assets (ROA)	1.20%	8.40%	5.60%	5.50%
Return on Invested Capital (ROIC)	1.90%	11.20%	7.30%	7.10%
Return on Equity (ROE)	5.90%	34.70%	18.40%	16.10%

Source: Bloomberg Terminal

2.5.2. Liquidity

Liquidity ratios are financial measurements used to evaluate a company's capacity to pay short-term debt obligations with its most liquid assets. They are essential tools for investors to assess how well a company can manage its short-term financial obligations and whether it has enough resources to continue operating smoothly. Some of the most used ratios by investors to assess an organization's ability to handle short-term difficulties are the current ratio, quick ratio, and cash ratio. The current ratio is a useful tool for assessing the liquidity of a business. It is computed by dividing the current assets of a business by its current liabilities. This ratio shows if there are sufficient assets in the company that can be quickly converted into cash to pay for its current liabilities.

The quick ratio, sometimes referred to as the acid-test ratio, is a more stringent indicator of liquidity than the current ratio because it does not include inventories in current assets. The quick ratio concentrates on the most liquid assets of the business by eliminating inventory. This helps investors determine whether the company can pay its debts without having to sell inventory, which is not always a quick or sure way to make cash, particularly in times of

recession when inventory might be difficult to sell or liquidate. Finally, using only cash and cash equivalents, the cash ratio determines the company's capacity to settle its short-term obligations. Only the company's most liquid assets are considered, making this the most conservative of the liquidity ratios. Higher cash ratios show a stronger capacity to pay short-term obligations without having to sell off other assets or look for other sources of funding.

Table 2.3 Mercedes's Liquidity Ratios (2020-2023)

Liquidity Ratios	2020	2021	2022	2023
Current Assets	115 264	102 929	102 874	104 032
Current Liabilities	99 809	87 675	88 403	82 434
Current Ratio	1.15	1.17	1.16	1.26
Current Assets (-) Inventories	88 820	81 463	77 253	76 738
Current Liabilities	99 809	87 675	88 403	82 434
Quick Ratio	0.89	0.93	0.87	0.93
Cash and Cash Equivalents	23 048	23 182	17 679	15 972
Current Liabilities	99 809	87 675	88 403	82 434
Cash Ratio	0.23	0.26	0.19	0.19

Source: Own Elaboration

The current ratio has been increasing steadily over the years, meaning that current assets have increased in relation to liabilities, in 2023 it reached its highest value of 1.26. Although the quick ratio has increased over the years, it has always been below 1, by looking at table 2.3 in 2023 reached its highest value 0.93. The large gap between the current ratio and quick ratio indicate that Mercedes relies on inventory to mee its short-term needs. The cash ratio has deteriorated over the past years, despite the reduction of Mercedes current liabilities, the decline in cash and cash equivalents has outweighed this effect.

2.6. SWOT Analysis

SWOT analysis is a technique for comprehending the internal and external elements influencing a project or business. Through a systematic examination of their advantages, disadvantages, opportunities, and threats, organizations may develop properly informed strategies to handle obstacles and capitalize on expansion prospects. It offers an in-depth review of the

organization's current situation and supports the decision-making process for actions that promote success.

Strengths:

Prestige brand and credibility: Mercedes-Benz is synonymous with high quality and luxury standards. Owning a Mercedes is considered a sign of status and success, the durability of this vehicles is guaranteed through the brand's commitment to rigorous production processes and the use of high-quality materials.

Worldwide visibility: The company established a global presence very early on, becoming one of the best-known car brands in the world. Its logo, the three-point star, is one of the best-known logos in the world. To strengthen its connection with its customers, the brand invests in sponsorship at prestigious events, reinforcing its cultural presence in different markets.

Diversified product portfolio: The German company has a wide range of vehicles, including everything from SUVs to high performance cars, commercial vans and electric vehicles, allowing to meet diverse consumer needs. This product diversity helps Mercedes build long-term brand loyalty, encouraging customers to stay with the brand as their preferences and life circumstances evolve.

Weakness:

Hight manufacturing costs: To maintain its reputation for innovation, Mercedes makes significant investments in R&D, especially in specific features like autonomous driving and electric vehicles technology. To meet the rigorous quality control, the company requires specialized labor, which is expensive and can raise the manufacturing costs.

Competitive Market: The automotive industry is very competitive, and for companies to succeed they must be able to distinguish themselves from the competition. The main markets where Mercedes has a major presence, such as America and Europe, are becoming increasingly saturated, and it is becoming more difficult to compete with the emergence of brands that offer cheaper options.

Environmental Concerns: To combat climate change, governments all over are enforcing more robust emissions regulations. With the aim to fulfill consumer demand for more sustainable options, Mercedes has been shifting its focus meet sustainability standards. However, balance luxury with sustainable options can be challenging, and if Mercedes fails to adapt to these expectations this can affect the company's public image and sales.

Opportunities:

Technological disruption: Advances in digital technologies, artificial intelligence, electric powertrains, and autonomous systems are driving a rapid transformation of the automotive industry. Mercedes-Benz can take advantage of these disruptions to improve its operations, products, and market position. The shared mobility can be an opportunity to Mercedes expand their operations, for example to mobility services, such as car sharing platforms or car subscription services.

Collaborations with different companies: Through partnerships, Mercedes-Benz can take advantage of outside knowledge in fields like artificial intelligence and autonomous driving, cutting significantly the time it takes to provide these next generation features to customers.

Expansion to emerging markets: Entry into these regions diversifies revenue streams, reduces reliance on saturated markets, and leverages Mercedes-Benz's strong global brand to attract appealing consumers.

Threats:

Disruptions in the supply chain channels: The semiconductor crisis has affected the automotive industry, and in recent years has caused serious damage to companies, and Mercedes was no exception. The shortage of this components led to the slowdown of the operations leaving potential customers waiting for extended periods.

Shift in consumer preferences: The whole experience, including brand engagement, tech integration, and interior comfort, is now more important to consumers. Mercedes-Benz can concentrate on meeting the demands of luxury buyers by providing not only excellent automobiles but also an exceptional customer experience. Meeting these high standards, though, can be costly and time-consuming.

Government Regulations: Mercedes-Benz's capacity to export automobiles internationally is impacted by restrictions on imports and trade tariffs. To decrease its dependency on imports and minimize the effects of trade tariffs, Mercedes-Benz has made investments in domestic production facilities in important markets like China, the United States, and India.

CHAPTER 3

Market Overview

3.1. Macroeconomic Outlook

When valuing a company, it is essential to consider the macroeconomic outlook because it has a significant impact on the company's future growth and performance. Critical macroeconomic variables that directly affect a company's sales, profitability, and financing costs include GDP growth, inflation, and interest rates. While higher interest rates increase the cost of borrowing, which has an impact on cash flow and profits, a strong economy increases consumer demand and revenues. In addition to impacting stock prices and valuation multiples, macroeconomic factors also affect investor sentiment and the discount rates that are used in valuation models to account for risk. The sensitivity particular to a given industry highlights how crucial it is to comprehend macroeconomic trends.

3.1.1. Gross Domestic Product (GDP)

GDP is an indicator of economic performance, reflecting the level of economic activity, productivity, and growth. It plays an essential role guiding the economic policies, helping to determine investment choices, and assessing the overall health and stability of an economy. Figure 3.1 presents the GDP growth from the three most important markets for Mercedes, by revenue.

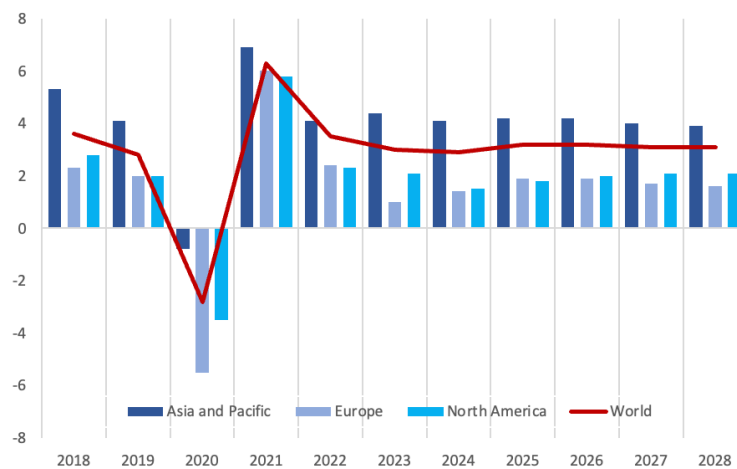


Figure 3.1 Growth of GDP (in %) by region, Source: World Economic Outlook Update, 2024

From Figure 3.1 we can observe that in 2020 due to Covid-19 pandemic, the World GDP decreased significantly with a negative variation of 2.8%. Europe was the region that registered the most negative variation with a value of -5.5%, followed by North America with -2.6%. In 2023 the World GDP grew around 3%, Asia and Pacific continued to experience robust growth in the range of 5%, supported by structural reforms, technological advancements, and rising consumer demand in emerging markets. North America and Europe noticed a return to more moderate growth rates, ranging from 1 to 3 %. Europe, on the other hand, experienced slower growth because of structural issues like low productivity growth. After the volatility of the pandemic, global growth stabilized between three and four percent, indicating a return to more normal economic conditions.

The global economy is predicted to grow at a steady 3% annual rate through 2028, according to the growth outlook. Asia and the Pacific are still the primary drivers behind global growth, which is a result of the region's persistent integration into global value chains and robust domestic demand. With growth stagnating below 2%, Europe continues to be the region with the slowest growth, which is indicative of serious problems like declining population and lower levels of innovation. Supported by industries like technology and finance, North America's growth stabilizes at roughly 2%, indicating a stable market. The economy is growing steadily on a global scale, with the Asia-Pacific area continuing to be crucial to the expansion of GDP overall.

3.1.2. Inflation Rate

Inflation is the rate at which prices for goods and services generally increase over time. It is an essential indicator of the strength and stability of an economy, influencing monetary policy, decisions about investments, and consumer purchasing power.

In 2022, inflation reached record levels. According to the International Monetary Fund, the global economy experienced an 8.9% increase in consumer prices (*IMF Data*, 2023). Europe was the region with the highest inflation rate at 10.8%, primarily driven by geopolitical tensions. The war between Russia and Ukraine caused significant disruptions in global supply chains, leading to sharp increases in the prices of key commodities such as energy and fuel. This crisis extended its impact beyond Europe, reaching North America, where inflation also climbed to one of the highest levels, registering a rate of 6.6%. To counteract these surging inflation rates, major central banks such as the European Central Bank and the Federal Reserve

implemented aggressive monetary policies by raising interest rates. Despite the alarming peak in 2022, inflation has shown signs of stabilization and decline in subsequent years. The Figure 3.2 illustrates a steady drop in inflation rates across all regions. Asia and Pacific saw a 5% drop in inflation by 2023 and projections indicate a gradual decline to about 4% by 2026. Long-term forecasts suggest that inflation in this region will stabilize at just over 3% by 2028, reflecting a return to normal economic conditions. Europe followed a similar pattern, with inflation steadily decreasing after 2022, and by 2028, it is expected to be around 3%. The aggressive monetary interventions, coupled with improvements in supply chain efficiency, have contributed to this downward trend.

North America, which experienced one of the sharpest spikes in inflation during 2022, has also shown notable progress in reducing inflationary pressures. In 2023, inflation in the region decreased to 6% and is projected to decline further to 3% by 2028. This rapid improvement reflects the effectiveness of policy interventions by the Federal Reserve and a rebound in supply chain resilience.

By 2023, the global inflation rate had decreased to 6%, and estimates suggest it will stabilize at approximately 3.5% by 2028. This trend underscores the coordinated efforts of policymakers and international organizations to address the challenges of inflation through a combination of fiscal discipline, targeted interventions, and sustained investment in supply chain infrastructure.

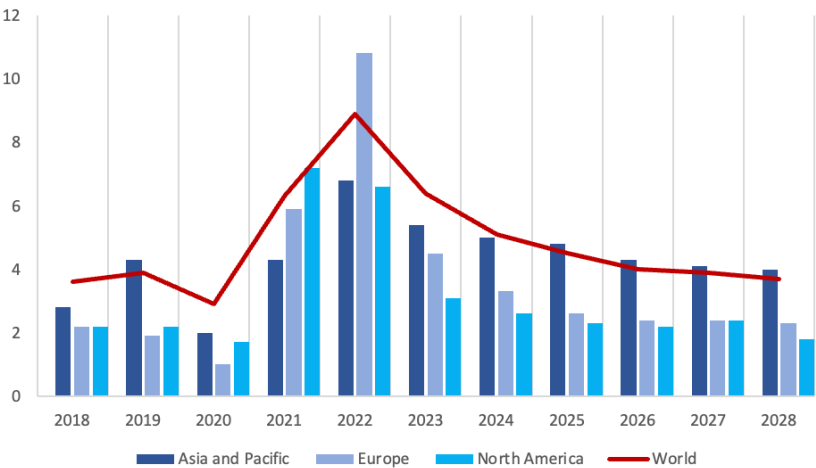


Figure 3.2 Inflation rate (in %) by region, **Source:** World Economic Outlook Update 2024

3.2. Automotive Industry

The automotive industry encompasses the design, development, production, and sales of vehicles propelled by internal combustion engines, electric motors, or alternative propulsion methods. The automobile sector is a vital component of global economy, generating revenue, providing employment and fostering innovation across numerous sectors. The industry is influenced by economic conditions, government policies and technological innovations, and as a result it is always evolving trying to adjust new trends and consumer demands.

The sector registered a break in the growing trend that had been registered in previous years, with pandemic and restrictions to circulation. Manufacture companies were forced to close temporarily which consequently caused a shortage of parts and components needed to produce vehicles. This caused both manufacturing and shipment delays, which had an additional adverse effect on the industry.

Although, the automotive industry showed resilience, assembly lines and component manufacturers have adapted their operations by enacting rigorous safety protocols and exploring innovative methods of customer service. Online transactions established importance, as businesses accelerate their digital transformation, enabling customers to research and purchase their cars through online platforms.

The automobile car sector has been a key driver in European economy, with a contribution to GDP of 7%, however in 2022 China overpassed Germany and became the biggest exporter of light vehicles, with 3 million cars exported (Cornet et al., 2023). For 2023 is expected a rise in car sales worldwide, the production reach 86 million units, an increase of 8.9% compared to 2022 (*S&P Global Mobility Forecasts Auto Sales in 2023*).

The forecast for 2024 is an increase of 2.8% to 88.3 million units. The main concern is the consumer demand, mainly due to credit and lending conditions. In the USA the volume of sales is expected to reach 15.9 million units, a 2% raise from projected in previous year, Europe should sell 15.1 million units reflecting an increase of 2.9%. The automobile sector of both economies relies on economic recession risks, high interest rates and a recovering of customer demand.

3.2.1. Electric Vehicle Sector

The EV sector is mainly composed by battery electric vehicles and plug-in hybrid electric vehicles. One of the key factors driving the evolution of the sector is the increasing awareness among consumers regarding climate change. The urgency to reduce greenhouse gas emissions, led Governments around the world to implement strict laws and give incentives to encourage the adoption of electric vehicles, including direct subsidies that lower the initial cost and tax reductions to new purchasers. The economic advantages associated with owning EV, such as lower operating costs and low maintenance have also been a major factor in drawing customers.

In 2023 were registered almost 14 million new electric cars in 2023, an increase of 3.5 million units compared with 2022. Although sales increased globally, they were mainly felt in three major markets. China accounted for nearly 60% of sales in 2023, followed by Europe (25%), and the USA (10%). Since these three markets together account for nearly 95% of all electric car sales worldwide, the adoption of electric vehicles in these markets will have a significant impact on the global automotive industry.

With more than 1.2 million electric vehicles exported in 2023, an 80% rise over the previous year, China emerged as the world's top exporter of these vehicles. Over the past few years, government subsidies have been used to promote growth in this sector. Due to this, the governments of the United States and the European Union have imposed tariffs to stop unfair competition from Chinese producers.

In Europe almost 3.2 million new electric car registrations occurred in 2023, a nearly 20% increase from 2022. Similar growth trends can be seen in the 2.4 million sales that occurred within the European Union. Particularly, with battery electric cars accounting for 18% of car sales and plug-in hybrids for 6%, Germany became the third nation, after China and the United States, to record more than half a million new battery electric cars in a single year.

In United States the demand for EVs remained high even though the growth rate was lower than it was in the preceding two years. In 2023 the car electric car registrations reached 1.4 million marking over a 40% increase from 2022. This increase was largely due to modifications made to the Clean Vehicle Tax Credit, which made more EV models eligible for the benefit and coincided with price reductions on several electric vehicles.

The electric vehicle it is expected to grow exponentially, for 2024 the market revenue is projected to reach 623.3bn\$ globally, and for the period 2024-2028 is expected a compound annual growth rate of 9.82%

3.2.2. Challenges of Automotive Industry

One of the biggest hazards is market volatility, which can result in erratic sales patterns due to changes in consumer demand triggered on by recessions, increases in interest rates, or adjustments in disposable income. The industry is particularly vulnerable due to its reliance on complex global supply chains, which can be disrupted by natural disasters, and geopolitical conflicts. These events can lead to delays in production, shortages of components, and higher costs.

Semiconductors are fundamental parts in the production of practically all electronic devices manufactured worldwide, and without them a large part of production has decreased. These components are so important to the automotive industry considering that one single car contains more than a thousand chips.

As previously mentioned, the automotive sector was greatly affected by the lack of these components, in 2021 the analysts estimate that 9.5 million units of light vehicle were lost due lack of semiconductors, in 2022 this number overpassed the 3 million. Since then, the industry is trying to find solutions. To prevent these incidents some of the world's largest manufactures, found ways to improve their operations. For example, Tesla is developing a new software to be able to work with new suppliers, while the Volkswagen Group, as part of its plan, announced that by 2030 it wants to produce its own microchips, to prevent its dependence on external suppliers. Mercedes established a partnership with one of the leading chip manufactures - Nvidia - to produce special semiconductors with characteristics adapted to the company's vehicles using Artificial Intelligence.

Furthermore, the integration of advanced technologies, such as Artificial Intelligence, connectivity, and autonomous driving technologies, increases the industry's exposure to cybersecurity threats and data breaches, all of which require significant amounts of investment.

3.2.3. Competition

The automotive industry is characterized by intense competition and continuous evolution, with companies striving to capture market share in an ever-changing landscape. The emergence of new players offering innovative features and customer-centric approaches adds challenges for traditional brands to maintain their positions. Mercedes-Benz's ability to innovate and deliver superior vehicles will play a key role in sustaining its appeal and prominence in the market. Below, we examine some of Mercedes-Benz's main competitors based on their strategic positioning, product offerings, and market performance.

Tesla, founded in 2003, has become a dominant force in the automotive sector due to its pioneering role in fully electric vehicles and advancements in autonomous driving technologies. The company's flagship models, such as the Model X and Model Y, have gained widespread popularity, particularly in key regions like the United States and Europe. Tesla's leadership in electric vehicle sales across several European markets underscores its growing influence. The company remains focused on reducing manufacturing costs, expanding its production capabilities, and scaling its operations globally to maintain its competitive edge.

BMW, a longstanding rival of Mercedes-Benz, is renowned for its luxury vehicles, engineering excellence, and global footprint. Over the years, BMW and Mercedes have been locked in a fierce competition for market leadership across various automotive segments. While BMW faced challenges related to delivery disruptions and a slowing Chinese market, it has demonstrated resilience by increasing its market share in Europe and maintaining a strong presence in the United States. In the electric vehicle segment, BMW continues to see growth, leveraging its expertise and commitment to sustainability.

Toyota, established in 1937 by Kiichiro Toyoda, is a major player in the global automotive industry. Known for its wide range of vehicles, Toyota has also been a leader in hybrid and electric technologies, with the Prius being one of the most iconic hybrid cars globally. Despite facing some setbacks in consolidated vehicle sales, Toyota has managed to achieve growth in sales revenue across key regions like North America and Europe. The company's adaptability and strong focus on innovative technologies have helped it remain a significant competitor in the industry.

BYD, founded in 1995 in Shenzhen, China, initially specialized in battery manufacturing before expanding into the automotive market. Over the years, BYD has established itself as a leader in electric vehicles and batteries, driven by its strong reputation in the Chinese market and increasing global presence. BYD's ability to align with the global electrification trend has positioned it as a key player in the automotive transition, with its expanding market share showcasing its responsiveness to shifting consumer preferences.

Volkswagen Group, founded in 1937, has evolved into one of the largest automotive conglomerates in the world. With a diverse portfolio of brands such as Audi, Porsche, and Lamborghini, Volkswagen has solidified its position as a leader in the industry. The group has made significant investments in electric vehicles and sustainability initiatives, aiming to strengthen its foothold in the rapidly growing EV market. However, Volkswagen has also faced challenges, including supply chain disruptions and heightened competition, which have affected its production and sales.

CHAPTER 4

Valuation

We will value Mercedes-Benz using two distinct approaches. First, we will apply the FCF model, discounted by the WACC, as it is one of the most common methods. We will cover the period from 2024-2028, followed by an assumption of a terminal growth rate for long-term value estimation. Next, a sensitivity analysis will be conducted to assess how variations in key variables, namely WACC and TGR affect the overall valuation outcome. To complement this analysis, we will perform a relative valuation by comparing Mercedes-Benz with other companies that have similar characteristics and operate within the same industry. This comparative approach will provide further context to the valuation.

4.1 Valuation Assumptions

This thesis will thoroughly assess every assumption related to stock price, considering market behavior, stock price trends, and Mercedes-Benz's past financial performance. The valuation aims to offer a realistic and knowledgeable evaluation of Mercedes-Benz's stock price potential by firmly establishing these assumptions in a combination of factual data and specific industry context. This method seeks to improve the financial model's reliability by offering insightful information about the company's market value and strategic positioning in the global automotive industry.

4.1.1 Revenues

Since it impacts other assumptions and assists in assessing the company's potential to create value, revenue generation is a major factor in determining Mercedes-Benz's overall valuation. Before estimating Mercedes future revenue, it is critical to analyze the challenges the business is currently facing as well as the automotive industry and how these problems may affect the revenue growth of Mercedes in the future.

As previously mentioned, the automotive sector has faced some difficulties. The inflation recorded in recent years and the semiconductor crisis were some of the factors that impacted the industry's growth. The industry is also facing a transformation with the growth of the electrical sector. This change requires high initial investment in new technologies that can compromise profits in the short-term.

The company's latest results reveal a decline in business activity this year, falling below expectations. As previously mentioned, the financial performance for 2024 is anticipated to be significantly weaker compared to the same period last year. According to Mercedes' estimates, revenues are projected to experience a substantial decrease, highlighting a challenging year for the company. In 2024, a rate of -4.7% will be used to project revenues, as this is the rate recorded up to September, and is expected to continue until the end of the year.

For the rest of the period up to 2028, a historical rate will be used, and the calculations are shown below.

Table 4.1 Mercedes's Revenue Projection (2024-2028)

million EUR	2023	2024 F	2025 F	2026 F	2027 F	2028 F
Revenues	153 218	146 017	150 928	156 005	161 252	66 676
Growth	2.13%	-4.7%	3.36%	3.36%	3.36%	3.36%

Source: Own elaboration

4.1.2 EBITDA

To estimate EBITDA, we will use one of the most widely used methods, using the average of the historical EBITDA margin. The EBITA margin provides information about the company's profitability before taxes and interest expenses through displaying the proportion of revenue that stands after deducting amortization and operating costs. By analyzing the historical data for the period (2020-2023), we can see that on average a rate of 15.07% has been used, and this is what will be applied.

Table 4.2 Mercedes's EBITDA Projection (2024-2028)

million EUR	2023	2024 F	2025 F	2026 F	2027 F	2028 F
Revenues	153 218	146 017	150 928	156 005	161 252	66 676
EBITDA Margin	15.72%	15.07%	15.07%	15.07%	15.07%	15.07%
EBITDA	24 086	22 001	22 741	23 506	24 296	25 114

Source: Own elaboration

4.1.3 Depreciation and Amortization Expenses

Using the same reasoning as our EBITDA calculation, we projected Mercedes Depreciation and Amortization (D&A). As a result, we began by determining out the ratio of the company's (2020–2023) revenues to its depreciation and amortization. With the support of these ratios, it was possible to determine that Mercedes amortization and depreciation account for 3.56% of its yearly revenues on average. The estimated D&A figures for Mercedes for the years 2024 – 2028 are displayed in table below. These figures are calculated by multiplying the projected revenues, which were previously presented by the average D&A/Revenues ratio.

Table 4.3 Mercedes's D&A Projection (2024-2028)

million EUR	2023	2024 F	2025 F	2026 F	2027 F	2028 F
Revenues	153 218	146 017	150 928	156 005	161 252	66 676
D&A (%)	2.89%	3.56%	3.56%	3.56%	3.56%	3.56%
D&A	4 426	5 201	5 376	5 556	5 743	5 936

Source: Own elaboration

4.1.4 Effective Tax Rate

The effective tax rate of Mercedes-Benz reflects the proportion of its pre-tax income that is paid in taxes. In recent years, the company's effective tax rate has been influenced by factors such as its global operations, tax benefits from specific jurisdictions, and temporary differences between accounting standards and taxable income. By analyzing the effective tax rate, investors and analysts can better understand the company's net profitability, cash outflows for taxes, and its ability to leverage tax optimization strategies. The average tax rate of the period (2020-2023) was 30.4%, however for estimate the future cash flows a marginal tax rate is more indicated since reflects the company's long term tax obligations. The Mercedes marginal tax rate for the upcoming years is 26.5% and it is the one used in this valuation.

4.1.5 Earnings before Interest and taxes (EBIT)

EBIT is an essential metric for assessing profitability and competence. It is a crucial tool for analysts and investors to evaluate the value of an organization because it gives a clear picture of the fundamental operations of the business. We already have all the information that we need

for its calculation, EBIT is obtained by doing the difference between EBITDA and D&A costs, as shown in Table 4.4.

By focusing on operational performance, EBIT serves as a vital indicator for decision-making, whether it involves evaluating the potential for investment, assessing management's efficiency, or identifying trends in profitability over time.

Table 4.4 Mercedes's EBIT Calculation (2024-2028)

million EUR	2023	2024 F	2025 F	2026 F	2027 F	2028 F
EBITDA	24 086	22 001	22 741	23 506	24 296	25 114
D&A	4 426	5 201	5 376	5 556	5 743	5 936
EBIT	19 660	16 800	17 365	17 949	18 553	19 177

Source: Own elaboration

4.1.6 Capital Expenditures – Capex

Capital expenditures refer to the funds a company allocates to acquire, upgrade, or maintain physical assets, such as property, equipment, or machinery. These investments are essential for sustaining and enhancing a company's operational capabilities and ensuring long-term growth.

The level and distribution of Capex often reflect a company's strategic priorities, signaling its focus on operational efficiency, innovation, or expansion into new markets.

Capex decisions are not only critical for maintaining competitiveness but also for adapting to changing market dynamics and technological advancements. In this analysis, we will examine Mercedes-Benz's capital expenditures by reviewing the investments in property, plant, and equipment detailed in the company's internal reports. These investments provide a clear view of the company's strategic direction and areas of focus. By 2028, Mercedes-Benz plans to significantly increase its capital expenditures to support its transition toward an all-electric future. This ambitious strategy necessitates substantial infrastructure investments, such as building new production facilities, upgrading existing factories to handle electric powertrain assembly, and expanding battery production capacity. These substantial investments align with the company's historical commitment to innovation and consistent reinvestment in its operations to remain at the forefront of the automotive market.

To ensure coherence between past trends and future projections, we conducted an analysis of Mercedes-Benz's financial performance during the period from 2020 to 2023. By calculating the average CAPEX as a percentage of revenue over this timeframe, we arrived at a value of 3.27% (Annex D). While this value reflects the company's historical reinvestment patterns, it also illustrates a foundation for forecasting future expenditures. The projection methodology incorporates this percentage across forecast years, recognizing that the significant capital investments planned for the electric transition are an evolution of the company's long-standing strategy of proactive and substantial investment to anticipate market demands and technological advancements.

Furthermore, Mercedes-Benz's dedication to utilizing modern technologies, like automation and artificial intelligence, to maximize manufacturing efficiency will support these initiatives. The business's significant investment in R&D further strengthens its capacity to provide new products that are suited to a changing customer base.

Table 4.5 Mercedes's Capex Calculation (2024-2028)

million EUR	2023	2024 F	2025 F	2026 F	2027 F	2028 F
Revenues	153 218	146 017	150 928	156 005	161 252	66 676
CAPEX	3 745	4 782	4 942	5 109	5 281	5 458
CAPEX/Revenues	2.44%	3.27%	3.27%	3.27%	3.27%	3.27%

Source: Own elaboration

4.1.7 Working Capital

It is a measure of a company's short-term financial health and operational efficiency, indicating its ability to cover day-to-day expenses and short-term obligations with assets that are expected to be converted into cash within a year.

For the projection of Mercedes cash flows we will focus on the operating working capital, this because as a business expands it typically requires more working capital to support an increase in production. We began by gathering data on Mercedes report, the company has included four items in its calculations, Inventories, Trade Receivables and Payables, Receivables from financial services and other operating assets and liabilities.

This calculation does not include cash or short-term debt. Cash is regarded as a non-operating asset, so even though it is a current asset, it is not considered when calculating operating working capital.

Using the information at our disposal for working capital and revenues, we first computed the WC/Revenue ratio for the 2020–2023 period. Then, by taking the simple average of this ratio across the period, we arrived at an average value of 2.09%. Finally, using the calculated ratio, we estimated the operating working capital for these forecasted years and determined the changes in working capital from 2024 to 2028.

Table 4.6 Mercedes's Net Working Capital Calculation (2024-2028)

million EUR	2023	2024 F	2025 F	2026 F	2027 F	2028 F
Revenues	153 218	146 017	150 928	156 005	161 252	66 676
WC/Revenues	2.37%	2.09%	2.09%	2.09%	2.09%	2.09%
WC	3 631	3 056	3 159	3 265	3 375	3 489
ΔWC	3518	-462	103	106	110	114

Source: Own elaboration

4.1.8 Terminal Growth Rate

One of the most important factors in determining TV is the TGR which shows the long-term growth a business is projected to achieve after the explicit forecast period. The computation of the TGR must consider real GDP growth in the areas where the business operates to be as accurate as possible.

Since Mercedes operates worldwide, we select the three regions that have more impact on the company revenue in 2023: Europe, North America, and Asia, which represent 95% of the total revenue. Table 4.7 presents a final growth rate of 2.58%. However, given that no company can sustainably grow at a rate higher than the economy in which it operates, we have chosen to apply a more conservative growth rate. Based on the forecast of the growth of the German economy we will use a TGR of 1.5%.

Table 4.7 Mercedes's TGR Calculation

	Revenues (million €)	Weight by Region	Expected GDP Growth Rate	Weighted GDP
Europe	61 895	40.41%	1.60%	0.65%
Noth America	40 448	26.41%	2.50%	0.66%
Asia	43 382	28.32%	4.50%	1.27%
TGR	2.58%			

Source: Own elaboration

4.2. Discounted Cash Flow

We can now calculate the FCFF after validating the assumptions covered in the previous section. We extend the forecast into perpetuity by presenting the projected FCFF for 2024-2028 in Table 4.8. These projections are derived by applying equation (1) outlined in the literature review in Chapter 1. The approach used is intended to provide an accurate estimate of the available cash flow that the business can produce for its investors by capturing the essential components of an organization's operational performance, such as revenue, operating costs, capital expenditures, and changes in working capital.

Table 4.8 Mercedes's FCFF Calculation

million EUR	2023	2024	2025	2026	2027	2028
EBIT	19 660	16 800	17 365	17 949	18 553	19 177
Tax Rate	27.60%	26.50%	26.50%	26.50%	26.50%	26.50%
Tax Value	5 426	4 452	4 602	4 757	4 917	5 082
NOPAT	14 234	12 348	12 763	13 193	13 636	14 095
+ D&A	4 426	5 201	5 376	5 556	5 743	5 936
- CAPEX	3 745	4 782	4 942	5 109	5 281	5 458
- Δ WC	3 518	-462	103	106	110	114
FCFF	11 397	13 229	13 094	13 534	13 989	14 460

Source: Own elaboration

4.3. The weighted Average Cost of Capital (WACC)

4.3.1 Market Value of Equity and Debt

The market value of equity, commonly referred to as market capitalization, represents the total value of a company's outstanding shares. This is an important financial indicator that gives investors a brief point of comparison to evaluate the size and value of a company and enables them to decide if a stock is overvalued or undervalued in relation to its earnings potential and growth prospects.

As of 31 December 2023, Mercedes had 1 040 966 589 shares outstanding and according to Yahoo Finance given the company's shares had a value of 62.55€ at the time, we were able to calculate the equity value, resulting in a value of 65 112.5 million euros. For the market value of the debt, as it was not possible to obtain an exact value, we will use the book value, which according to the Bloomberg service was 115 319 million euros.

4.3.2 Cost of Equity

As mentioned in the literature review, we must determine three distinct components: the levered beta, the risk-free rate and the market risk premium. After compute the three variables, by applying equation (3) corresponding to the CAPM model we estimate the cost of equity of 11.17%.

4.3.2.1 Risk free rate

Since there is no investment that is completely risk-free, the yield on government bonds issued by stable economies usually serves as an indicator for the risk-free rate. Given that Mercedes-Benz is a European company, we will use the German 10-year government bond due to the country's strong economic stability and low default risk. As of December 31, 2023, the value of the risk-free rate was 2.75%.

4.3.2.2 Market Risk Premium

To determine the MRP and since Mercedes is a German based company, in our valuation we will use the MRP available for Germany where in 2023 was averaged 5.70%. Considering Mercedes-Benz's global reach and operations across different countries, we included the Country Risk Premium (CRP) in our analysis. The CRP considers the extra risks that come with doing business in different foreign markets, especially those where there are more political and

economic instabilities than in Germany. We weighted the CRP according to the revenue contribution of each region in which Mercedes-Benz operates to account for this in our MRP computation, we reach a CRP of 1.09% (Annex E). Through the implementation of these weights, the overall MRP was effectively modified to reflect the wider risk profile of Mercedes-Benz's worldwide operations, ensuring a thorough and precise risk assessment. By adding the two components we reach the final value of 6.79%.

4.3.2.3 Beta

Since Mercedes is a German company, we will base our estimation of the beta, as presented in the literature review, on the weekly returns of the Mercedes stock relative to the DAX index. The analysis period covered the dates 31/12/2022 through 31/12/2023. The weekly returns' linear regression resulted in a raw beta estimate of 1.298 and the final equation of $Y = 1.298X - 0.108$.

4.3.3 Cost of Debt

A company's financial health can be inferred from its cost of debt. It also aids when choosing about the best way to combine debt and equity financing to reduce total cost of capital. An efficient way to figure out the actual interest rate a business pays on its debt is to calculate the cost of debt based on the yield to maturity of its bonds. When coupon payments, face value, and the bond's current market price are taken into consideration, the YTM represents the total return an investor can anticipate receiving if the bond is held to maturity. However, it assumes that all interest payments will be made on time and that the bond will be held until maturity. The true cost of debt may vary if a company defaults or redeems the bonds early. After analyzing the bonds issued by the company, we see that the bond with the ISIN: DE000A2YNZY4 has the highest maturity until 2034 and a yield to maturity of 3.25%. This is the rate that will be used as our cost of debt before tax. By applying the marginal tax rate of 26.5% we arrive at an after-tax cost of debt of 2.39%

4.3.4 WACC Calculation

With all the components calculated, we reach a WACC value of 7.77% (Annex F).

4.4 FCFF Valuation

After calculating the TGR, the cash flows for the period 2024-2028, and the WACC we are now able to estimate the company's enterprise value (EV). This process involves discounting each of the projected FCFF values over the forecast period back to their PV using the WACC. By applying the WACC as the discount rate, we account for the time value of money and the risk profile of Mercedes cash flows. The Terminal Value (TV) is determined using the TGR for the years after 2028, when it is anticipated that Mercedes will continue to grow indefinitely. This value, which accounts for a substantial portion of the company's valuation, captures the potential for continuous growth. To maintain consistency with the other cash flows, the TV is also discounted to its PV using the WACC. By applying equation (3) we reach an EV of € 215 669 million.

Now to reach the value of Mercedes stock we need to compute the Equity Value, to do so we deduct the value of debt and add the non-operating assets (NOA).

Lastly, we calculated the price of Mercedes Benz shares by dividing the equity value by the total number of outstanding shares, which amounted to 1041 million. Table 4.9 shows that the final price per share was 111.73€, indicating a potential upside of 78% by the end of December 2023 in relation to its current market price.

Table 4.9 Mercedes's Target Price

million EUR	2023	2024 F	2025 F	2026 F	2027 F	2028 F	Perpetuity
FCFF		13 229	13 094	13 534	13 989	14 460	14 677
WACC							7.77%
TGR							1.5%
PV of FCFF		12 275	11 274	10 813	10 370	9 946	
TV							234 050
PV of TV							160 992
Enterprise Value	215 669						
- Debt	115 319						
+ NOA	15 962						
Equity Value	116 312						
Shares Outstanding	1 041						
Target Price	111.73						

Source: Own elaboration

4.5 Sensitivity Analysis

Sensitivity analysis is an essential tool for stock price prediction because it assesses the impact of modifying fundamental assumptions on valuation results.

To estimate the price of Mercedes shares, several assumptions were made, and to understand the impact of these assumptions, a sensitivity analysis was performed to understand how changes in these inputs affect the estimated enterprise value. In the previous calculation of the FCFF method, a WACC of 7.7% and a TGR of 1.5% were used, in the table below we can see the impact that a variation of $\pm 0.25\%$ in WACC and TGR will have on the final price of Mercedes-Benz shares.

In the most optimistic scenario, where WACC is lowered to 7.02% and TGR is increased to 2.25%, the target price reaches €167.62, reflecting a highly favorable valuation. In contrast, the target price drops to €77.64 in the most pessimistic scenario, where WACC rises to 8.52% and TGR drops to 0.75%, underscoring the downside risks connected with unfavorable conditions. This sensitivity analysis, as illustrated in Table 4.10, demonstrates how small adjustments in these two critical assumptions can lead to significant variations in the estimated target price. WACC and TGR are central to valuation models, influencing the discount rate applied to future cash flows and the projected terminal value of the company, respectively. The results underscore the importance of using accurate and well-founded assumptions when forecasting share prices, as even minor changes can result in wide-ranging valuation outcomes. This analysis offers investors important insights into the risks and opportunities related to Mercedes-Benz's future performance by presenting a range of possible target prices, from the optimistic €167.62 to the pessimistic €77.64.

Table 4.10 *Sensitivity Analysis*

	WACC							
		7.02%	7.27%	7.52%	7.77%	8.02%	8.27%	8.52%
TGR	0.75%	117.25	109.33	102.01	95.23	88.94	83.10	77.64
	1.00%	123.90	115.40	107.56	100.33	93.64	87.43	81.65
	1.25%	131.13	121.97	113.56	105.83	98.68	92.27	85.93
	1.50%	139.02	129.11	120.06	111.73	104.11	97.06	90.52
	1.75%	147.65	136.91	127.12	118.18	109.98	102.42	95.45
	2.00%	157.14	145.44	134.82	125.16	116.32	108.22	100.76
	2.25%	167.62	154.82	143.26	132.77	123.22	114.49	106.49

Source: Own elaboration

4.6 Relative Valuation

To complete the valuation, we will perform a relative valuation to evaluate Mercedes performance against its main industry competitors. The first step was to choose the peer group; to do so, the criteria were the market capitalization, and the volume of revenue generated by the companies.

In Table 4.11 we can see the list of the companies as well as the chosen multiples, the EV/EBITDA, and the P/E.

Table 4.11 *Relative Valuation*

Peer Group	Country	EV/EBITDA	P/E Ratio
Tesla	USA	47.31	80.15
Toyota	JPN	7.67	9.09
BYD	CH	14.6	19.92
Ferrari	ITA	25.39	47.12
Porsche	GER	4.72	3.65
General Motors	USA	5.48	5.04
BMW	GER	3.2	5.82
VW	GER	3.63	4.18
Average		14.00	21.87
Median		6.58	7.46
Mercedes Benz	GER		
Net Income		-	14 531
EBITDA		24 086	-
Enterprise Value		158 365	-
Equity Value		59 008	108 329
Shares Outstanding		1041	1 041
Share Price		56.69	104.07
Actual Price 31st December 2023		62.55	62.55
Potencial		-9.37%	66.37%

Source: Yahoo Finance, Own elaboration

Both EV/EBITDA and P/E ratio were retrieved from the Yahoo Finance website, and the values are dated 31 December 2023 to be in line with the calculation of Mercedes shares. From Table 4.11 we can observe that the peer group has very different values for each multiple, so

the median was used to ensure that outliers were not taken into consideration. In the end, the result obtained was an EV/EBITDA of 6.58 and a P/E of 7.47.

By applying Mercedes 2023 EBITDA to the multiple 6.58, we get the Enterprise Value of €158 365, and by subtracting debt and adding the non-operating assets, we get the Equity Value of €59 008. Finally, when we divide by the number of outstanding shares, we reach a share price of €56.69, indicating a potential decrease in the share price compared to the market of 9.37%.

If we utilize the Mercedes 2023 net income and multiply it by the peer group multiple P/E of 7.46, we get the equity value of €108 329, adjusting it by the number of outstanding shares, we have a share price of €104.07 which, when compared to the actual stock price, delivers a potential upside of 66.37%.

4.7 Discussion of the Valuation Results

An equity valuation of Mercedes-Benz Group AG was performed, dated December 31, 2023, with the objective of understanding the company's current situation, the business it operates, and the future perspectives. Summary results are presented in Table 4.12.

Table 4.12 *Mercedes's Fair Value*

Mercedes Fair value Stock Price (€)	Share Price	Potencial
Price (31/12/23)	62.55	
DCF-FCFF	111.73	78.63%
EV/EBITDA	56.69	-9.37%
P/E	104.07	66.37%

Source: Own elaboration

Different valuation approaches were utilized, the Discounted Cash Flow to the FCFF method estimated a Mercedes share price of 111.73€, indicating a potential upside of 78.63% when compared to the same period. This method indicates that Mercedes stocks were clearly undervalued, however, from the sensitivity analysis, we realize that the stock can have a range of prices depending on the growth and discount rates utilized, which can result in more optimistic and more conservative valuations.

When applying the relative valuation methodology, through the EV/EBITDA and P/E ratios we get different target prices. The EV/EBITDA indicates a fair value of €56.69, indicating a 9.37% downside, this result implies that the stock may be overvalued based on peer comparisons or current market multiples. The P/E ratio estimates a fair value of €104.07, reflecting a 66.37% upside potential. The variations among these assessments result from the distinct methods and presumptions that support each strategy. Multiples-based approaches like EV/EBITDA and P/E concentrate on short-term performance and relative market conditions, whereas DCF emphasizes long-term potential.

4.8 Analyst Coverage

Stock coverage is important because it can give investors current, comprehensive information that they need to make wise investment choices. Mercedes-Benz presents a list of analysts who regularly examine the company's shares. The recommendations of the main analysts who regularly analyze the company are presented in Table 4.13, to see if the recommendation given in this thesis is in the same direction.

From the 26 analysts in the list, 69% assigned a buy/outperform recommendation, 23% a hold recommendation, and 8% a sell/underperform recommendation. The consensus rating, which represents the attractiveness of a stock based on the company's performance, for Mercedes is 4.14. indicating a clear buy recommendation with an implied target price of 78.48€, resulting in a potential appreciation of 25.8%

Table 4.13 *Analyst Coverage*

Entity	Analyst	Target Price	Recomendation
Bernstein	Daniel Roeska	85	Outperform
BNP Paribas	Dorothee Cresswell	62	Underperform
Stifel	Daniel Schwarz	65	Hold
AlphaValue	Valentin Mory	80.3	Buy
Deutsche Bank	Tim Rokossa	120	Buy
Societe Generle	Stephen Reiman	75	Buy
HSBC	Mike Tyndall	77	Buy
J P Morgan	Jose Asumendi	78	Buy
Oddo	Anthony Dick	50	Underperform
Barclays	Henning Cosmn	60	Hold
Bankhaus Metzler	Pal Skirta	92	Buy
Goldman Sachs	George Galliers	90	Buy
Morgan Stanley	Ross Macdonald	70	Hold
Jefferies	Philippe Houchois	72	Hold
Citi	Harald Hendrikse	60	Hold
DZ Bank	Michael Punzet	70	Buy
DBS Bank	Rachel Mil	70	Buy
Morning Star	Richard J. Hilgert	114.98	Buy
Landesbank	Frank Biller	86	Buy
M.M Warburg	Marc-Rene Tonn	92	Buy
RBC Capital	Tom Narayan	85	Outperform
Kepler Cheuvreux	Michael Raab	65	Hold
Grupo Santander	Eduardo Gonzalez	98	Outperform
Berenberg	Romain Gourvil	83	Buy
Banco Sabadell	Oscar Rodriguez	100	Buy
Sadif Inv. Analytics Team Coverage		82.38	Buy
Price Target		78.48	

Source: Bloomberg Terminal

CHAPTER 5

Conclusions

The main objective of this thesis was to estimate the fair value of Mercedes Benz shares on December 30, 2023. This process used discounted cash flow methods, relative valuation based on the company's main competitors, and finally a sensitivity analysis to understand the impact that changes in key variables such as TGR and WACC can have on the company's shares. Initially, an analysis was made of the existing literature on company valuation, the main authors dedicated to studying the subject, and the main methods used by investors and analysts.

To analyze a company, it is essential not only to look at its internal situation but also at the market in which it operates, what its characteristics are, what the main trends are, and how consumer preferences are evolving. As Mercedes is a company that operates worldwide, the macroeconomic scenario was analyzed by looking at GDP and inflation in the regions with the most weight in the company's revenue, namely Europe, the United States, and China. The company's financial situation was analyzed through its annual reports to understand how it has evolved throughout its history, what its strengths and weaknesses are, and what are the growth prospects for the future.

The first method used, DCF, calculated a unit value per share of €111.73. Since Mercedes stocks on December 31, 2023, were traded at €62.55, it was determined that the shares were undervalued by 78.7%.

In the second method used, the relative valuation showed quite different results in the two multiples used: the EV/EBITDA showed a share value of 56.69€, thus showing an overvaluation of 9.37%, while the P/E ratio showed a final recommended price of 104.07€, indicating an overvaluation of 66.37%.

After analyzing the results, it is possible to see that they present different indications: while the DCF method and EV/EBITDA show a target share price higher than that observed on the market, it is possible to draw a clear final indication to investors to buy. On the other hand, the P/E multiple indicates that the share is being traded at a higher value than its fair value and therefore gives an indication to sell.

It is important to note that, like any projection, the estimate of Mercedes shares in this thesis is based on several assumptions that may have an impact on the analysis. Cash flows can be uncertain, especially in a sector as dynamic and subject to change as the automotive sector, where constant technological changes, regulatory changes, and changes in consumer preferences can affect the company's performance and results.

References

- Baker, H. K., Filbeck, G., & Kiymaz, H. (2020). *Equity Markets, Valuation, and analysis*. John Wiley & Sons.
- Bernström, S. (2014). *Valuation: The Market Approach*.
- Bodie, Z., Kane, A., Marcus, A.J., Investments, 11th Edition, McGraw Hill Education
- Brealey, R. A., Myers, S. C. & Allen, F. 2011. *Principles of Corporate Finance* (10th Ed.). New York: McGraw-Hill/Irwin
- Bruner, R. F., & Perella, J. R. (2004). *Applied mergers and acquisitions*. John Wiley & Sons.
- Damodaran, A. (2006). *Valuation Approaches and Metrics: A Survey of the Theory*. Working Paper, Stern School of Business.
- Damodaran, A. 2012. *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset* (3rd Ed.). New Jersey: John Wiley and Sons, Inc.
- Damodaran, A. (2014). *Applied Corporate Finance*. John Wiley & Sons.
- Fernandez, P. (2007), *Company valuation methods, the most common mistakes in valuation*, IESE Business School.
- Gordon, M. J., Shapiro, E. (1956), *Capital equipment analysis: The required rate of profit*, *Management Science*, 3(1), 102–110
- Koller, T., Wessels, D., & Goedhart, M. (2015). *Valuation: Measuring and managing the value of companies* (6th ed.). New York: John Wiley & Sons, Inc.
- Kumar, R. (2015). *Valuation: Theories and Concepts*. Academic Press.
- Massari, M., Gianfrate, G., & Zanetti, L. (2016). *Corporate valuation: Measuring the Value of Companies in Turbulent Times*. John Wiley & Sons.
- Pinto, J., Henry, E., Robinson, T., & Stowe, J. (2015). *Equity Asset Valuation* (3rd ed.). Hoboken, New Jersey: John Wiley & Sons.
- Pratt, S. P., & Grabowski, R. J. (2014). *Cost of capital: Applications and Examples*.
- Ratner, I., Stein, G. T., & Weitnauer, J. C. (2009). *Business valuation and bankruptcy*. John Wiley & Sons.
- Schmidlin, N. (2014). *The Art of Company Valuation and Financial Statement Analysis A Value Investor's Guide with Real-life Case studies* (1st ed.). United Kingdom: John Wiley & Sons, Inc
- Sharpe, W. F., "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk," *Journal of Finance* 19 (September 1964), 425–442

Internet Sources

- Automotive industry worldwide. (2024, October 17). Statista.
<https://www.statista.com/topics/1487/automotive-industry/#topicOverview>
- Brand growth slows finds Interbrand's Best Global Brands Report 2023 - Interbrand. (2024, January 8). Interbrand. <https://interbrand.com/newsroom/brand-growth-slows-finds-interbrands-best-global-brands-report-2023/>
- Companies ranked by Market Cap - CompaniesMarketCap.com. (n.d.).
<https://companiesmarketcap.com/>
- Cornet, A., Heuss, R., Schaufuss, P., & Tschiesner, A. (2023, August 31). *A road map for Europe's automotive industry*. McKinsey & Company.
<https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/a-road-map-for-europes-automotive-industry>
- EVO Report 2024 | BloombergNEF | Bloomberg Finance LP. (2024, June 12).
BloombergNEF. <https://about.bnef.com/electric-vehicle-outlook/>
- Heineke, K., Kampshoff, P., & Möller, T. (2024, March 12). Spotlight on mobility trends. McKinsey & Company. <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/spotlight-on-mobility-trends#/>
- Latest risk-free rate and market risk premium. (n.d.).
Germany. <https://atlas.kpmg.com/de/en/deal-advisory-services/cost-of-capital-and-multiples/market-risk-premium-and-risk-free-rate>
- Lower battery prices are expected to eventually boost EV demand. (2024, February 29).
Goldman Sachs. <https://www.goldmansachs.com/insights/articles/even-as-ev-sales-slow-lower-battery-prices-expect>
- S&P Global Mobility forecasts 88.3M auto sales in 2024. (2023c, December 14). News Release Archive. <https://press.spglobal.com/2023-12-14-S-P-Global-Mobility-forecasts-88-3M-auto-sales-in-2024>
- Statista. (n.d.). *Electric vehicles - Worldwide | Statista market forecast*.
<https://www.statista.com/outlook/mmo/electric-vehicles/worldwide#unit-sales>
- Trends in electric cars – Global EV Outlook 2024 – Analysis - IEA. (n.d.).
IEA. <https://www.iea.org/reports/global-ev-outlook-2024/trends-in-electric-cars>
- The future of four wheels is all electric. (2024, February 16). Goldman Sachs.
<https://www.goldmansachs.com/insights/articles/the-future-of-four-wheels-is-all-electric>
- Yahoo Finance <https://finance.yahoo.com/>

Annexes

Annex A Mercedes's Revenues 2020-2023

million EUR	2020	2021	2022	2023
Revenues	121 778	133 893	150 017	153 218
Growth	-10.67	9.95%	12.04%	2.13%
Average	3.36%			

Annex B Mercedes's EBITDA 2020-2023

million EUR	2020	2021	2022	2023
Revenues	121 778	133 893	150 017	153 218
EBITDA	14 624	21 339	24 907	24 086
EBITDA Margin	12.01%	15.94%	16.60%	15.72%
Average	15.07%			

Annex C Mercedes's D&A expenses 2020-2023

million EUR	2020	2021	2022	2023
Revenues	121 778	133 893	150 017	153 218
D&A	5 940	4 430	4 758	4 204
D&A (%)	4.88%	3.31%	3.17%	2.74%
Average	3.56%			

Annex D Mercedes's CAPEX 2020.-2023

million EUR	2020	2021	2022	2023
Revenues	121 778	133 893	150 017	153 218
CAPEX	5 741	4 579	3 481	3 745
CAPEX/Revenues	4.71%	3.42%	2.32%	2.44%
Average	3.27%			

Annex E CRP Computation

	Revenues Region Weight	Average CPR by region	CRP*Weight
Europe	40.4%	1.29%	0.52%
North America	26.4%	0	0,00%
Asia	28.3%	1.68%	0.48%
Other Markets	4.9%	1.81%	0.09%
CRP Weighted			1.09%

Source: Country Risk premium – Damodaran Website

Annex F Mercedes's WACC Computation

Cost of Equity	11.17%
Pre Tax Cost of Debt	2.39%
Tax Rate	26.5%
Market Value of Equity	65 112.5
Market Value of Debt	115 319
Debt / (Equity+Debt)	63.91%
Equity / Equity+Debt)	36.09%
WACC	7.77%