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**The role of investment banks in creating/destroying value in
IPOs: The case of Porsche AG**

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Master in Finance

Supervisor:
PhD, Mohamed Azzim Gulamhussen, Full Professor, Iscte-Iul

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**BUSINESS
SCHOOL**

Department of Finance

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Abstrato

Em 29 de setembro de 2022, a Porsche AG, um dos principais fabricantes mundiais de automóveis de luxo, foi cotada na bolsa de valores de Frankfurt com uma avaliação de mais de 75 mil milhões de euros, com um preço de mercado primário de 82,50 euros por ação e um preço de fecho no primeiro dia de negociação de 82,52 euros por ação. Para concretizar este projeto, a Porsche AG rodeou-se de alguns dos principais bancos de investimento do mundo. O objetivo do presente documento é destacar o papel desempenhado pelos bancos de investimento numa OPI de uma grande empresa do sector automóvel como a Porsche AG.

A revisão da literatura sobre o tema tem salientado a importância dos bancos de investimento nas finanças do século XXI, em particular no que respeita às IPO. No entanto, o potencial duplo papel dos bancos de investimento como consultores e subscritores durante um projeto deste tipo chamou a atenção de alguns autores, uma vez que poderia conduzir a um conflito de interesses entre os interesses dos seus clientes (Emissor ou investidores) e os do próprio Banco. Além disso, uma OPI deve respeitar as regras estabelecidas para o mercado de entrada e pode revelar-se complexa em função das condições de mercado e do sector de atividade da empresa.

Para exemplificar melhor o assunto, é escolhido o caso da Porsche AG, com o objetivo de determinar a estratégia de preços utilizada pelos bancos de investimento envolvidos no projeto e destacar os seus papéis.

Em termos de metodologia, começámos por fazer uma análise do mercado e do sector, bem como da empresa antes e depois da OPI. Utilizamos três modelos de avaliação: o método dos fluxos de caixa descontados, o método dos múltiplos e, finalmente, o método do valor acrescentado do capital próprio, que conduzem o projeto a uma comparação entre o preço de emissão da IPO, o preço de fecho do primeiro dia de negociação e os três valores justos por ação encontrados.

Os resultados da investigação mostram que a Porsche AG está subavaliada, com o método do Discounted Cash Flow a indicar um preço da ação de 99.32 EUR, o método dos múltiplos a indicar um preço da ação de 86.77 EUR e o método do Equity Added Value a indicar um preço da ação de 87.68 EUR.

Abstract

On September 29, 2022, Porsche AG, one of the world's leading manufacturers of luxury automobiles, was listed on the Frankfurt stock exchange at a valuation of over 75 billion euros, with a primary market price of EUR 82.50 per share and a closing price on the first day of trading of EUR 82.52 per share. In order to realize this project, Porsche AG has surrounded itself with some of the world's leading investment banks. The purpose of this paper is to highlight the role played by investment banks in an IPO for a major automotive company such as Porsche AG.

The literature review on the subject has highlighted the importance of investment banks in 21st century finance, particularly when it comes to IPOs. Nevertheless, the potential dual role of investment banks as advisors and underwriters during such a project has drawn the attention of some authors, as it could lead to a conflict of interest between the interests of their clients (Issuer or investors) and those of the Bank itself. What's more, an IPO must comply with the rules laid down for the entry market and can prove complex depending on market conditions and the company's industry.

To further exemplify the subject, the case of Porsche AG is chosen, with the aim of determining the pricing strategy used by the investment banks involved in the project and highlighting their roles.

In terms of methodology, we firstly conduct a market and an industry overview as well as the company one's prior and post IPO. We use 3 valuation models : the Discounted Cash Flow method, the Multiples Method and finally the Equity Added Value Method which lead the project to a comparison between the issue price of the IPO, the closing price of the first trading day and the three fair values per share found.

The results of the research show that Porsche AG is undervalued, with the Discounted Cash Flow method showing a share price of 99.32 EUR, the Multiples method showing a share price of 86.77 EUR and the Equity Added Value method showing a share price of 87.68 EUR.

JEL Classification: G10, G12, G17, G24, G32, G34

Keywords: Initial Public Offering, Investment Banks, Valuation, Automotive Industry, Porsche AG

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Glossary

IB : Investment Bank
AG : Aktiengesellschaft – German term for a public limited company
IPO : Initial Public Offering
CEO : Chief Executive Officer
CFO : Chief Financial Officer
US : United States
UK : United Kingdom
R&D : Research and Development
ROA : Return on Assets
ROE : Return on Equity
ROIC : Return on Invested Capital
D/E : Debt to Equity
DOL : Degree of Operating Leverage
DFL : Degree of Financial Leverage
DCL : Degree of Combined Leverage
g : Growth rate
 r_e : Cost of Equity
 r_d : Cost of Debt
 r_f : risk-free rate
 r_m : Rate of return of the market
t : Tax rate
CAPM : Capital Asset Pricing Model
 β_L : Beta Levered
 β_U : Beta Unlevered
 β_D : Beta Debt
D&A : Depreciation and Amortization
EBITDA : Earnings Before Interest, Taxes, Depreciation and Amortization
EBIT : Earnings Before Interest
NOPAT : Net Operating Profit After Tax
FCFF : Free Cash Flow to the Firm
WACC : Weighted Average Cost of Capital
DCF : Discounted Cash Flow
NPV : Net Present Value
EV : Enterprise Value
TV : Terminal Value
EQV : Equity Value

1. Introduction

The main purpose of this Thesis is to better understand the role of Investment Banks in the valuation strategy of a fair share price for a big automotive company such as Porsche AG during an IPO.

Porsche is a German company mainly known as one of the top sport car manufacturers. The company went public on September 29, 2022, by entering at the Frankfurt Stock Exchange.

To determine the pricing strategy used by the Investment Banks involved in the book of the Porsche AG's IPO, three mainly known valuation Methods will be used: the Discounted Cash Flow method, the Multiples Method and finally the Equity Added Value Method. This will lead the project to a comparison between the issue price of the IPO, the closing price of the first trading day and the three fair values per share found by conducting the different methods of valuation.

The project is subdivided as follow: Chapter 2 consists of a literature review of the major themes to be addressed on the subject. Meaning, the presentation of an IPO project, the reasons for a company to go public, the Investment Banking origin, the main Investment banking operations within the financial sector, the main roles of Investments Banks in IPOs, the pricing strategy behind an IPO ,the requirements, and the pricing strategy on the Frankfurt Stock Exchange and finally the valuation methods investment banks could use while conducting an IPO process . Chapter 3 will be presenting the hypothesis that emerge from the literature review and that need to be analyzed during the project. Chapter 4 provides a clear overview of the market, with a macroeconomic analysis of the years leading up to and following the IPO, as well as an analysis of the automotive sector. Chapter 5 gives a clear company overview during the prior years of the IPO. Chapter 6 presents the assumptions and application lined to the valuation methods in the context of Porsche AG's IPO. Finally, Chapter 7 draws conclusions on the role of Investment Banks and the Porsche AG's pricing strategy.

2. Literature Review

2.1. What is an IPO?

An Initial Public Offering (IPO) corresponds to a change in the status of a company's shares. Initially, shares in a company are generally traded privately. The IPO makes this exchange available to the public for the first time. This is known as the primary market.

Draho (2004), defined this process as the means by which unlisted companies offer their equity to potential new investors. He also categorized these investors into two categories: the promoters and the financial investors. On the one hand, promoters want to acquire control of a company, while on the other, investors want a favorable return on their investment.

Brau & Fawcett (2006), defined this process as a "market window". This is the means by which a company can open up a new ownership perspective by offering its shares to a wide range of investors, both institutional and individual. This new opening is also seen by these authors as an opportunity for the company to increase its capacity to finance external growth, by selling its shares as a means of carrying out acquisition operations (Brau & Fawcett, 2006).

Nevertheless, Bochner et al. (2016), warned of the potential fallout from such an action, as it can also lead to unfavorable conditions due to the implementation of regulations aimed at preventing conflicts of interest and safeguarding the interests of minority groups. Indeed, it is important to note that, during an IPO, only a part of the company's shares is offered for sale on the primary market. This means that some shares will still be held by early investors that may not have the same vision as the new ones.

2.2. Why should a company go public?

Therefore, it's important to understand what is driving a company to launch such a long and difficult project. Bender & Ward (2009) highlight two major hypotheses regarding a company's IPO. The first is that the company will continue to expand by trying to raise capital. The second, more relative to mature companies, is to offer an exit opportunity for historical shareholders by guaranteeing the sale of all or part of their shares to new shareholders.

An IPO can be motivated by four major reasons: to make a strategic business decision to enhance the company's reputation, the effect of the IPO on the cost of capital, to simplify acquisition activities and for insiders seen as a means to cash out.

Firstly, an IPO can be seen as a strategic choice for a company. According to Chemmanur & Fulghieri (1999), an IPO could lead to a more equitable ownership structure, thereby increasing the liquidity of the company's capital. This theory is supported by research conducted by Brau, Rayan & Degraw (2006) among 438 CFOs of US companies (with a 44.5% participation rate). Nevertheless, Jong, Huijgen, Marra & Roosenboom (2012) found a positive correlation between ownership and the likelihood of an IPO, concluding that insiders would prefer to retain full control of the company rather than go public. On the other hand, companies have the chance to enhance their reputation more externally to the company (Bradley, Jordan & Ritter, 2003), which in turn affects their position on the market (Chemmanur & He, 2011). For UK companies, reputation and publicity are the main drivers of an IPO, as demonstrated by Burton, Helliard & Power (2006), and by Pastor-Llorca & Poveda-Fuentes (2006) for Italian companies. Additionally, over 80% of CFOs in Europe concur that the IPO gives the company visibility, which boosts its reputation (Bancel & Mittoo, 2013).

In IPOs, analysts play a crucial role as they may have an impact on the issuer, the underwriter can profit from analysts who may feel under pressure from investment banks or broker firms to make biased recommendations because doing so may have an impact on their reputation and income (Roger, 2018). Analysts' recommendations not only affect an issuer's reputation, but also its trading volume (Mehran & Peristiani, 2009). Investment bank/broker houses "encourage" its analysts through short-term incentives (pay) and long-term incentives (reputation) in order to

maintain their reputation and boost commissions. According to Irvine (2004), the Toronto Stock Exchange has both reputational consequences and incentives to make upbeat predictions. The impact of analyst expectations on the company's capital structure is also highlighted by Dambra, Field, Gustafson & Pisciotta (2018), which brings us to the second reason for going public: the effect on the cost of capital. The classic method proposed by Modigliani & Miller (1963) states that the cost of equity capital increases with the debt-to-equity ratio. Since both managers and investors have access to all information, Modigliani & Miller (1963) support the Trade-Off Theory, which states that when a corporation switches from equity to debt, it is switching from a more expensive source of financing to one that is less expensive. As a result of the firm's capital becoming riskier, the debt-to-equity ratio will rise, and the cost of equity capital for the company will follow this progression. An IPO will result in a lower debt-to-equity ratio, which will lower the cost of equity financing and raise the value of the company's stock. Myers & Majluf (1984) and Myers (1984), in contrast to Modigliani & Miller (1963), have discussed the impact of asymmetric information between management and investors and a potential decline in stock price. They also support a hierarchy of funding, with internal funds coming first, followed by debt issues and, last but not least, external equity issues. In other words, businesses typically employ a hierarchical finance structure where debt takes precedence over outside stock.

Third, IPOs might streamline the acquisitions process. Insiders can exit and have the chance to receive a premium of up to 22% over those who sell out to acquirers by using the IPO to increase the company's value in advance of a sale or to be acquired in exchange for shares (Pagano, Panetta & Zingales 1998), (Zingales, 1995). Similar to Brau, Francis & Kohers (2003), Qi, Sutton & Zheng (2015) demonstrate that regardless of the alliance history, the stock offer premiums are higher than the cash offer premiums for US enterprises.

According to (Zingales, 1995), the final argument to go public, is that insiders may view the IPO as an opportunity for profit. Insiders consequently sell shares at profitable moments in order to grow their wealth (Ang & Brau, 2003). A company's venture capitalist may also be able to quit more easily after an IPO, giving the company more power (Black & Gilson, 1998). The studies made by Espenlaub, Khurshed & Mohamed (2015) show that IPO exits are more common

for enterprises outside of the UK, whereas mergers and acquisitions are the most prevalent exit strategy for UK businesses.

2.3. What is the origin of Investment Banking?

According to Haentjens & Gioia-Carabellese, (2015), investment banking emerged in the late 1800s, when financial institutions decided to integrate investment advisory services with their commercial activities. These same institutions therefore now offered the classic services of a bank, namely taking deposits and granting loans to individuals and companies and took on the role of financial intermediaries between investors and companies during the process of raising capital for businesses by issuing shares and bonds on the public markets.

The 1929 crisis, mainly due to excessive speculation on the part of certain banks, led regulators to take an interest in the potential separation of commercial and investment banking entities. In 1933, the US government voted the Glass-Steagall Act, which provided for the separation of commercial and investment banks to prevent the insolvency of investment intermediaries from leading to the bankruptcy of the commercial banks (Cassis et al., 2016).

This law was therefore the initial phase in setting up the framework for investment banking institutions. At that time, they functioned solely as intermediaries between companies and investors.

The US government only decided to repeal this law in 1999, under pressure from the banking sector according to Filson & Olfati (2014), in favor of a new, more appropriate set of regulations: the Gramm-Leach-Bliley Act. Chen & Wu (2021), argued that the repeal of the 1933 law led to a consolidation of the various branches of the investment banking sector as some of the investment banks now started to play an active dual role by providing both advice and financing to the buyer in the same transaction.

According to Golubov, Petmezas and Travlos and Herron (2022), in the late 20th century, investment banking sector began to take off, with the emergence of 8 major top tier banks which are Goldman Sachs, Bank of America Merrill Lynch, Morgan Stanley, JP Morgan, Citi,

Credit Suisse (now absorbed by UBS), Barclays and Lazard. According to these authors, these top tier banks were most of the time involved in deals related to the Investment Banking sector.

The 2008 crisis, which had a major impact on the financial sector led to increased supervision and the creation of new regulations for the sector, such as Basel III. Especially with the collapse of Lehman Brothers which was previously one of the top tier banks in terms of investment banking. This new regulation, based on the previous ones, governs the global investment banking sector. In effect, it is a set of global banking regulations and agreements drawn up by the Basel Committee on Banking Supervision, introducing stricter capital and liquidity requirements for banks to reinforce their financial stability (Cassis et al., 2016).

Today, these "investment banks" remain at the heart of the global financial markets of the 21st century as they offer a wide range of services, from advice on corporate strategy and capital raising to the trading of complex financial instruments (Liaw, 2012).

2.4. How do investment banks operate in the financial sector?

As explained previously, an investment bank is a financial institution that offers a range of financial services to individuals, companies, and governments. The services offered by this type of banks can be divided into two broad classes: services offered as advisors and services offered as financiers, in some deals cases both type of services can be offered. Regarding this topic, Esperanca & Gulamhussen (2001) argue that multinational banks follow their customers, whether private or corporate, thanks to their reputations and their customers' particular knowledge.

- Investment Banks as advisors :

As advisors, investment banks, can first and foremost help companies set up financial transactions such as mergers and acquisitions. According to Golubov, Petmezas and Travlos (2012) as well as Servaes H., Zenner M. (1996) during these processes, the investment banks provide structured advisory services to both buying and selling companies. For such deals, these banks

evaluate target companies, negotiate agreements and structure transactions to maximize value for their selling clients and reduce costs for their buying clients.

The investment bank also offers its customers corporate finance advisory services. This involves advising on capital structure, financing options and fund-raising strategies. Indeed, it is with the help of these investment banks and their analyses that certain companies can decide on their financing strategies: more access to debt or capital through bond or share issues, while optimizing capital allocations (Linda Allen et al., 2004).

In situations of financial distress, investment banks offer restructuring advice to companies. They intervene to renegotiate company debts, in the sale of assets and to implement new strategies to secure their clients' financial health (Hoshi et al., 1990).

Some companies may also use investment banks for valuation purposes in a range of contexts, such as tax planning, litigation, or simply financial reporting. Their role is to act as intermediaries in the valuation of a company itself, or of its assets and securities (Gallemore et al., 2019).

Finally, an investment bank can also act as an advisor during an IPO. As this is a highly complex process. A company cannot undertake such a project without being properly advised. In this context, Investment Banks determine offering prices, prepare regulatory files and advise companies on investor relations (Giudici & Vismara, 2021).

- Investment Banks as Financiers :

As financiers, investment banks, are first and foremost facilitators of trading in a variety of instruments, from equities and bonds to derivatives and currencies. Indeed, thanks to their Trading and Sales desks, they guarantee market liquidity by gathering buyers and sellers and executing their transactions (Lowry et al., 2019).

According to Linda Allen, Jagtiani , Peristiani , & Saunders (2004), as part of their primary activities, investment banks also offer lending services of all kinds: corporate loans, mortgages

and even loans to individuals. Their role here is to negotiate the terms of loan contracts, both in terms of the overall amount authorized and the setting of the borrowing rate.

Berzins, Liu & Trzcinka (2013) also added that Investment banks often offer asset management services. These desks are directly involved in managing the portfolios of various clients, whether they are private individuals, institutions or even funds.

They are also involved in risk management for their customers, offering hedging strategies to reduce their exposure to market fluctuations.

Finally, according to Baron (1982a) the key duty of investment banks in the finance industry is to act as underwriters in public offerings of securities. They agree with the company wishing to increase its capital to purchase on behalf of the bank a portion of the securities issued, and subsequently to own them in the bank's book. This role helps companies to raise capital through IPOs, equity capital raisings and new debt issues, while guaranteeing firm interests, at risk, taken by the banks. In return for the risk taken by the bank and depending on the contract at the time of issue, the banks then have a choice of allocations. In other words, before the launch of this type of offer, the banks involved in the deal is promoting it to its clients to gather their interests. Once the offer has been launched, the bank can decide whether to allocate its clients. In the case of non-allocation, the bank therefore decides to keep the securities in its own book to trade it at risk in the name of the bank.

According to Lowry, Rossi and Zhy (2019), the investment banking business is genuinely complex and can appear as a conflict of interest due to its various activities. In fact, according to the author, this conflict lies mainly in the fact that the “advisor” part possesses substantial private information that the “financier” part seeks to obtain. This conflict may arise for example in the process of valuing a company as part of an IPO.

2.5. How Investment Banks play a crucial role in IPOs?

As mentioned previously, an IPO is a highly complex exercise, requiring a lot of time and a precise organization in the various stages of implementation. The length of this process can be explained by the difficulty of aligning the various stages that make up the listing operation. The

issuer must also choose and surround himself with advisors, who can be, and often are, investment banks, in order to prepare for the many stages involved.

Jenkinson & Jones (2007), explain in their work that investment banks play a key role in the first stage of syndicate building. The syndicate is made up of all the banks with different functions supporting the company's IPO. When this group is created, each of the functions is then allocated to the various players. The global coordinator is then elected and is the key player in all operations. He also organizes the activities of the investment banks within the syndicate. The management group is also appointed and manages the syndicate and organizes the operations required for the bidding and pricing process. Finally, the non-managing underwriter is another branch of the banks that aims to place shares after finding investors, capturing their interest and gathering all the information needed to generate the offer. Jones (2012) also highlights the significant role played by investment banks in syndicates, which he sees as temporary arrangements. Nevertheless, he also warns that this role can lead to serious asymmetries between partners.

Khurshed (2019), highlights another crucial stage in which banks also play a key role: the creation of the prospectus. This document contains all the information about the company and the shares it will issue. A due diligence is carried out to analyze the feasibility of the business plan, assess market conditions, the company's economic and financial structure and management organization. The listing application and related documentation are filed with the stock exchange, and the entity managing the exchange evaluates the document and, in the event of a positive response, confirms the issuer's admission to the market. The filing ends with the publication of the prospectus by the entity that has analyzed the documents. The company then enters the executive phase.

Corwin & Schultz (2005), show that, during an IPO, investment banks play a key role in designing the Equity Story. This is a report prepared by investment banks to present the company and attract investors. It is the primary marketing tool for an IPO, and the basis on which the various investors assess the company's value. This is the last stage of pre-marketing. The authors also highlight the role of banks in the first marketing phase of the IPO, with the Roadshow. This is a

meeting organized by the company and all the investment banks involved in the process, with the aim of informing investors about the project and gathering their interest (Corwin & Schultz, 2005).

Cornelli & Goldreich (2001) highlight the role of banks in an IPO, emphasizing in particular the role of the global coordinator during the book-building phase. This phase defines the construction of the book of orders, in which the global coordinator collects all expressions of interest from investors. This book is important to create the demand function, which will be the starting point to define the maximum price for launching the offer on the market and for the final price of the share issue. The most important details of this phase are the three types of bid used to determine the share price. The strike bid is the category of investors who commit to buying a certain number of shares irrespective of the price at which they are offered, while the limit bid is the category of investors willing to buy a certain number of shares at a certain price. Tiered bidding is the category of investors expressing interest in different quantities at different price levels. The global coordinator compares the supply curve, which is fixed, with the demand curve, which is inelastic, since at high prices, demand for shares is low. Once the study has been carried out, in synergy with the syndicate and the issuer, the category of investors who contribute to the definition of the price through their expression of interest will then be elected. (Cornelli & Goldreich, 2001)

Iannotta (2010) highlights the crucial role played by investment banks in the valuation of a company going public. In particular, the obstacle they face in pricing: the trade-off between investors' interest in paying a low price and the issuer's interest in selling shares at a high value.

2.6. What is the IPO's pricing strategy?

The Issuer may experience underpricing despite various reasons to go public. The issue price is therefore significantly lower than the opening and closing share price on the first day of trading, after the IPO. Thus, the stock was underpriced while transferring the issuer's capital from old to new shareholders. In this case, the underpricing is rapidly corrected by the market due to a high shareholder demand on the secondary market, as they all believe that price of the stock will rise. This pricing strategy for IPOs called « underpricing » can be explained by knowledge asymmetries between investors, issuers, and underwriters, issuer transfer of ownership and control structure, litigation, and agency concerns.

Welch (1992) proposes the « cascade hypothesis » for information asymmetries, according to which investors ignore their own information and make judgments based on that of others. In other words, investors "herd" in the avalanche of information, communication and interests as they believe so many interests behind a project cannot be misleading (Vieira & Pereira, 2015). According to Roider & Voskort (2016) 41,67% of the IPO investors ignore their own beliefs and follow others. Due to knowledge asymmetries during the IPO, ignorant investors are more likely to overpay and risk the Winner's curse according to Rock (1986). Where, according to Rock (1986) and Chowdhry & Sherman (1996), adverse selection forces issuers to pay uninformed investors.

Ritter & Welch (2002) suggest using the discretionary power of underwriters to allocate « hot-issue » shares to buyers interested in acquiring other IPOs, in order to prevent asymmetries between investors. Where, Benveniste & Spindt, Baron (1982) and Baron & Holmström (1980) argue that the underwriter knows more than the issuer and the investors about securities demand, creating strong information asymmetries. Baron & Holmström (1980) advise that the issuer delegate the minimum offer price choice to the underwriters, as underwriters' reputation or persuasion may also affect securities demand (Baron, 1982b). In addition to their previous work, Benveniste & Spindt (1989) warn of potential pre-offer information asymmetries between underwriters and potential investors regarding the issue price strategy. Meaning that, the underwriters will potentially question the market by communicating on the price range that was fixed during the prospectus phase in order to gather as much information as possible from investors. In this way, investors can provide underwriters with information on their willingness to invest in the project and their highest price limit. On the basis of this information, the underwriters can then adjust their opinion of the issuer's issue price.

Even if underwriters have access to larger information regarding an IPO, competition between them does not solve the problem of underpricing either (Hoberg, 2007). Hoberg (2007) shows that underwriters with more accurate IPO valuations tend to underprice more than their competitors. He also believes that underwriters who underprice IPOs once will continue to do so in the future.

Booth & Chua (1996) explain that an IPO allows ownership of a company to be dispersed, thereby increasing liquidity within the firm. The authors also argue that underpricing is a positive function of ownership dispersion in the presence of costly information. Jacoby & Zheng (2010) support Booth & Chua ideas, whereas Bouzouita, Gajewski, Gresse (2015) find no association between the two variables, implying that ownership dispersion does not affect liquidity.

According to Tinic (1988), corporations and investment banks may underprice the stocks to protect against future litigation. Lowry & Shu (2002) also argue that corporations with a higher litigation risk tend to accept the underpricing of their shares. Lin, Pukthuanthong & Walker (2013) identify international scenarios, supporting Tinic (1988) and Lowry & Shu (2002) assumption. They argue that underpricing for corporations going public in a country depends on its litigation risk. Whereas, Walker, Turtle, Pukthuanthong & Thiengtham (2015) find no association between underpricing and litigation risk, but instead propose a relationship between supply price and litigation risk, i.e., the higher the offer price, the higher the likelihood of post-IPO litigation.

Finally, agency issues and the spin-off or the deliberate underpricing hypothesis. Loughran & Ritter (2002) analyze this spin-off theory, according to which underwriters are recruited and therefore attracted to the project by underpricing the shares issued in order to obtain side payments. Underwriters may then decide to allocate the undervalued shares to investors in exchange for commissions, to executives to influence their decision, or to the company itself through a "friends and family" program, known as "spinning", which aims to keep a portion of the shares allocated to them on the primary market in the investment bank's book, for resale on the secondary market (Liu & Ritter, 2010).

Meanwhile, Aggarwal & Wu (2006) examine this phenomenon when investors agree to acquire shares on the secondary market, but must first gain access to the IPO through interests shown at Investment Banks. The corporate strategy defined by investment banks in this case may therefore be to set a lower price than the fair price in order to attract the greatest number of investors and offer their shares on the secondary market at a higher price. Aggarwal, Krigman & Womack (2002) refer to this as the "lock-up effect". This period during "hot issues" automatically

boosts the share price, as the underwriters involved voluntarily hold a certain number of shares in order to stabilize the market.

According to several authors, this voluntary undervaluation can pose a major threat to listed companies, as it can also lead to share underperformance. Loughran (2002) have shown that it can lead to a five-year period of underperformance, while Ritter (1991) insists on the possibility of underperformance occurring during the first three years following IPO.

However, this underperformance can also result from disagreement between investors and underwriters, a window of opportunity or the influence of an impresario. Miller (1977) proposes that investors' views on the future performance of initial public offerings differ because of uncertainty and risk. Investors will therefore trade according to how they interpret public information, whereas underwriters will trade according to the private information to which they have access. Miller (1977) therefore highlights the fact that optimistic investors buy more shares than pessimistic ones. The higher the disagreement over the share's value, the higher its price on the secondary market will be in relation to its issue value and, once the uncertainty is removed, its future returns will be lower (Diether, Malloy & Scherbina 2002).

Shiller (1990) claims that on the one side underpricing IPOs will yield large initial returns, making the impresario seem like a smart investment advisor. "Underwriters let the high initial returns run for a while to generate publicity and goodwill for the IPO's." (Shiller, 1990). Nevertheless, on the other side, as the market learns more, IPOs with large early gains may underperform in the future.

2.7. What are the requirements and the pricing strategy on the Frankfurt Stock Exchange ?

According to the Deutsche Börse AG (2023a), to be listed at the Frankfurt Stock Exchange company must comply to several requirements depending on the specific market choice.

Potential IPO candidates can select the regulated market, where a number of legal as well as follow-up requirements must be satisfied, on the one hand. Firms can choose between the Prime Standard, which demands even more transparency, and the General Standard after selecting the regulated market. Candidates can, however, choose the Open market, where only the bare minimum of formal criteria are required (Deutsche Börse AG, 2023a).

Candidates who want to be approved for trading on a German organized market must submit a security prospectus as part of the official listing process. This prospectus includes general information about the offering and the firm, risk factors, and annual financial reports for the three fiscal years preceding the offering, among other things. A free float percentage of at least 25% is the fundamental condition, but there are several other share-specific requirements as well. A free float of 25%, in instance, means that 25% of a company's shares must be publicly tradeable and not held by significant shareholders or other long-term investors. A minimum par value of €1 for each stock, a market capitalization of free float of at least €1.25 million, and the general condition that the shares are held by at least 100 different owners are additional requirements (Deutsche Börse AG, 2023b).

Past research conducted by Wasserfallen & Wittleder (1994) on 92 public offerings on the Frankfurt Stock Exchange between 1961 and 1987 showed that IPOs on this market tend to be undervalued by almost 15% on average. More recent research conducted by Kiefer (2020) tend to confirm Wasserfallen & Wittleder (1994) claims. Indeed, through an empirical analysis on the pricing behavior of 130 IPOs on the Frankfurt Stock Exchange between 2001 and 2009 he was able to show that, on average, IPOs on the Frankfurt Stock Exchange were undervalued by an average of 6.17%, and in some cases by as much as 45%.

2.8. How investment banks value companies?

According to Damodaran (2006b), value is seen as a fundamental element of financial discipline. Valuation is of considerable importance in various sectors, such as corporate finance and M&A analysis. Evaluation plays an essential role in several areas of finance, such as portfolio management, acquisition analysis and corporate finance (Damodaran, 2012). Furthermore, the significance of evaluation has become pivotal in the resource allocation process within organizations, as resource allocation plays a critical role in determining the success or failure of a business (Luehrman, 1997).

In Damodaran's (2012) analysis, it is posited that assets, regardless of their nature as financial or material, has inherent value. To conduct a comprehensive evaluation of a company's intrinsic value, it is vital to initially scrutinize the extant scholarly literature pertaining to the most efficacious methodologies employed for ascertaining this value. The determined value is impacted by the market's anticipations regarding the future performance of each company, which may possess a subjective element (Berk & DeMarzo, 2017). However, despite the prevailing consensus regarding the viability of ascertaining a company's worth, there remains a lack of agreement regarding the specific approach to be employed in determining said value. Multiple valuation methodologies have been created for the purpose of assessing the value of assets, each of which is grounded on unique assumptions (Damodaran, 2006a).

When selecting a valuation methodology for determining the worth of a particular firm, it is imperative to take into account many elements like the current economic climate, the industry in which the company works, and the unique attributes of the company's operations. In instances where a definitive valuation method is not available for a particular company, employing multiple valuation methodologies might yield a more accurate estimation of the company's worth.

According to Damodaran (2012), there exist three fundamental methodologies for conducting business appraisal. The initial approach, referred to as the Discounted Cash-Flow (DCF) method, establishes a connection between the valuation of the company and projected future cash flows, which are adjusted to their present value. The second methodology, referred to

as relative valuation, is assessing the worth of a company by juxtaposing it with other firms that exhibit comparable attributes, such as earnings and sales. The third strategy, known as

Equity Value Added which measures a company ability to generate returns that exceed the cost of its shareholders' equity investment.

2.8.1. Discounted Cash Flows Valuation Method

The valuation model known as the Discounted Cash Flow (DCF) is utilized to ascertain the equitable value of a company. This is achieved by estimating the present value of anticipated cash flows associated with the asset, which are subsequently discounted at a rate that accurately reflects the level of risk associated with said cash flows (Berk & DeMarzo, 2017). Over the last two decades, this particular methodology has garnered significant popularity among investors and managers due to its high level of accuracy and consistency, as noted by Berk & DeMarzo (2017). Furthermore, Fernández (2001) asserts that this methodology stands as the sole conceptually correct approach to valuation within the realm of finance.

Although this approach is widely utilized as a valuation model, it is important to acknowledge that it is not without its limitations. One of the primary concerns is its reliance on future projections, which can introduce accuracy issues. Additionally, the model is susceptible to bias and subjectivity, further compromising its reliability.

The DCF Valuation Model encompasses multiple models that can be categorized into two distinct perspectives: Firm/Enterprise Valuation and Equity Valuation. The first perspective, which encompasses the entire company, employs valuation models such as Free Cash Flow to the Firm (FCFF), Excess Return Models (EVA), and Adjusted Present Value (APV). On the other hand, the second perspective, which focuses solely on shareholders' value, utilizes the Free Cash Flow to Equity (FCFE) valuation model. The subsequent pages provide a comprehensive examination of each of these models, with the aim of selecting the most precise methodology for calculating the fair equity value of Porsche AG.

- Firm Valuation: FCFF, Enterprise Value, TV

The FCFF model is widely utilized in the Discounted Cash Flow (DCF) Valuation Model and is recognized as one of the prominent valuation models for assessing and evaluating a company's financial well-being. As stated by Berk & DeMarzo (2017), this approach can be defined as the aggregate of cash flows allocated to all stakeholders within the organization, encompassing stockholders, bondholders, and preferred stockholders. In essence, it represents the net cash flow generated after accounting for taxes, expenses related to depreciation and amortization, net working capital, and fixed asset investments (capex).

$$FCFF = EBIT (1 - t) + D\&A - Capital\ Expenditures \pm Working\ Capital\ Changes \quad (1)$$

Where,

EBIT : Earnings Before Interest and Taxes t – tax rate

D&A : Depreciation and Amortization

In order to ascertain the market value of a company, it is imperative to discount the future free cash flow to the firm (FCFF) and the terminal value (TV) at the company's weighted average cost of capital (WACC). Assuming the ongoing operation of the company, the terminal value denotes the value of the business beyond the projected period, assuming perpetual growth at a constant rate (g), which is expected to be equal to or lower than the overall economic growth rate (Berk & DeMarzo, 2017)

$$Enterprise\ Value = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1 + WACC)^t} + \frac{TV_T}{(1 + WACC)^T} \quad (2)$$

Where,

FCFF_t : Free Cash Flow to the Firm Considering t period

WACC : Weighted Average Cost of Capital

$$Terminal\ Value_T = \frac{FCFF_T (1 + g)}{WACC - g} \quad (3)$$

g : Expected growth rate of the company

- WACC

When calculating the value of a business, it is appropriate to utilize the weighted average cost of capital (WACC) of the company as the discount rate for the expected free cash flow to the firm, as indicated in the above equations. The Weighted Average Cost of Capital (WACC) is a financial metric that quantifies the minimum rate of return demanded by all investors, including both equity and debt holders, for their investments in each company (Berk & DeMarzo, 2017). Put differently, the weighted average cost of capital represents the foregone opportunity of allocating resources towards an investment in a particular firm.

Therefore, by considering the company's capital structure and estimating the cost of equity (r_e) and the cost of debt (r_d), the weighted average cost of capital (WACC) can be calculated as follows:

$$WACC = r_e \times \frac{E}{D + E} + r_d \times (1 - t) \times \frac{D}{D + E} \quad (4)$$

Where,

r_e : cost of equity

r_d : cost of debt

$\frac{E}{D+E}$: percentage of equity in the company's capital structure

$\frac{D}{D+E}$: percentage of debt in the company's capital structure

E : Equity's market value

D : Debt's market value

t : tax rate

- Cost of Equity

Koller, Goedhart & Wessels (2015) as well as Berk & DeMarzo (2017) advocate for the presence of three distinct approaches for determining the anticipated return for equity investors. These methods include the Capital Asset Pricing Model (CAPM), the Fama-French three-factor model, and the Arbitrage Pricing Theory. According to Pratt and Grabowski (2014), there are three additional methods that can be considered, namely the Market-Derived Capital Pricing Model, the Yield Spread Model, and the Implied Cost of Equity Capital. Despite the existence of various methodologies and certain critiques, the Capital Asset Pricing Model (CAPM) continues to be

widely employed for the computation of the cost of equity (r_e), establishing a connection between anticipated returns and risk.

According to the Capital Asset Pricing Model (CAPM), the cost of equity can be determined by adding the risk-free rate (r_f) to the product of the market risk premium ($r_m - r_f$) and the levered beta of the company, along with the country risk premium that accounts for the additional risk associated with a specific market (Berk & DeMarzo, 2017) .

$$r_e = CAPM = r_f + \beta_L (r_m - r_f) \quad (5)$$

Where,

r_e : cost of equity

r_f : risk-free rate

β_L : levered beta

r_m : rate of return of the market

$(r_m - r_f)$: market risk premium

▪ Cost of Debt

A company's debt cost is its return to creditors. Capital providers must be rewarded for the risk of lending to a company. Debt costs are easier to assess than equity costs because observable interest rates are a major factor. Debt costs represent a company's default risk and market interest rates. It also helps calculate a company's WACC (Berk & DeMarzo, 2017).

$$r_d = r_f + \beta_D (r_m - r_f) \quad (6)$$

Where,

r_d : cost of debt

r_f : risk-free rate

β_D : beta of debt

r_m : rate of return of the market

$(r_m - r_f)$: market risk premium

- Betas

The Capital Asset Pricing Model (CAPM) Beta is a singular metric that conveys to financial investors and analysts the level of risk associated with a particular stock. The Beta is a measure that quantifies the level of market risk, also known as systematic risk, associated with a company in relation to the overall market. It is determined by evaluating the covariance between the asset and the market portfolio, and subsequently dividing it by the variance of the market portfolio (Berk & DeMarzo, 2017). According to Berk & DeMarzo (2017), the value of beta is influenced by the financial structure. According to the author, there exist two primary methods of financing a company, namely through equity or debt. In instances where a company's financing is solely derived from its equity, it can be observed that the beta value aligns with the unlevered beta (β_U) value. If the company is funded through a combination of equity and debt, its value can be determined by the levered beta (β_L), which can be computed using the subsequent formula:

$$\beta_L = \beta_U + (\beta_U - \beta_D) \times \frac{D}{E} \times (1 - t) \quad (7)$$

Where,

$$\beta_D = \frac{(r_D - r_f)}{(r_M - r_f)} \quad (8)$$

β_L : levered beta

β_U : unlevered beta

β_D : beta of debt

$\frac{D}{E}$: debt-to-equity ratio, using the market value of equity

t : tax rate

- Equity Value and Fair value for a share

The Equity Value of a Firm (EQV) can be reached by subtracting the Financial Debt of a Company to its Firm Value.

$$EQV = Enterprise\ Value - Net\ Debt - Preferred\ Stocks - Minority\ Interests \quad (9)$$

The valuation per share can then be determined by dividing the previously calculated Equity Value (EQV) by the total number of outstanding shares of the company.

$$Fair\ Value\ for\ a\ share = \frac{EQV}{nbr\ of\ outstanding\ shares} \quad (10)$$

2.8.2. Multiples Valuation Method

The Relative Valuation Model, alternatively known as the Multiple Valuation Model or Pricing, represents an alternative approach to company valuation within the realm of corporate finance. This methodology, in contrast to the assessment of a company's intrinsic value through the DCF Valuation Model, employs a market-based approach to determine the company's worth by examining the pricing of comparable companies or industries (Berk & DeMarzo, 2017).

In recent years, there has been an increasing trend in the adoption of this method for company valuation. This can be attributed to its straightforwardness and efficiency in calculations, as compared to the DCF Valuation Model (Berk & DeMarzo, 2017). However, it is important to note that this pragmatic approach may result in an inaccurate estimation of the company's value. This is primarily due to the oversimplification of factors such as risk, growth, and cash flows that are inherently linked to the company.

Due to this rationale, certain financial scholars, such as Fernández (2001), propose the utilization of this methodology as an adjunctive strategy, to undertake a critical comparison with the outcomes derived from the DCF Valuation Model.

According to Berk & DeMarzo (2017) research, the utilization of this methodology necessitates adherence to four fundamental steps to ensure accurate computation of standardized multiples and avoid potential complications. There are four steps that can be identified:

- 1.1.1 The concept of "multiple" refers to comprehending the methodologies employed to derive estimates of multiples, as well as the consistent application of these measures across comparable firms.
- 1.1.2 Elucidating the notion of "multiple" entails gaining an understanding of the cross-sectional dispersion of this metric.
- 1.1.3 The objective of this analysis is to gain a comprehensive understanding of the multiple, including its underlying fundamentals, the potential effects of various changes on the multiple, and the interrelationships between the multiple and relevant variables.
- 1.1.4 Use the multiple by carefully considering the selection of companies for comparison.

With respect to the points, it is presumed that companies within the same industry possess similar attributes, as stated by Berk & DeMarzo (2017) wherein comparable companies are expected to exhibit equivalent levels of risk, growth, and cash flows to facilitate accurate valuation of the company in question.

According to Fernández (2001), there are three distinct categories of multiples. These include multiples that are based on a company's capitalization, such as the Price Earnings Ratio, Price to Sales, and Price to Book Value. Additionally, there are multiples that are based on a company's value, such as EV/EBITDA and EV/Sales. Lastly, there are multiples that are referenced to growth, such as EV/EBITDA growth.

In their work, Berk & DeMarzo (2017) classifies multiples into four distinct categories. The first category encompasses multiples that are based on earnings, such as Price/Earnings and EV/EBITDA. The second category comprises multiples that are based on book value, specifically Price/Book value. The third category includes multiples that are based on revenues, such as Price/Sales and EV/Sales. Lastly, the fourth category consists of sector-specific multiples.

Although this approach may appear straightforward, the process of identifying suitable companies for comparison can pose challenges. Moreover, the primary benefit of utilizing multiples is to determine the extent to which the evaluated company is over or undervalued relative to its peer group.

2.8.3. Economic Value Added

The Economic Value Added (EVA) model can be seen as an alternative approach to the conventional models such as the Discounted Cash Flow (DCF) valuation model. Berk & DeMarzo (2017) stated that this methodology might be a way to assess the value generated or lost by an investment or a collection of investments. It represents a distinct approach within the broader category of Excess Return Models.

$$EVA = NOPAT - (Capital\ Invested \times WACC) \quad (11)$$

▪ Market Value Added

After having conduct the EVA, it is important to compute the market value added (MVA) as it represents the present value of future expected EVA (Stern & Shiely, 2003). This calculation aims at discounting the EVA and the TV at the WACC.

$$MVA = \sum_{t=1}^T \frac{EVA_t}{(1 + WACC)^t} + \frac{TV_T}{(1 + WACC)^T} \quad (12)$$

Where,

$$TV_T = \frac{EVA_T(1 + g)}{WACC - g} \quad (13)$$

- Enterprise Value

The Enterprise Value could then be easily found by adding Capital Invested of last year to MVA.

$$EV = MVA + Capital\ invested_t \quad (14)$$

- Equity Value

As for the DCF valuation method the equity value can be found by adding the non-operating assets and subtracting the Financial Debt and the non-operating Liabilities of the company to the Enterprise Value.

$$EQV = Enterprise\ Value - Net\ Debt - Preferred\ Stocks - Minority\ Interests \quad (15)$$

From the EQV the Fair value for a share can then be computed by dividing the EQV by the number of shares outstanding.

$$Fair\ Value\ for\ a\ share = \frac{EQV}{nbr\ of\ ousstanding\ shares} \quad (16)$$

3. Research Design

3.1. Research Context

In this literary review, we can see the different authors' points of view on the process of an IPO and the reasons for a company to go public. In particular, the authors agree on four major factors in setting up an IPO for a company. Research conducted by Bradley, Jordan & Ritter (2003), Chemmanur & He (2011) and Burton, Helliar & Power (2006) among others, tends to prove that this process improves a company's reputation. Modigliani & Miller (1963) et Field, Gustafson & Pisciotta (2018) highlight the positive effect of an IPO on a company's cost of capital. Research carried out by Zingales (1995) and Pagano, Panetta & Zingales (1998) demonstrates the simplification of acquisition activities brought about by an IPO. Finally, Ang & Brau (2003) and Espenlaub, Khurshed & Mohamed (2015) demonstrate the ability of a company to increase its liquidity through this process. The authors also agree on the complexity of such an exercise, which cannot be carried out without external assistance from investment banks. On this subject, Liaw (2012) shows that investment banks are now at the heart of this type of process, becoming a major player in 21st century financial sector. The role of investment banks in an IPO process is defined by the authors through two major roles. On the one hand, investment banks play a role of advisors, as defined by Giudici & Vismara (2021) by determining the offer price, preparing regulatory files and advising companies on investor relations. On the other hand, some of banks involved in the process also play a financial role, as Baron (1982a) points out with their work as underwriters.

Nevertheless, the involvement of external players such as investment banks in such a process may also raise a potential conflict of interest as highlighted by Lowry, Rossi and Zhy (2019). Indeed, investment banks act as advisors and underwriters in the same process. They may therefore be led to make biased decisions, as shown by Welch (1992), Baron & Holmström (1980) and Loughran & Ritter (2002), regarding the valuation of the company, and thus deliberately determine an issue price lower than the real fair value of a share.

Another key element highlighted through this literature review is the fact that the access to a stock market listing is regulated, as demonstrated by the Frankfurt Stock Exchange. The company must therefore comply with numerous rules in order to be approved by the Frankfurt stock

exchange and succeed in having its shares traded on an organized German market. Regarding this specific market, the studies carried out by authors such as Wasserfallen & Wittleder (1994) and more recently Kiefer (2020), are intended to endorse the previous authors' arguments that companies tend to be undervalued at the time of an IPO. Moreover, as demonstrated in the work of Caussat (2021), studies of banking activities tend to focus on Anglo-American players, this reduces serious analysis of IPOs to the US and UK markets. Moreover, through this literature review process no serious research has been found related to the underperformance or overpricing of companies in the automotive sector during an IPO.

We can see from this discussion that the role of investment banks is very strong during the IPO process. Their involvement as advisors to the company is decisive in the valuation process but can be biased by their involvement as underwriters. Moreover, there are only a limited number of research that investigates potential IPO undervaluation on the German market and on the automotive industry.

Finally, this literature review also shows the importance that authors such as Luehrman (1997), Damodaran (2012) or Berk & DeMarzo (2017) attach to the valuation of a company as the key to its success or failure. They also agree that 3 major models can be used by investment banks when carrying out an IPO: the Discounted Cash Flow valuation method, the Multiples valuation method and the Economic Value-Added valuation method.

3.2. Research Methodology

Considering all the research carried out on the role of investment banks regarding the valuation of a company at the time of an IPO, as well as the very limited amount of IPO-related research on the German market and in the automotive industry, our research focuses on a particular and very recent case study that has not yet been explored. This is Porsche AG's IPO on the Frankfurt Stock Exchange on September 29, 2022. We consider this study in order to test the hypotheses set out below, while demonstrating the role of the investment banks involved in the valuation of such a company linked to the automotive sector. The main aim of our study is therefore

to determine whether or not the issue price of Porsche AG shares was undervalued and if the investment banks involved in the deal may have played a role in this strategy.

To do this, we will start by looking at the market situation prior and after the IPO, providing a macroeconomic outlook and an overview of the automotive industry.

We will then take a retrospective look at the company Porsche AG before its IPO. The company's history will be presented. We will then look at the company's main revenue drivers. The company's corporate structure at the time of the IPO will also be presented. Next, we present a financial and non-financial analysis of Porsche AG before and at the time of the IPO. Finally, we close this section on the company with a comprehensive analysis of its listing on the Frankfurt Stock Exchange, including a broad survey of the investment banks involved in the deal.

The 3 company valuation models presented in the literature review will be applied to the case of Porsche AG by means of assumptions that will enable us to determine a fair value for the share price emanating from each model. DCF, EVA, and the Comparable approach are crucial to assessing the creation and destruction of value in an Initial Public Offering. Indeed, DCF's allow to assess the IPO's prospective revenue streams. EVA assesses if the IPO creates value above the cost of capital revealing how the offering may affect shareholder wealth. The Comparable technique uses market data from similar firms to assess the IPO's value against real market transactions and industry indicators. The choice of these three valuation models is explained by the fact that they represent three types of company valuation. The intrinsic assessment of the company's value with the DCF; the market-based assessment with the comparable and finally the excess return assessment with the EVA.

Finally, the results found will be compared with the share's issue price and its closing price at the end of the first trading day. These analyses will enable us to determine the valuation strategy used by the banks involved in the deal and if they may have played a role in it.

Finally, it is important to mention that our study will be based mainly on the following documentation:

- Data extracted from Bloomberg and related to Porsche AG or the companies that are mentioned in the analysis
- Data provided by the company Porsche AG's : Prospectus, Financial reports, or non-financial reports
- Press articles related to the deal, Porsche AG or companies linked to the deal.

The case study enables us to focus on a specific case by choosing a single entity to analyze. In the case of an IPO, it allows us to delve deeper not only into the company itself, but also into growth projections, market conditions and sector specificities. All these details then feed into a concrete case study of the chosen entity linked to this entity. It can also be used to demonstrate or refute important factors that may have been identified in empirical studies through a particular case. For example, in the case of an IPO, the frequent undervaluation of a company by investment banks and the close examination of the details that led these banks to create or destroy a company's value.

3.3. Hypotheses Design

With the help of research carried out on the subject through the literature review and the announcement of the research design, 2 main hypotheses are to be tested in this thesis:

Hypothesis 1 - Investment banks created value for Porsche AG while running the IPO:
This hypothesis argues that investment banks involved in Porsche AG's IPO added a significant value to the company during the IPO process. They brought their expertise, market knowledge and a range of financial services that helped the company to go public smoothly and with a favorable valuation at the right time. They helped market the IPO to potential investors, generating interest and demand for the company's shares. Finally, they provided price stabilization mechanisms after the IPO to avoid excessive volatility and support the share price, while guaranteeing a consistent issue price.

Hypothesis 2 - Investment banks destroyed value for Porsche AG while running the IPO: This hypothesis suggests that the investment banks involved in Porsche AG's IPO did not act in the issuer's best interests and potentially destroyed value during the IPO process. Indeed, the investment banks may have underpriced the IPO to ensure a successful launch, which could have led the company to leave money on the table by not capturing the full value of its shares. They may also have prioritized their own profits or their relationships with certain investors over the interests of the issuer. They may also have undertaken practices designed to manipulate the market, for example by offering a lower-than-normal issue price or artificially inflating demand, which can have negative consequences for the company and its shareholders.

4. Market Overview

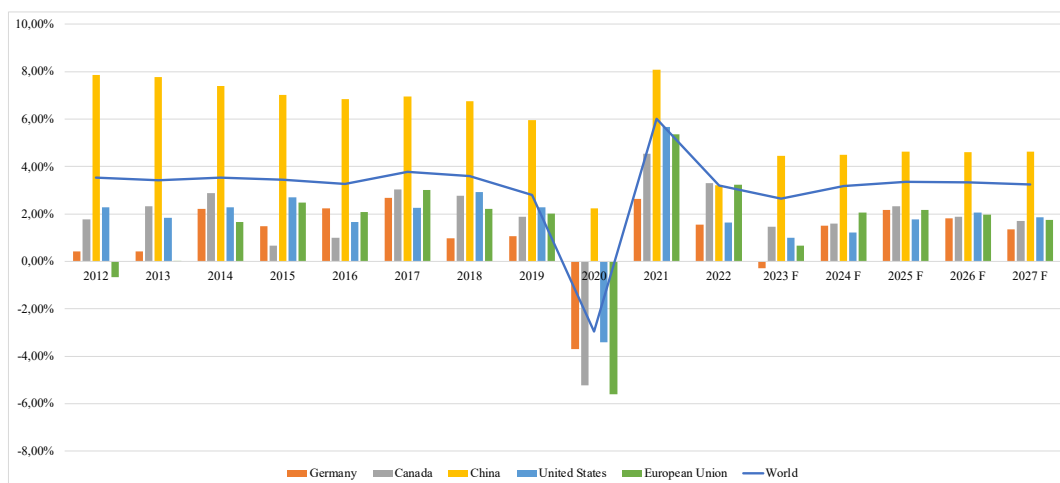
4.1. Macroeconomic Outlook

4.1.1. Gros Domestic Product

Gross Domestic Product (GDP) growth is a fundamental indicator of a nation's economic performance. It measures the increase in the total market value of all goods and services produced within a country over a specific period, typically a quarter or a year. GDP growth indicates the rate at which an economy is expanding or contracting. A positive GDP growth suggests economic expansion, while negative growth indicates a recession. This growth is influenced by various factors, including consumer spending, business investments, government expenditure, and net exports. A robust GDP growth is often associated with job creation and an improved standard of living. Policymakers use GDP growth data to evaluate the health of an economy, make informed decisions, and implement economic policies. However, it's essential to consider factors such as the quality of economic growth, income distribution, and environmental sustainability when analyzing the implications of GDP growth for society as a whole.

The graph below is representing the real growth of the GDP over the 10 last years (2012-2022) considering the countries and regions where Porsche AG is most active, as well as the whole world trend.

Figure 1 : GDP Growth over the 10 past years in different regions/countries and world trend



Source: Author's elaboration considering IMF Database

As previously mentioned, the table above shows the real GDP trends for the regions and countries in which Porsche AG, the subject of our research, is most active. It shows constant GDP growth from 2012 to 2019 for European Union countries, ranging from -0.67% in 2012 to +2% in 2019. The chart also shows that North American countries such as Canada and the USA are also recording constant GDP growth, averaging +2% for Canada between 2012 and 2019, and +2.28% for the USA. China, one of the countries in which Porsche AG achieves the bulk of its sales, recorded slightly lower year-on-year growth over the years 2012-2019, but still recorded average annual growth of around +7.07% over these 8 years.

The year 2020 marks the end of global GDP growth. In fact, as we can see from the global trend chart, between 2012 and 2019 global GDP grew by an average of +3.42% a year. However, in 2020, with the arrival of the global Covid-19 epidemic leading to major lockdowns in many parts of the world, growth was severely impacted. Indeed, many companies saw their production slow down or even stop in order to combat the proliferation of the epidemic. The European Union was hardest hit, recording the biggest drop in growth, with GDP down by almost -5.59%. The United States and Canada were also hard hit, losing -3.4% and -5.23% respectively of their annual GDP. Only China seems to have escaped this negative growth, despite a notable slowdown from +5.95% in 2019 to +2.24% in 2020.

The year 2021 marks a return to global growth, driven in particular by the reopening of countries and the consequent return to normal trade in goods, as well as the free movement of the world's population. The graph shows that global growth is up +6.02% on previous years (2012-2019), boosted by the reopening of new markets. This abnormally high GDP growth is also noticeable in the European Union in 2021 with +5.36%; but also in North American countries with GDP growth of +5.67% in the US and +4.54% in Canada; as well as in China with GDP growth of +8.08%.

This GDP growth then stabilizes in 2022, with a return to global growth similar to the pre-covid rate, at around +3.19%.

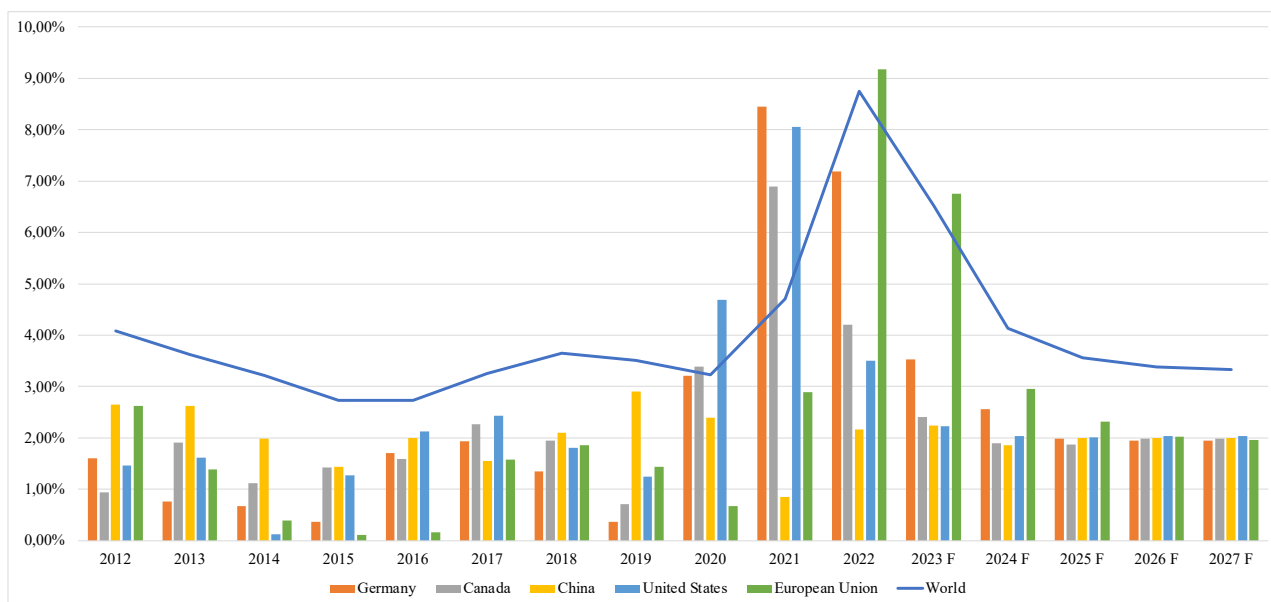
IMF projections for the next five years (2023 to 2027) forecast steady global growth of around +3.16% per annum but could well be severely affected by a potential global recession.

4.1.2. Consumer Price Index (Inflation)

The Consumer Price Index (CPI) is a widely-used measure of inflation that tracks changes in the average prices paid by consumers for a basket of goods and services over time. CPI index growth reflects the rate at which these prices are increasing or decreasing. A rising CPI suggests inflation, indicating that the purchasing power of a currency is declining, as it takes more money to buy the same goods. Conversely, a falling CPI implies deflation, where prices are decreasing, potentially leading to reduced consumer spending. CPI is crucial for both economic policymakers and individuals as it helps in adjusting wages, benefits, and investment strategies in response to changing price levels. Central banks often use CPI data to guide their monetary policies, striving to maintain stable, low inflation to support economic growth.

The graph below is representing the real growth of the CPI Index over the 10 last years (2012-2022) considering the countries and regions where Porsche AG is most active, as well as the whole world trend and a forecast period for the next 5 years.

Figure 2 : CPI Index Growth over the 10 past years in different regions/countries and world trend



Source: Author's elaboration considering IMF Database

As we can deduct from the preceding table highlighting the IMF's inflation figures, before the Covid crisis in 2020, inflation was globally stable, hovering around +3.33% per annum worldwide.

In 2021, the world began to experience very high inflation, with a global average of +4.7%. This trend of very high inflation also marks the year 2022, with global inflation rising by more than +8.75%, which can be explained by the delayed impact of the covid crisis, but also by the start of the armed conflict between Ukraine and Russia. Indeed, these two countries are world hubs for the exchange of goods, particularly raw materials. This war has drastically pushed up the price of raw materials, with a snowball effect on the prices of products sold at the end of the chain.

Locally, the countries most affected by this phenomenon are those of the European Union, as many raw materials are imported into this region, notably gas, oil and cereals. As a result, the European Union expects inflation in its member countries to rise to over +9% by 2022.

The North American States have also been impacted by this high inflation from 2020 until 2021. Inflation in the US is expected to rise to over +8% in 2021. As the North American economy is mainly based on the new technologies sector, it has been impacted by the semiconductor crisis in Asia, due to numerous confinements.

In contrast, inflation in China has been fairly constant, as the country is relatively unaffected by fluctuations in commodity prices, with its strong access to natural resources and low dependence on imports.

Through its 5-year forecast presented in the graph, the IMF is therefore aiming to keep inflation contained, in the countries where Porsche AG is most active, at around +2% per year. In order to contain inflation consistently around +2%, the various central banks have had to make a number of monetary decisions.

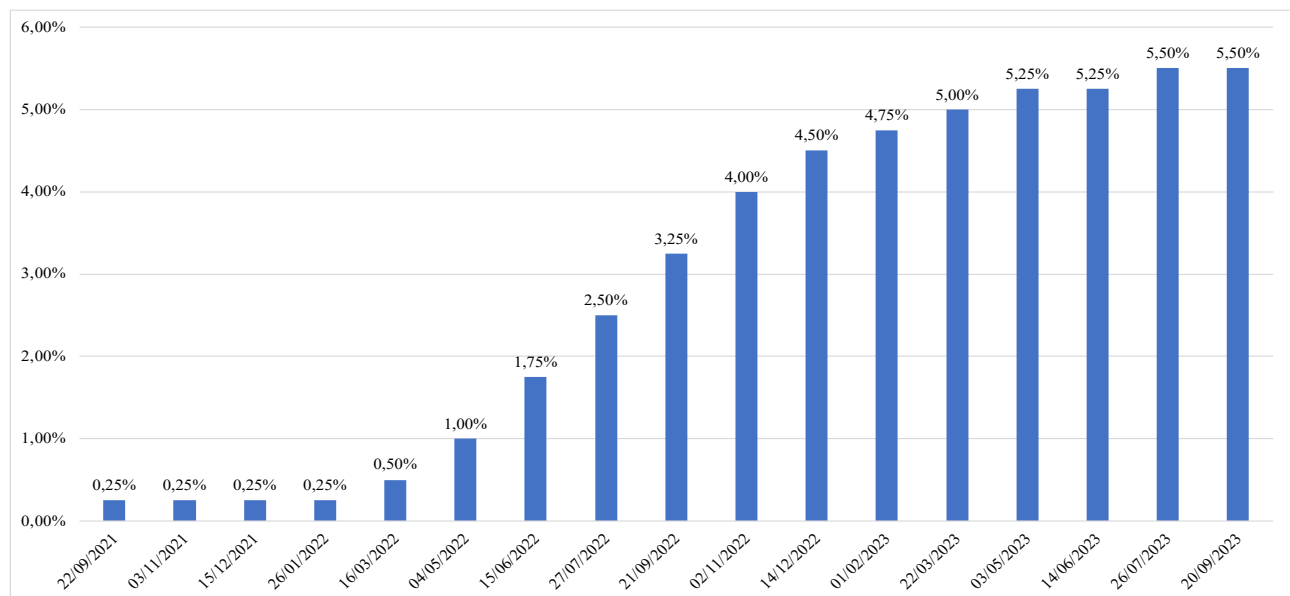
4.1.3. The Monetary decisions from Central Banks

Over the past three years, central banks around the world have made a series of monetary decisions in response to various economic conditions and challenges. In general in the past years before the covid crisis, central banks have implemented a mix of accommodative policies, including lowering interest rates and engaging in quantitative easing, to stimulate economic growth and combat the impact of the COVID-19 pandemic. However, as the global economy recovered, some central banks began to gradually normalize their monetary policies by raising interest rates and reducing asset purchases to address concerns about inflationary pressures. These decisions have been guided by a delicate balancing act, as central banks aim to support economic recovery while ensuring price stability and financial market stability in an evolving economic landscape.

Two examples have been chosen here to illustrate this change in monetary policy. These are the decisions of the US Federal Reserve (FED) and the European Central Bank (ECB).

The figure below shows the interest rate trend and timetable set by the US Federal Reserve (FED) over the past three years.

Figure 3: FED interest rate trends

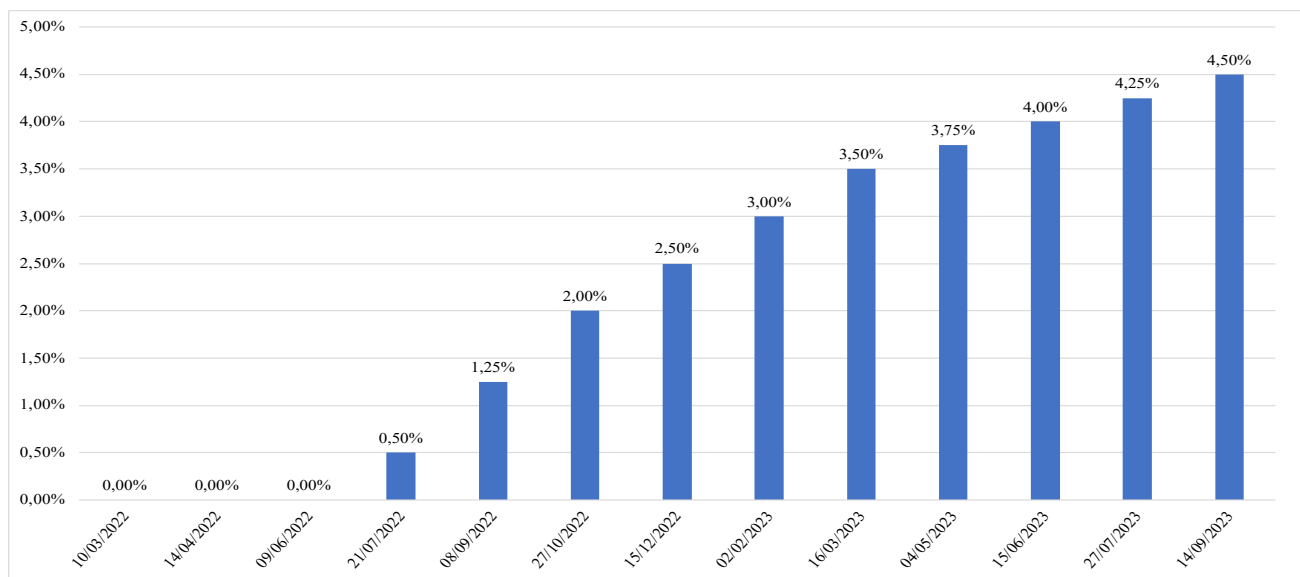


Source: Author's elaboration based on Bloomberg Data

In the figure above, we can see that over the last two years, the US Federal Reserve (FED) has made 11 rate hikes, ranging from 25 basis points to 50 basis points and as high as 75 basis points. The interest rate set by the Federal Reserve has thus risen from 0.25% at the end of Covid to 5.50% in September 2023.

The figure below shows the interest rate recovery policy of the European Central Bank (ECB) over the past 3 years.

Figure 4 : ECB interest rate trends



Source: Author's elaboration based on Bloomberg Data

This table leads to the same conclusion as that of the FED: the ECB has made 10 rate hikes over the past two years, also ranging from 25 basis points to 50 basis points, and even up to 75 basis points. The interest rate set by the ECB has thus risen from 0% at the end of Covid to 4.50% in September 2023.

These two tables illustrate the transition made by different countries in the world in terms of post-covid monetary policy. In other words, a drastic increase in terms of interest rates. Nevertheless, these decisions are not without impact on the economy and, in particular, on the various world markets.

4.1.4. The impact of the Central Banks decisions on the market

The decisions taken by the various European central banks to counter inflation have had a direct impact on the financial markets. Indeed, inflation is considered one of the major factors in an investment strategy, as it reduces the real returns on a financial investment and erodes an investor's purchasing power.

On the stock market, this impact can be detrimental, as during this period of rising interest rates, companies may experience a slowdown in their net profits, as the price of raw materials rises and is forced to impact products at the end of the chain, leading end-consumers to make choices based on necessity. Stock prices can therefore fluctuate wildly, and investors are not guaranteed a constant return.

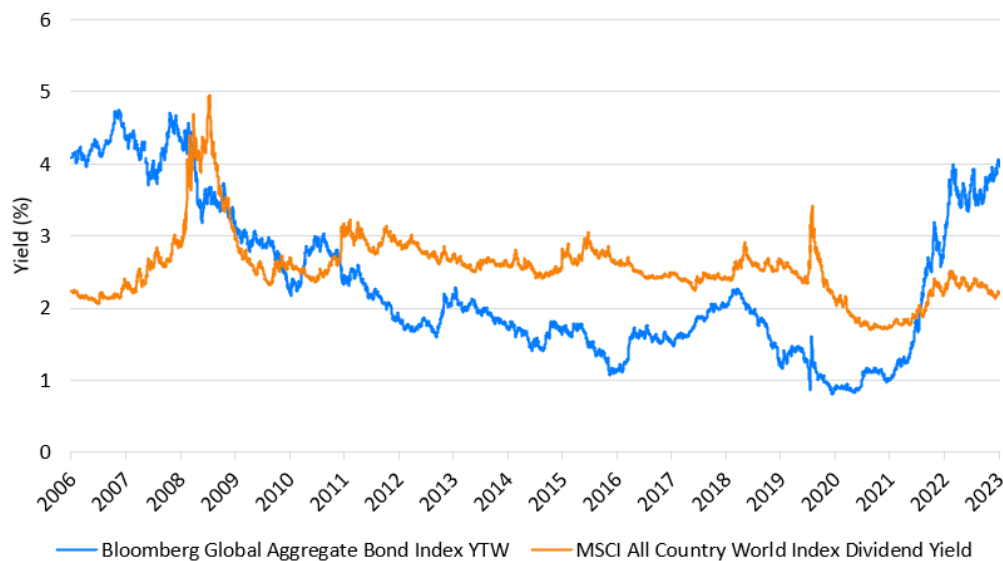
In the interest-rate and Fixed Income markets, higher interest rates have a direct impact, as they increase the cost of debt for a company, a country or even a borrower. Conversely, investors see their returns increase, as companies, governments or even banks take on debt at a higher overall cost, which in turn means higher interest rates for lenders.

A recent study conducted in 2023 by Bloomberg compares the returns of global bonds with those of global equities. The chart below is the result of this research and compares the returns of the MSCI All Country World Index Dividend Yield with those of the Bloomberg Global Aggregate Bond Index YTW.

The MSCI All Country World Index Dividend Yield is a metric that represents the average annual dividends paid by companies in the MSCI ACWI Index as a percentage of their stock prices. The MSCI ACWI (All Country World Index) is a global equity index that includes a wide range of publicly traded companies from both developed and emerging markets, providing a comprehensive snapshot of the global stock market. It encompasses stocks from more than 50 countries and is used as a benchmark for investors and fund managers to assess the performance of their portfolios in a global context .

The Bloomberg Global Aggregate Bond Index Yield to Worst (YTW) is a measure that reflects the weighted average yield of a global bond index, taking into account the worst potential yield for the bonds in the index if they were to perform at their lowest possible level, such as through call provisions or other factors. It provides a conservative estimate of the index's yield by considering the most adverse scenarios for bondholders, helping investors understand the potential risks associated with the bonds in the index.

Figure 5 : Yield on Global Bonds vs Stocks



Source:

Author's elaboration based on Bloomberg Data

As we can see from the graph above, between 2012 and 2021, equity yields were higher than bond yields, favoring investment in equities over bonds. However, the chart shows a reversal of this trend in 2021, with the two curves crossing at the end of the year. This reversal reflects higher yields on the Bloomberg Global Aggregate Bond Index (YTM) than on the MSCI ACWI. This trend could therefore lead investors to prefer a bond investment that guarantees a higher short-term return than equities.

4.2. Industry Overview

In recent years, with rapidly advancing technologies, increasingly focused and important customer expectations, supply chain refinements and differing regulations from one country to another, the automotive industry was redefined.

Furthermore, the Competition in the automotive market is fierce, the market is saturated, and consumers are fluctuating and changing.

4.2.1. A Powerful Industry

In 2020, with almost 6.6 million kilometers of road, the USA was the world's most extensive road network, a record that testifies to the indispensable role played by the car in this region. However, sales of light cars in the USA were not as significant as the road network: less than 3.3 million units in 2021, which is even lower than in 2020. Automobile sales have never been worse in the USA, with 2021 being the worst year since 1951. Car production in the USA is also at half-mast. In 2020, 1.9 million cars were produced, compared with 5.5 million in 1999 .

Regarding car manufacturing, Latin America now plays an important role. Mexico produced just under 3.2 million cars in 2020, while vehicle production in Brazil amounted to just over two million units that year. These two countries ranked among the world's largest producers of motor vehicles (Mukjerjee, 2022).

In contrast on the one hand the automotive superpower, Germany is losing ground to the Chinese and Indian giants in vehicle manufacturing. For many years, the flagships of German industry - Volkswagen, BMW, Mercedes and Audi - have been relocating to Asia and Latin America. France, on the other hand, increased its vehicle production between 1997 and 2018 and can be considerate as an exception in Europe as the production volumes have been falling since 2018 (Cornet et al., 2023).

Spurred by global climate initiatives such as the Paris Agreement, several countries have begun to introduce stricter emissions controls for new vehicle models. As a result, automakers are

beginning to extend their activities to the electric mobility sector. By 2025, it is predicted that one in three new vehicles sold will be powered or assisted by an electric battery. In the United States in particular, the electric vehicle market has gained in popularity. Around 600,000 light electric plug-in vehicles were sold there in 2021, almost double the number sold in 2020. The Tesla Model S was the best-selling car in the first quarter of 2022, followed by the Model 3 (Bloomberg News, 2023).

4.2.2. A competitive industry

Globally, the Volkswagen Group and Toyota Motor are the leading automakers in terms of sales. The Japanese automotive giant generated nearly US\$250 billion in revenues in 2020, and Volkswagen more than US\$245 billion. The US-based Tesla brand recorded strong growth throughout 2021, making it the world's most valuable brand across all sectors, despite the fact that their only car segmentation is electric (River, 2022).

Historic automotive giants such as Volkswagen and Toyota are facing two new phenomena: the emergence of new market players such as Chinese cars, and market constriction. Car sales had been declining even before the COVID-19 crisis. However, sales of the sector's leading companies quickly rebounded, despite sluggish vehicle sales. Volkswagen, for example, achieved excellent results in 2021. In fact, the German firm retained its runner-up position in terms of global car sales market share in 2021. Nevertheless, in the same region such as in France, consumers are still very attached to local brands. In 2020, for example, the PSA and Renault Groups accounted for almost 50% of car registrations in France (River, 2022).

4.2.3. An industry shaped by transition

Although still underdeveloped in the United States, where the private car is still at the heart of mobility, MaaS (Mobility as a service) is developing strongly in other regions of the world, such as Europe and Asia. In the car-sharing services sector, Europe and Asia will account for almost 85% of market share, compared with just 15% for North America in 2021 (Kriswardhana & Esztergár-Kiss, 2023).

Among these MaaS, BlaBlaCar leads the way in passenger transport. This "Consumer to Consumer" model is expanding rapidly, with BlaBlaCar's membership rising from 60 million in 2018 to 100 million in 2021. But it's not in Europe where car-sharing is most popular. In Asia, almost half of all individuals had already made a ride-sharing trip by 2021, compared with just 22% of Europeans (Kriswardhana & Esztergár-Kiss, 2023).

Another heavyweight in the MaaS sector is chauffeur-driven cars (VTC), whose introduction has created a great deal of reluctance, particularly in France, where cohabitation with cabs was initially stormy. The American firm Uber has posted a sharp rise in net income since 2014, however, the company is regularly singled out for the low pay of its drivers. In 2019, on the average 45-hour working week of Uber drivers in France, they were paid around 1,600 euros net per month (Kriswardhana & Esztergár-Kiss, 2023).

With public transport and bicycle infrastructure sometimes lacking or insufficient in certain regions, these MaaS provide an additional alternative to the private car. This gradual move away from private car travel will save several tones of CO₂ per inhabitant per year in the future, and perhaps bring us a little closer to the global objectives in terms of limiting global warming (Kriswardhana & Esztergár-Kiss, 2023).

5. Company Overview

This chapter aims to provide a complete overview of Porsche AG, which is important when valuing a company, as it helps to understand how it operates. A brief review of the company's history is given, followed by a description of revenue factors, the corporate structure of Porsche AG and a financial and non-financial analysis is defined, before concluding by the company's IPO analysis at the end of September 2022.

5.1. Porsche history

Ferdinand Anton Ernst Porsche, nicknamed "Ferry Porsche", gave his name to the well known German car manufacturer firm. His father, Ferdinand Porsche, was an automotive engineer who designed models for a host of manufacturers including Austro-Daimler, Mercedes-Benz and Steyr. Equally passionate about mechanics, his son grew up in the world of beautiful cars and technical innovations. In 1931, together with his son, the father founded the "Dr. Ing. h.c. F. Porsche GmbH - Konstruktion und Beratung für Motoren- und Fahrzeugbau" design office in Stuttgart. The company designs engines and spare parts, and patents the torsion-bar suspension, used for many decades in automobile construction worldwide.

During the Nazi regime, Ferdinand Porsche was asked to design a car that was cheap and fast enough. This was the birth of the "Volkswagen", literally the "people's car", later to become the Beetle. In the aftermath of the Second World War, his son took over the reins of the German company and revived the workshops, then in a state of disrepair. These were the beginnings of one of the world's greatest sports car manufacturers. After designing the Beetle and then a military vehicle under the Third Reich, the German company finally freed itself from the Nazi yoke and created the cars of its dreams. In 1948, the Porsche Typ 356 "n°1" Roadster marked the birth of Porsche. Designed by Ferry Porsche on the mechanical basis of the Volkswagen Beetle, using a four-cylinder flat Boxer engine, it went into series production from 1948 to 1965. The quality of its manufacture earned Porsche a solid reputation. It was a great success, particularly in the United States. The car also boasted an impressive racing record. 1951 marked the 356 SL's first victory in its class at the 24 Hours of Le Mans, with driver Auguste Veillet. The 356 also topped the first

edition of the 9 Hours of South Africa in 1958, as well as the 1,000 kilometers of Catalonia on several occasions.

In September 1963 Porsche presented at the Frankfurt Motor Show its latest top-of-the-range model was called the "901". Nevertheless, since Peugeot had registered all numbers with a central zero, the name was dropped in favor of the current "911" designation. Visually similar to the 356, the 911 differs in terms of its engine: a 2-liter flat-six with a rear overhang. The 911 then became Porsche's most famous model. Eight generations have succeeded one another and over the years, Porsche has introduced improvements; each new model was more powerful than the previous one. In 1968, it reached 210 km/h, a record for the time. Today, older models are among the most sought-after sports cars among collectors. On May 11, 2017, the one millionth Porsche 911 left the Zuffenhausen factory.

Porsche is also well known in the world of racing, particularly in GT classic racing, thanks to its numerous victories in the various endurance categories. In 1962, the Porsche 804 took first place in the F1 French Grand Prix. In 1968, the Porsche Type 908 LH won the Daytona 24-hour race in Florida. In 1970, in addition to its overall victory in the 24 Hours of Le Mans, the 917 won Porsche the Constructors' World Championship. The 936/77 Spyder went on to win the World Championship title in 1977. In the 1980s, Porsche dominated the world of motorsports. The Porsche 911 Carrera 4x4c won the 1984 Paris-Dakar. In 1996, Porsche announced its comeback and entered the increasingly popular GT1 category. In 2005, the Porsche RS Spyder marks the German manufacturer's return to the Sport-Prototype category. In 2011, Porsche announces its return to Le Mans and endurance racing in 2014, with the hybrid Porsche 919. Porsche had even considered a potential return to F1 by 2026 but ended the project in 2023 without completely abandoning the idea.

In 2005, as the most profitable automaker, Porsche decided to increase its stake in Volkswagen, but the economic crisis crippled the acquisition attempt. By 2009, the company had accumulated debts in excess of €10 billion. To avoid bankruptcy, Porsche merged its activities with Volkswagen, which purchased 49.9% of its shares.

Today, Porsche remains faithful to its DNA and celebrated its 70th anniversary in 2018. The German manufacturer continues to offer a wide range of sports cars, including coupes, convertibles, roadsters and even sedans since the arrival of the 4-door Panamera in 2009. In addition, with the advent of the SUV, the Zuffenhausen-based company has effectively established itself in this new segment, where the Cayenne and the little Macan are best-sellers. Nor has it forgotten the ecological issues that currently govern the automotive world, and since 2019 it has been offering its first 100% electric sports car, the Taycan, while actively working on synthetic fuels.

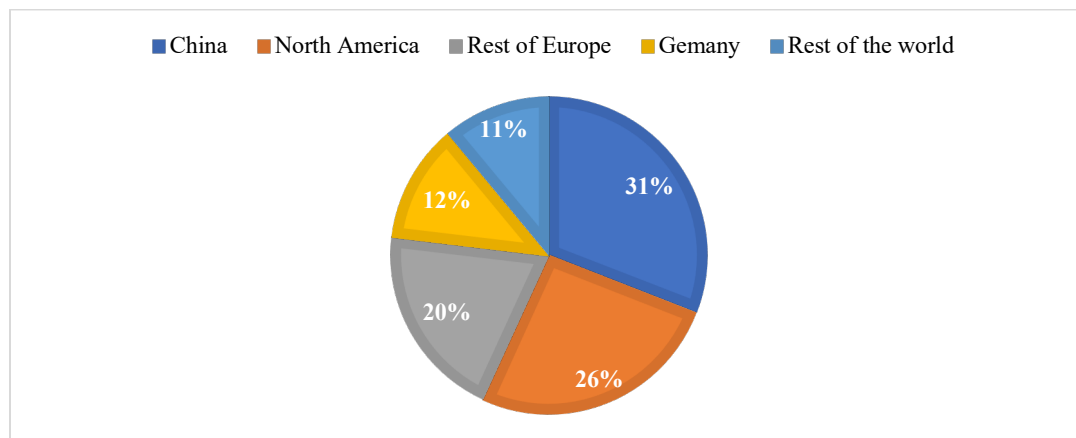
5.2. Porsche AG's Key Factors on Revenues

The Porsche AG's key revenues factors aim to highlight the markets in which Porsche AG is present, as well as the company's sources of revenue. These factors are key elements as it shows the investors the markets and the products the company is exposed to, and the types of activities led by the company.

5.2.1. Porsche AG's main geographic markets

Porsche AG is a multinational company which operates all over the world as represented in the Figure 6. This Figure represents Porsche AG's main geographic markets in terms of revenues generated in 2021. As stated on the figure, the company generates most of its revenues in China, with 31% of its annual revenues in 2021 coming from China, which represents around 10 333 million euros. North America also represents a major market for Porsche AG, generating around 26% of annual revenues in 2021, or 8 673 million euros. Europe (excluding Germany) accounts for 20% of the company's revenues, or 3 697 million euros. Germany alone accounts for 12% of Porsche's worldwide revenues in 2021, or 4 034 million euros. Finally, the rest of the world should not be underestimated, accounting for almost 11% of the company's revenues in 2021, or 3 697 million euros.

Figure 6 : Porsche AG 2021's main geographic markets

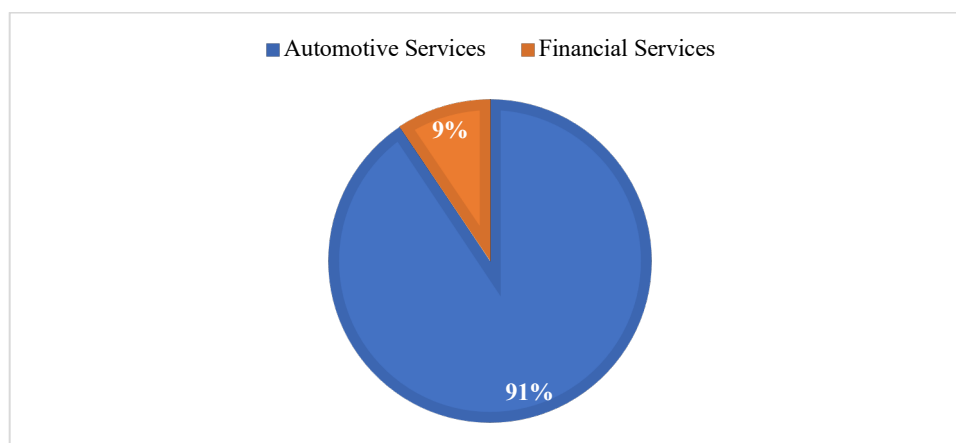


Source: Author's elaboration considering Porsche AG's Data from IPO Prospectus and Bloomberg

5.2.2. Distribution of Porsche AG's Revenues

Porsche AG's revenues in 2021 was generated mainly by two segments represented in the Figure 7 below. Firstly, 91% of the company's revenues, which represents 30 289 million euros in 2021, was generated by the automotive linked services through the sale of vehicles and related services such as car servicing and repairs. Secondly, financial services, that can refer to financing and leasing plans, insurance, and credit cards, accounted for 9% of revenues, or 3 127 million euros.

Figure 7 : Segmentation of Porsche AG's Revenues in 2021



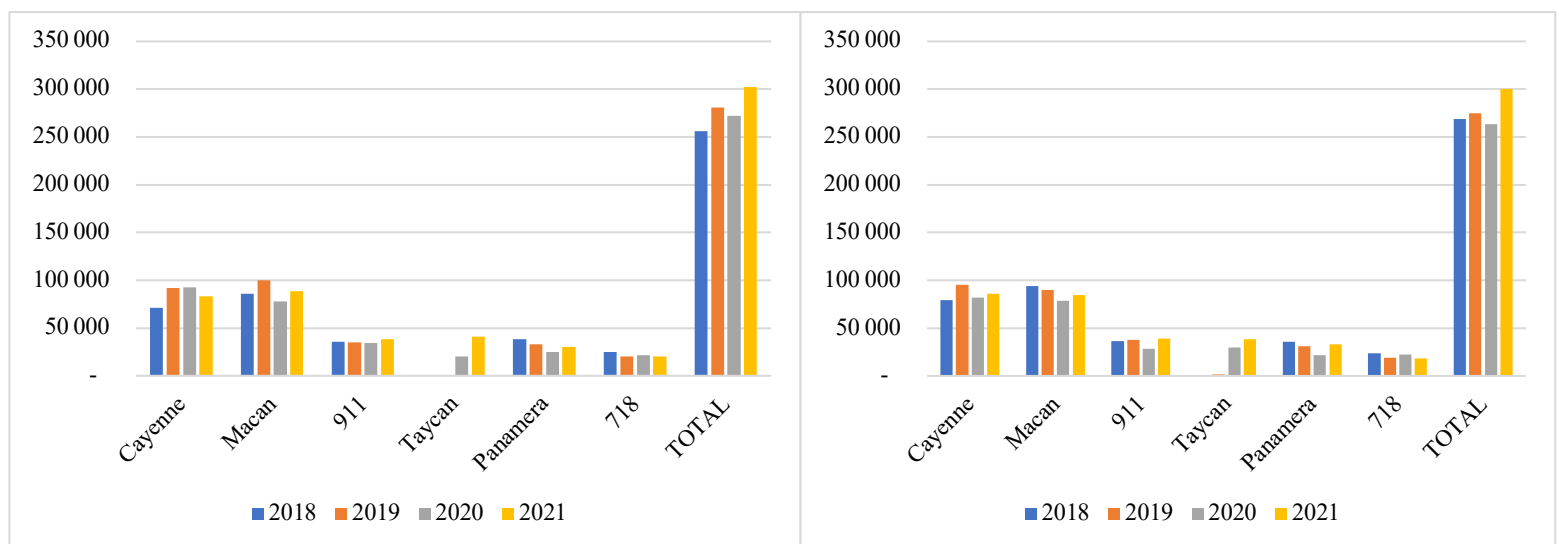
Source: Author's elaboration considering Porsche AG's Data from Bloomberg

5.2.3. Porsche AG's sales/production distribution

There are two factors that are also very important for a company like Porsche AG. These are the company's sales and production volumes. In fact, as mentioned previously, since the company's core segment is the automotive services, it generates most of its income from the production and sale of vehicles. The ratio of cars sold to cars produced therefore already seems to be a good potential indicator regarding profit and health for the automaker. Especially if this ratio is positive, as according to a study carried out by McKinsey & Co in July 2022, companies in the automotive sector can expect to sell their product with a margin between 8% for standard models and up to 25% for more unique models (Guan et al., 2022).

According to Porsche AG's total volumes of cars sold and produced, the company has managed to sell more cars than it produced on average, this ratio being greater than 1 for the years 2019, 2020 and 2021. Indeed, while in 2018 Porsche AG sold 0.9 cars for every one car produced, the company reversed this trend, achieving a ratio of 1.02 in 2019, 1.03 in 2020 and 1.01 in 2021 car sales for every one produced.

Figure 8 : Number of Vehicles Sold/Produced Worldwide



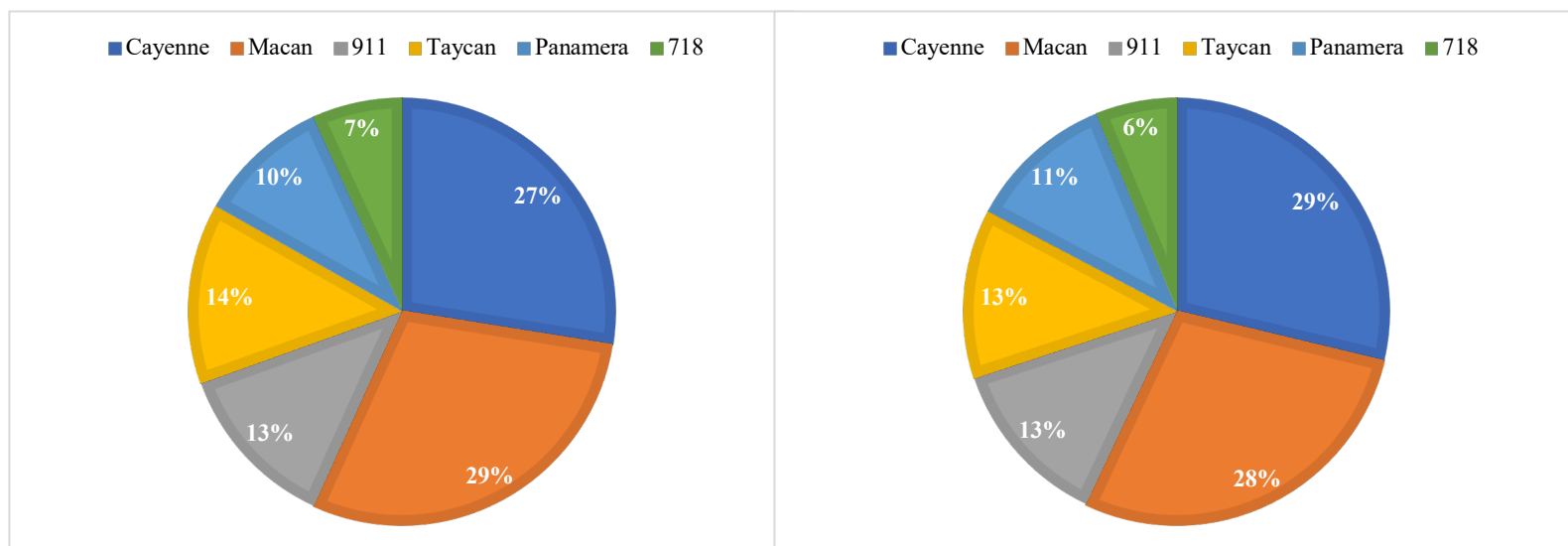
Source: Author's elaboration considering Porsche AG's Data from IPO Prospectus and Bloomberg

A second important factor to take into account for the distribution of sales and production is the proportion in terms of sales (left) and production volume (right) of each vehicle in the Porsche range in 2021, as shown in Figure 9 below.

One of the most important factors to take into account in this figure is the proportion of the new model called Taycan, which is 100% electric and relatively young since it was revealed in 2020. Indeed, the figure 4 below shows that these models currently represent 14% of models sold (left) and 13% of volumes produced (right). These percentages are getting closer and closer to those of the German brand's legendary 911 model.

Moreover, the company is in line with the current trend in the automotive sector for SUVs, with most of its sales and production going to the company's Cayenne (large SUV) and Macan (city SUV) models. These two models are representing 56% of the vehicles sold and 57% of the vehicles produced in 2021.

Figure 9 : Proportion of Models Sold/Produced in 2021



Source: Author's elaboration considering Porsche AG's Data from IPO Prospectus and Bloomberg

5.3. Porsche AG's Corporate Structure

Corporate structure is also a key factor in the analysis of a company, as it presents its organization and enables investors to understand how the company is run and managed, and who oversees decision-making.

5.3.1. Porsche AG's Managers

Porsche AG's top management is organized like all large companies, with a Chief Executive Officer at the head of the company. Management decisions are also made by 6 top managers, each of them representing one of Porsche AG's departments. So, Porsche AG's top management is composed by a Chief Financial Officer, a Chief Tech/Sci/R&D Officer, a Chief Investment Officer, a Chief Investor Relations Officer, a Chief Sales & Marketing Officer, and a Chief Human Resources Officer. Finally, the company's top management also includes 4 Corporate Officers/Principals. The following table 1 presents the 11 top managers of Porsche AG and their positions within the corporation.

Table 1 : Porsche AG's Managers

Managers	Title
Oliver Blume	Chief Executive Officer (CEO)
Lutz Meschke	Director of Finance (CFO)
Dr Michael Steiner	Chief Tech/Sci/R&D Officer
Claire Zhu	Chief Investment Officer
Björn Scheib	Chief Investor Relations Officer
Detlev von Platen	Chief Sales & Marketing Officer
Andreas Haffner	Chief Human Resources Officer
Barbara Frenkel	Corporate Officer/Principal
Albrecht Reimold	Corporate Officer/Principal
Mathias Busse	Corporate Officer/Principal
Fritz Enzinger	Corporate Officer/Principal

Source: Porsche AG's Data from IPO Prospectus and Bloomberg

5.3.2. Porsche AG's Board Members

The composition of a company's board is an important factor to take into account when analyzing it. As stated in the table 2 Porsche AG's board is composed by 20 board members including a Chairman, a Deputy Chairman, nine Employee Representatives and nine Board members.

According to the Diligent Institute's study of board member trends in 5,007 listed companies in Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom (UK), United States (US), Canada, and Australia between 2019 and 2021, the average age of board members is between 58.92 and 59.62 years old (Frimpong, 2021). Porsche stands out from this average, as the average age of its board members is around 57.1 years old. On the other hand, Porsche is below the results found by the same study in terms of the male/female split on boards, since the study tends to show that women represent between 41.8% and 43.1% on average of the board members of these companies (Frimpong, 2021). Nevertheless, only 30% of Porsche AG's board members are women.

Table 2 : Porsche AG's Board Members

Name	Title	Age	Since
Dr Wolfgang Porsche	Chairman	80	16/11/2007
Jordana Vogiatzi	Deputy Chairman	47	04/10/2022
Wolfgang Von Duehren	Employee Representative	61	18/07/2014
Harald Buck	Employee Representative	61	08/02/2019
Akan Isik	Employee Representative	52	08/02/2019
Knut Lofski	Employee Representative	60	08/02/2019
Cartsen Schmuker	Employee Representative	36	08/02/2019
Stefan Schaumburg	Employee Representative	62	24/02/2021
Nora Leser	Employee Representative	42	01/04/2021
Vera Schalwig	Employee Representative	44	01/04/2021
Ibrahim Aslan	Employee Representative	50	01/12/2022
Dr Ferdinand Oliver Porsche	Board Members	62	29/01/2005
Dr Hans Michel Piech	Board Members	81	16/11/2007
Hans Dieter Poetsch	Board Members	72	30/03/2010
Dr Hans Peter Schuetzinger	Board Members	63	25/04/2015
Dr Christian Dahlheim	Board Members	55	02/10/2020
Dr Arno Antlitz	Board Members	53	01/04/2021
Hauke Stars	Board Members	56	29/09/2022

Source: Porsche AG's Data from IPO Prospectus and Bloomberg

5.4. Porsche AG's Financial Analysis

The financial analysis of a company is a very important factor for investors, particularly during an IPO, as it enables them to know the company's overall financial situation before investing in its capital, and thus to believe in its growth.

5.4.1. Profitability Analysis

The first factors to analyze in a company's financial analysis are profitability ratios. They allow investor to better understand whether a company is generating enough profit to cover its running expenses. Table 3 shows Porsche AG's profitability ratios such as Net Profit Margin, Return on Assets, Return on Equity and Return on Invested Capital for the 5 years preceding its IPO, i.e. from 2017 to 2021.

Table 3 : Profitability Ratios

	2017	2018	2019	2020	2021
Net Profit Margin	13%	12%	10%	11%	12%
ROA	9%	8%	7%	7%	8%
ROE	20%	19%	16%	16%	18%
ROIC	14%	14%	11%	11%	12%

Source: Author's elaboration considering Porsche AG's Data from IPO Prospectus and Bloomberg

The net profit margin is the percentage of sales that remains in the final Net Income after excluding all the expenses associated with the proper functioning of the company. In the case of Porsche AG during the last 5 years it means that on average 12% of the Revenue generated by the company was kept in the Net Income after removing all the expenses. It also means that the company is able to limit its operating costs in order to generate a descent net profit. According to Damodaran's database (2021b), compared to others Auto & Truck manufactures Porsche AG is able to generate more profit from it sales than the globally other manufacturers' that generated an average profit margin of 0.98% in 2021.

The return on Assets allows investors to understand how efficiently a company is using its assets to generate profit. In the case of Porsche AG, with an average 5-year ROA at 8% it means that the company is using on average 8% of its assets to generate a descent Net Income. This results is above the average ROA stated for the industry in the database of Macrotrends (2023) during the same period fixed at 5.02%.

The return on Equity, gives to the investors a clear vision on how effectively the shareholders' capital is used to generate profit. Meaning, that Porsche AG during the 5-year period from 2017 to 2021 was using on average 18% of its shareholders' capital to generate profit. According to Damodaran's database (2023a), Porsche AG's ROE is higher than the average global auto & truck manufacturers with an average ROE at 11.51%.

Finally, the Return on Invested Capital is a financial ratio that measures the profitability of a company in relation to the capital invested in its operations and allows investors to understand how effectively a company generates returns for both its equity and debt investors. During the 5 years prior to the IPO on average, Porsche AG was able to generate a ROIC of 13%. This result is much higher than the average result for all global auto and trucks makers shown in Damodaran's database (2023a), which is 5.34%.

The profitability analysis leads to the conclusion that Porsche AG, in the five years prior to the IPO, was able to generate sufficient revenues to cover all its operating expenses and to generate a higher cash flow than the global average of car and truck manufacturers, since all its profitability ratios were above the industry average.

5.4.2. Liquidity Analysis

The second factors to be analyzed while conducting a financial analysis are the liquidity ratios. These ratios allow investors to assess a company's ability to meet its short-term financial obligations by evaluating its cash and readily convertible assets relative to its short-term liabilities.

Table 4 shows Porsche AG's liquidity ratios such as Current Ratio and Quick Ratio for the 5 years preceding its IPO, i.e., from 2017 to 2021.

Table 4 : Liquidity Ratios

	2017	2018	2019	2020	2021
Current Ratio	0,91	0,93	1,12	1,34	1,42
Quick Ratio	0,63	0,60	0,77	0,97	1,07

Source: Author's elaboration considering Porsche AG's Data from IPO Prospectus and Bloomberg

According to this data, Porsche AG's current ratio was below 1 from 2017 to 2019, meaning that the company did not have enough current assets to cover its short-term debts, which is a good indicator of potential financial distress. Nevertheless, as of 2019, Porsche AG has sufficient current assets to cover its short-term debts, as its current ratio is above 1. Compared to the industry thanks to the Macrotrends' database , from 2017 to 2019 Porsche AG was under the industry average around 1.04 but is now following the average trend (2023a).

The quick ratio provides investors with the same type of information as the current ratio, except that only the most liquid assets are included in the calculation. As the table shows, Porsche AG can only cover its short-term debts with its most liquid assets since 2021, as the quick ratio became greater than 1. While Porsche AG's current ratio was slightly below the industry average, the quick ratio was well above the industry average of 0.25, according to the Macrotrends' database (2023a).

5.4.3. Solvency Analysis

To complete the analysis carried out on the company's ability to cover its short-term liabilities, a solvency analysis is also important, as it assesses a company's ability to meet its long-term financial obligations and debts, indicating its capacity to remain financially stable over the long run. Table 5 shows Porsche AG's Solvency ratios such as the Solvency of the enterprise, the Debt-to-Equity Ratio as well as the Debt to Asset Ratio and finally the Equity to Assets for the 5 years preceding its IPO, i.e., from 2017 to 2021

Table 5 : Solvency Ratios

	2017	2018	2019	2020	2021
Solvency	2,79	2,81	2,29	2,43	2,36
Debt to Equity	0,36	0,36	0,44	0,41	0,42
Debt to Assets	0,16	0,15	0,18	0,18	0,19
Equity/Assets	0,43	0,43	0,41	0,44	0,45

Source: Author's elaboration considering Porsche AG's Data from IPO Prospectus and Bloomberg

The solvency ratio enables investors to measure a company's ability to meet its long-term obligations by comparing its total equity with its total debt. According to data found on Porsche AG, this means that, on average, over the 5-year period from 2017 to 2021, the solvency ratio was around 2.53, meaning that the company's total equity was more than twice its total debt, which means that shareholders contributed more capital than the company borrowed, which can be a sign of financial stability and lower financial risk.

The debt-to-equity ratio compares company's total debt to its shareholders' equity and is used to assess its financial leverage and risk. In Porsche case, the results found tend to prove that the company can fully cover its long-term liabilities, representing on average only 40% of its equity level, and may even be able to borrow more to cover future projects. According to Damodaran's database Porsche AG is slightly under the D/E ratio of the Auto & Truck manufacturer established at 42.90%.

The debt-to-Assets compares company's total debt to its total assets and indicates the proportion of assets financed by debt. As mentioned on the table with an average of 17%, during the 5 years investigated, meaning that the company's main source of financing is equity, not debt.

The Equity-to-Assets ratio confirms the above statements, as it reflects the proportion of a company's total assets that are financed by shareholders' equity. As previously stated and confirmed by an Average Equity-to-Assets ratio of 43%, Porsche AG is mainly financed by equity.

5.4.4. Risk Analysis

Finally, the financial analysis of Porsche AG concludes with a risk analysis. For this purpose, the Degree of Operating Leverage (DOL), Degree of Financial Leverage (DFL) and Degree of Combined Leverages (DCL) ratios are studied as presented in the table 6.

Table 6 : Risk Ratios

	2018	2019	2020	2021
Degree of Operating Leverage (DOL)	1,28	-	13,63	1,96
Degree of Financial Leverage (DFL)	1,46	1,45	1,39	1,42
Degree of Combined Leverage (DCL)	1,87	-	18,93	2,78

Source: Author's elaboration considering Porsche AG's Data from IPO Prospectus and Bloomberg

The Degree of Operating Leverage gives to the investors a clear idea on how sensitive a company's operating income is to changes in sales. As shown in the table, unfortunately no data were provided in 2019, as EBIT in 2019 was slightly lower than in 2018, leading to negative results. Nevertheless, the results tend to prove that Porsche AG operating profit is clearly affected by the percentage change in terms of Sales.

The Degree of Financial Leverage helps investors evaluate a company's net income, including debt use and tax advantages, by assessing changes in EBIT on earnings after tax and per share. This data gives a better insight on Porsche AG case as over the 4 years from 2018 to 2021, the DFL was greater than one which typically indicates that a Porsche AG's earnings after taxes are more sensitive to changes in operating income.

This is confirmed by the calculation of the DCL that highlights, by being greater than one during the time studied, that Porsche AG earnings per share are highly sensitive to changes in operating income.

5.5. Porsche AG's Non-Financial Analysis

A company's value no longer depends solely on its financial performance. Indeed, investors, buyers and other stakeholders are increasingly aware of the importance of non-financial criteria, such as a company's environmental impact, the quality of life of its employees or its compliance with legal requirements. All these factors play an important role in a company's valuation, since they have a direct influence on the company's results.

5.5.1. Environmental and energy factors

According to the 2021 Porsche AG's Annual & Sustainability Report, the company's policy includes a major focus on Environmental and energy factors.

Firstly, the company is committed to a CO₂-neutral balance sheet by 2030 by reducing emissions through a decarbonization initiative. By 2030, over 80% of its vehicles will be equipped with electric motors. The company's first all-electric car called Taycan, produced in 2019, is already carbon-neutral, and its German plants use certified electricity from renewable sources. Furthermore, the Taycan features an optional interior made of recyclable materials and renewable raw materials, such as Race-Tex and Econyl®, instead of leather. The aim of Porsche is to extend this type of modification to its entire range of products (Porsche AG, 2022a).

Porsche also plans to invest over one billion euros in wind turbines, solar energy, and climate protection measures such as making better use of water to reduce waste (Porsche AG, 2022a).

Finally, to achieve a carbon-neutral balance sheet, Porsche requires a sustainability rating for suppliers, and participates in the Responsible Mica Initiative. Hence, Porsche is testing a monitoring system called Prewave to identify sustainability threats, using artificial intelligence to track supplier news in over 50 languages and 150 countries (Porsche AG, 2022a).

Porsche's new environmental protection measures are obviously important not only to protect the planet, but also to preserve the company and its attractiveness to investors. Research conducted by Capital Group in 2022 shows that 93% of European investors, 88% of Asia-Pacific

investors and 79% of North American investors are sensitive to ESG issues and the actions taken by the various market players.

5.5.2. Personnel and social factors

According to the 2021 Porsche AG's Annual & Sustainability Report, the company is committed to promoting diversity and equal opportunity in its workforce, with a focus on women, intergenerational collaboration, and the LGBTIQ community. The company has signed the Charta der Vielfalt (Diversity Charter) in 2019 and has set a goal of increasing diversity within the company by 2030. Porsche has a whistle-blower system in place to report potential violations of equal opportunity and equal treatment, and a company complaints desk has been established to address discrimination (Porsche AG, 2022a).

Porsche's HR strategy includes the Porsche Code, which offers long-term guidance and a target vision for employees and managers. The company aims to recruit experienced and creative IT and digitalization experts and partners with universities and organizations to secure talented young individuals (Porsche AG, 2022a).

Porsche is committed to ensuring staff achieve a work-life balance by providing various measures and options, such as regular childcare in nurseries, emergency childcare at day care centers, and family services for parents and the elderly. The company received over 130,000 applications in 2021 for over 3,800 advertised vacancies (Porsche AG, 2022a).

The company gauges employee satisfaction using the mood barometer, which measures employee satisfaction levels and provides managers with information on areas requiring attention in their organizational units. Employee development and socially ethical transformation are crucial for Porsche. The company has implemented initiatives to support employees and managers in their work and learning environments, such as offering flexible work arrangements, promoting hybrid collaboration, and providing virtual workshops and tricks for self-assessment (Porsche AG, 2022a).

A representative employee survey conducted in October 2021 revealed that over 60% of employees had development expectations at Porsche. The company has introduced a feedback form to measure the effectiveness of its portfolio of interdisciplinary qualifications in order to continually improve processes (Porsche AG, 2022a).

5.5.3. Legal key factors

Another key factor that should be carefully explore while conducting a non-financial analysis of a company is the company's legal framework. Indeed, it's important that when a company goes public, it complies with the rules laid down by the various regulatory authorities. It is also important that all employees and subcontractors are involved in this legal compliance. Indeed, a legal scandal, which has already happened in the past in different companies, can have a serious impact on a company's capital, as investors may decide to lose interest in the company due to this uncertain legal situation.

Porsche is deeply involved regarding this type of subject. Indeed, the company has established a compliance organization to prevent and help employees comply with applicable laws. This organization includes the Chief Compliance Officer, compliance topic owners, and local compliance officers in the Group companies. This organization provide preventive measures that include adopting compliance directives, providing confidential advice, and providing regular training on relevant compliance topics. The Porsche Code of Conduct outlines principles and expectations on business integrity, ethical conduct, and sustainable conduct. The company has adopted Compliance Directives on all compliance topics, including dealing with conflicts of interest, combating corruption, avoiding antitrust violations, and complying with anti-money laundering laws. The central Compliance Helpdesk is available for advice and information on compliance. Senior management and employees receive regular task-related training and are required to report suspicions of violations (Porsche AG, 2017). Internal and external reporting channels are established for reporting potential violations. Porsche expects compliance from both employees and contracted business partners, using the Code of Conduct for Business Partners (Porsche AG, 2020).

5.5.4. Customer Satisfaction

A last potential non-financial factor regarding Non-Financial Analysis that is not included into any of the Non-Financial Reporting Directive of any market is the customer satisfaction. This factor is key elements that directly drives the Sales and the renew of a company.

Regarding this factor Porsche AG excels as in 2021 the company was rewarded and for the third year in fourth years as the first top premium brand in the J.D. Power 2021 Sales Satisfaction Index (SSI) study, top one premium brands in the 2021 Customer Service Index (CSI) and finally the top performer in the 2021 Automotive Performance, Execution and Layout (APEAL) studies (Logan, 2021).

The aim of these studies is not only to gather customer opinions from new buyers, but also to present the quality of services provided post-purchase and during the life of the vehicles by the company.

This factor is therefore very important to consider in a company's non-financial analysis, as it reflects the loyalty and recognition that customers have for the company. In the case of a project such as an IPO, this can increase the interest of public investors, as these awards guarantee them a certain durability in the company's appeal, and therefore stable or even rising earnings, which can reinforce their belief in the company.

5.6. Entry at the Frankfurt Stock Exchange.

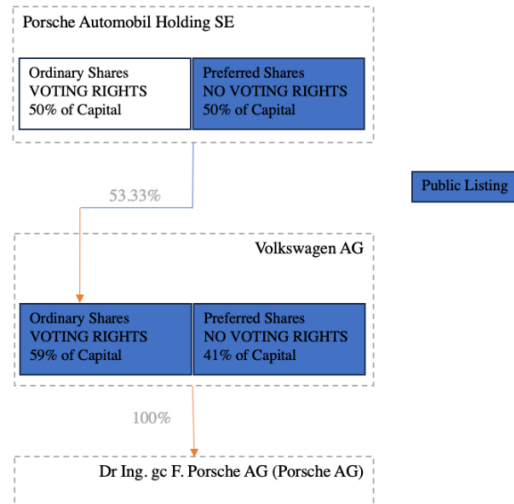
On September 29, 2022, Porsche AG became a listed company on the Frankfurt Stock Exchange. The aim of this section is to analyze the changes brought about by the IPO in shareholder structure and dividend policy. The composition of the syndicate will then be analyzed, followed by an analysis of share price trends up to June 2022.

5.6.1. Shareholder structure

- Prior to the IPO:

Prior to Porsche AG's IPO, the company was not listed and was a 100% subsidiary of Volkswagen AG, as shown in figure 10 below.

Figure 10 : Porsche AG's Ownership prior IPO



Source: Author's elaboration considering Porsche AG's Data from IPO Prospectus

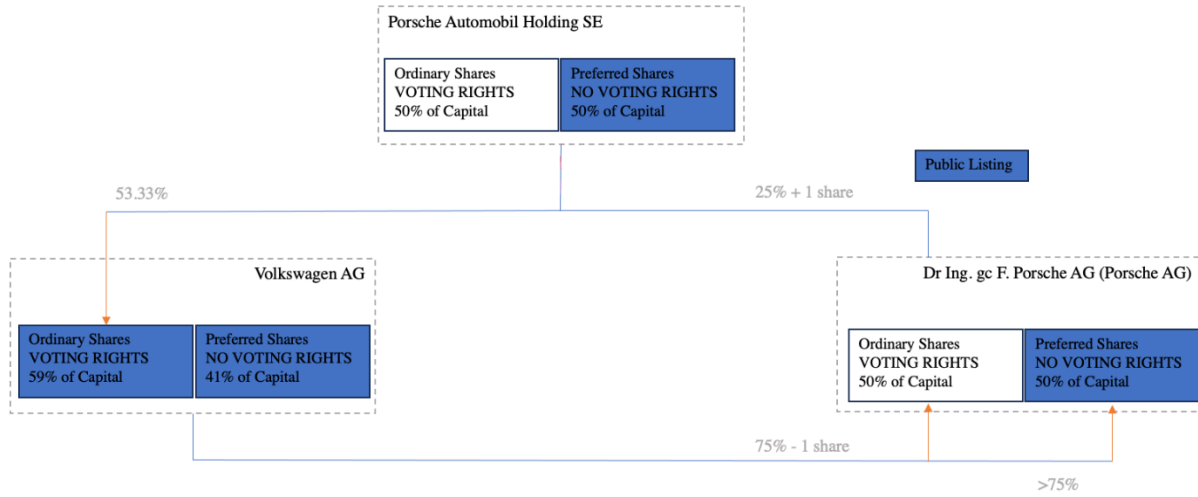
- Post IPO:

During the IPO prospectus drafting process, all parties involved firstly decided to divide the company's total final capital into 911 000 000 shares, in a further tribute to the brand's mythical model. These shares are subdivided into two classes: 50% of the shares (455 500 000) are Ordinary Shares that gives access to a voting right but are not listed, and 50% of the shares (455 500 000) shares, are Preferred Shares that are not giving access to a voting right nevertheless are listed (Porsche AG, 2022b).

Secondly, Volkswagen AG agree to sold 25% + 1 share of Porsche AG's ordinary shares to Porsche Automobil Holding SE at a premium of 7.5% of the issue price and decided to keep the control on 75% - 1 share of Porsche AG's ordinary shares.

This transfer of shares ownership is shown on the Figure 11 below.

Figure 11 : Porsche AG's Ownership post IPO



Source: Author's elaboration considering Porsche AG's Data from IPO Prospectus

This means that after the IPO, the ownership structure of the Ordinary Shares was: 75% of Porsches AG's Ordinary Shares are held by Volkswagen and 25% by Porsche Automobile Holding SE as shown on the table 7.

Table 7 : Porsche AG's Ordinary Shares Structure

Ordinary Shares		
Name	Nbr shares owned	%
Volkswagen AG	341 624 999	75,00%
Porsche Automobile Holding SE	113 875 001	25,00%
Total	455 500 000	100,00%

Source: Author's elaboration considering Porsche AG's Data from IPO Prospectus

Thirdly, regarding the remaining 455,500,000 Preferred Shares, Volkswagen AG, in agreement with the banks advising on the deal, decided to sell only 25% of them to public investors. This action enabled them to retain full control over more than half of the listed shares. Indeed, as shown in table 8 below, which shows the evolution of the positions of the company's 20

biggest investors between Q3 2022 and Q2 2023, Volkswagen retained 78.26% of Porsche AG's listed shares during this period.

The top 20 investors also include early investors such as Qatar Investment Authorities, which had been pre-allocated almost 5% of the company's total Preferred Shares.

This table also highlights the fact that most of the 20 largest investors over the period Q3 2022 to Q2 2023 have overall, tended to retain a consolidated position or even strengthen their position in the Company, sending out a positive signal about their confidence in the company and its Board.

Table 8 : Porsche AG's Preferred Shares Structure

Preferred Shares								
Name	Q3 2022 Holdings	% Q3 2022	Q4 2022 Holdings	% Q4 2022	Q1 2023 Holdings	% Q1 2023	Q2 2023 Holdings	% Q2 2023
Volkswagen AG	356 474 300	78,26%	356 474 300	78,26%	356 474 300	78,26%	356 474 300	78,26%
Qatar Investment Authorities	22 729 450	4,99%	22 729 450	4,99%	22 729 450	4,99%	22 729 450	4,99%
Norges Bank	-	0,00%	10 092 512	2,22%	10 092 512	2,22%	10 092 512	2,22%
Capital Group Cos, Inc	9 146 406	2,01%	8 125 265	1,78%	6 569 180	1,44%	7 668 021	1,68%
T. Rowe Price Group, Inc	7 139 251	1,57%	8 551 453	1,88%	8 091 593	1,78%	5 555 335	1,22%
BlackRock, Inc	273 094	0,06%	3 709 969	0,81%	3 939 057	0,86%	4 187 110	0,92%
Jennison Associates LLC	722 194	0,16%	940 595	0,21%	2 291 005	0,50%	2 685 834	0,59%
Deutsche Bank AG	1 310 497	0,29%	1 564 320	0,34%	1 651 566	0,36%	2 243 451	0,49%
Vanguard Group, Inc	1 911 157	0,42%	1 726 218	0,38%	1 723 224	0,38%	1 700 160	0,37%
Prudential Financial, Inc	570 935	0,13%	1 042 255	0,23%	1 380 875	0,30%	1 393 095	0,31%
Harbor Capital Advisors, Inc	-	0,00%	1 349 486	0,30%	1 349 486	0,30%	1 316 365	0,29%
Teachers Insurance & Annuity Association of America	755 188	0,17%	1 333 835	0,29%	1 287 602	0,28%	1 289 600	0,28%
Schroders PLC	106 076	0,02%	755 182	0,17%	851 339	0,19%	906 211	0,20%
FMR LLC	158 125	0,03%	675 701	0,15%	716 112	0,16%	761 144	0,17%
JPMorgan Chase & Co	309 147	0,07%	281 869	0,06%	583 983	0,128%	697 519	0,153%
DJE Investment SA	1 152 792	0,25%	367 550	0,08%	581 392	0,128%	695 568	0,153%
Government Pension Investment Fund Japan	-	0,00%	-	0,00%	650 782	0,14%	650 782	0,143%
Credit Agricole Group	128 926	0,03%	482 998	0,11%	581 339	0,13%	632 738	0,139%
DekaBank Deutsche Girozentrale	59 800	0,01%	525 135	0,12%	592 185	0,13%	576 689	0,127%
Olive Street Investment Advisers LLC	369 683	0,08%	430 268	0,09%	515 350	0,11%	515 350	0,11%
The Others	52 182 979	11,46%	34 341 639	7,54%	32 847 668	7,21%	32 728 766	7,19%
TOTAL	455 500 000	100%	455 500 000	100%	455 500 000	100%	455 500 000	100%

Source: Author's elaboration considering Porsche AG's Data from Bloomberg

5.6.2. Dividend Policy

The IPO prospectus outlines an annual dividend of 50% of the Group's profit after tax to shareholders, subject to legal restrictions and market conditions. Future dividend determinations will be based on the Company's results, financial condition, contractual restrictions, and capital requirements. The company depends on distributable profits from operating subsidiaries and financing arrangements, and cannot guarantee future dividend payments (Porsche AG, 2022b). The other part of the Group's profit after tax will go to research and developments related to Electric vehicles (Porsche AG, 2022b).

5.6.3. Syndicate

On the publication of the prospectus on September 19, 2022, the syndicate for Porsche AG's IPO was made up of 15 of the world's largest banks, their main responsibilities and their role during the IPO process were also distributed as explained on the table 9 :

Table 9 : Porsche AG's IPO syndicate

Investment Banks	Responsibilities	Role
Bank of America	Joint Global Coordinators	Advisor/Underwriter
Citi	Joint Global Coordinators	Advisor/Underwriter
Goldman Sachs	Joint Global Coordinators	Advisor/Underwriter
JP Morgan	Joint Global Coordinators	Advisor/Underwriter
BNP Paribas	Senior Joint Bookrunners	Underwriter
Deutsche Bank	Senior Joint Bookrunners	Underwriter
Morgan Stanley	Senior Joint Bookrunners	Underwriter
Banco Santander	Joint Bookrunners	Underwriter
Barclays	Joint Bookrunners	Underwriter
Société Générale	Joint Bookrunners	Underwriter
Unicredit Bank	Joint Bookrunners	Underwriter
Commerzbank	Co-Lead Managers	Order taker
Crédit Agricole CIB	Co-Lead Managers	Order taker
Mizuho	Co-Lead Managers	Order taker
Landesbank Baden-Württemberg	Co-Lead Managers	Order taker

Source: Data from IPO Prospectus

As already mentioned previously, the presence of such a prestigious syndicate is also a very good signal for investors, as internationally renowned banks are showing a real interest in this IPO and bringing their exposure and reputation to the deal. Nevertheless, it is also important to understand the role played by each of the banks involved in the deal and to have a brief overview on them.

- Orders takers :

Regarding the prospectus, the Co-Lead Managers play a major role in the IPO process, as they oversee communicating the IPO to their customers and to gather their interests locally in order to place them in the various books. Following these reasons, they can be seen as orders takers. For Porsche AG's IPO, the following four banks were chosen to act as Co-Lead Managers:

- Commerzbank is a German universal bank founded in 1870, is active in both retail and investment banking, and is headquartered in Frankfurt, Germany. Commerzbank is present in over 50 countries worldwide, and regularly participates in IPOs.
- Crédit Agricole CIB is the branch of the Crédit Agricole Group that specializes exclusively in corporate and investment banking. The CACIB bank is renowned for its M&A and trading services. The bank is based in Montrouge, France, and operates worldwide, with a presence in Europe, the Middle East, America, Asia and the Pacific by.
- Mizuho is a Japanese bank holding company headquartered in Tokyo. It offers both retail and investment banking service and operates worldwide.
- Landesbank Baden-Württemberg is Germany's largest state-owned bank, operating a wide range of universal banking activities, and is located in Stuttgart, Germany. The bank operates mainly in Germany, but also in 12 other countries around the world.

According to the prospectus and in order to grant them for taking part in the project, the Co-Lead Managers will receive a base fee and a discretionary fee separately (Porsche AG, 2022b).

- Underwriters and advisors:

According to the Porsche AG's IPO prospectus 6 banks involved in the IPO process were granted the sole role of Underwriter and 4 were granted the role of Underwriter and Advisor. This means that the sole underwriters banks will only run a book for share issued. While the underwriters and advisors will be also running a book at the same time as advising the company regarding the enterprise valuation, the potential increase or decrease of the total number of offer shares, the potential increase or decrease of the upper or lower limit of the price range and to extend or shorten the offer period (Porsche AG, 2022b). First of all, a brief presentation of these 11 banks is important to understand how they represent a reassuring asset for investors.

- Bank of America is an American bank, based in Charlotte, North Carolina, and offering universal banking services. According to the Wall Street Journal (2023), in 2022 Bank of America was ranked the third largest investment bank in the world, generating over \$4.586 billion in revenues and representing a market share of nearly 5.8%. According to Bloomberg, Bank of America manages a total of \$861.1 billion in equity assets, invested in 7 981 securities. In terms of industry, the bank's portfolio is mainly exposed to the technology and health care sectors, representing 14.6% and 7.3% of the portfolio respectively. In terms of geographic region, the bank is mainly exposed to North American market , corresponding to 95.2% of its portfolio, and 3.4% corresponds to exposure to the Western European market. Finally, in terms of market cap, the bank is mainly exposed to large-cap stocks, with 87% of its portfolio, compared with 10% to mid-cap stocks.
- Citi is an American bank, based in New York City, and offering both Financial Services as well as investment banking services. According to the Wall Street Journal (2023), in 2022 Citi was ranked the sixth largest investment bank in the world, generating over \$3.150 billion in revenues and representing a market share of nearly 4%. According to Bloomberg, Citi manages a total of \$78.5 billion in equity assets, invested in 5 025 securities. In terms of industry, the bank's portfolio is mainly exposed to the technology and health care sectors, representing 23.4% and 9.5% of the portfolio respectively. In terms of geographic region, the bank is mainly exposed to North American market, corresponding to 92.9% of its

portfolio, and 4.1% corresponds to exposure to the Western European market. Finally, in terms of market cap, the bank is mainly exposed to large-cap stocks, with 86.7% of its portfolio, compared with 10.7% to mid-cap stocks.

- Goldman Sachs is an American bank, based in New York City, specialized exclusively in investment banking services. According to the Wall Street Journal (2023), in 2022 Goldman Sachs was ranked the second largest investment bank in the world, generating over \$6.019 billion in revenues and representing a market share of nearly 7.6%. According to Bloomberg, Goldman Sachs manages a total of \$484.8 billion in equity assets, invested in 10 423 securities. In terms of industry, the bank's portfolio is mainly exposed to the technology and health care sectors, representing 19.9% and 9.5% of the portfolio respectively. In terms of geographic region, the bank is mainly exposed to North American market, corresponding to 78.9% of its portfolio, and 10.4% corresponds to exposure to the Western European market. Finally, in terms of market cap, the bank is mainly exposed to large-cap stocks, with 80.9% of its portfolio, compared with 11.2% to mid-cap stocks.
- JP Morgan is an American bank, based in New York City, and offering both retail and investment banking services. According to the Wall Street Journal (2023), in 2022 JP Morgan was ranked the first largest investment bank in the world, generating over \$6.145 billion in revenues and representing a market share of nearly 7.8%. According to Bloomberg, JP Morgan manages a total of \$1.4 trillion in equity assets, invested in 14 145 securities. In terms of industry, the bank's portfolio is mainly exposed to the technology and health care sectors, representing 17.6% and 10.3% of the portfolio respectively. In terms of geographic region, the bank is mainly exposed to North American market, corresponding to 66.5% of its portfolio, and 15% corresponds to exposure to the Asia Pacific market. Finally, in terms of market cap, the bank is mainly exposed to large-cap stocks, with 79.5% of its portfolio, compared with 11.7% to mid-cap stocks.
- BNP Paribas is a French bank, based in Paris, and offering universal banking services. According to Bloomberg, in 2022 BNP Paribas was ranked the first largest European bank, generating over \$3.080 billion in profit all activities combined. BNP Paribas manages a total of \$727 million in equity assets, invested in 133 securities. In terms of industry, the

bank's portfolio is mainly exposed to the health care and materials sectors, representing 32.3% and 20.3% of the portfolio respectively. In terms of geographic region, the bank is mainly exposed to Western European market, corresponding to 66.7% of its portfolio, and 33.2% corresponds to exposure to the Asia Pacific market. Finally, in terms of market cap, the bank is mainly exposed to large-cap stocks, with 80.5% of its portfolio, compared with 16.8% to mid-cap stocks.

- Deutsche Bank is a German bank, based in Frankfurt, and offering both retail and investment banking services. According to the Wall Street Journal (2023), in 2022 Deutsche Bank was ranked the ninth largest investment bank in the world, generating over \$1.479 billion in revenues and representing a market share of nearly 1.9%. According to Bloomberg, Deutsche Bank manages a total of \$377.8 million in equity assets, invested in 10 553 securities. In terms of industry, the bank's portfolio is mainly exposed to the technology and financial sectors, representing 18% and 12.2% of the portfolio respectively. In terms of geographic region, the bank is mainly exposed to North American market, corresponding to 49.3% of its portfolio, and 37.6% corresponds to exposure to the Western European market. Finally, in terms of market cap, the bank is mainly exposed to large-cap stocks, with 79.6% of its portfolio, compared with 12.7% to mid-cap stocks.
- Morgan Stanley is an American bank, based in New York City, specialized exclusively in investment banking services. According to the Wall Street Journal (2023), in 2022 Morgan Stanley was ranked the fourth largest investment bank in the world, generating over \$4.268 billion in revenues and representing a market share of nearly 5.4%. According to Bloomberg, Morgan Stanley manages a total of \$89.4 billion in equity assets, invested in 3 798 securities. In terms of industry, the bank's portfolio is mainly exposed to the technology and health care sectors, representing 28% and 12.7% of the portfolio respectively. In terms of geographic region, the bank is mainly exposed to North American, corresponding to 90.1% of its portfolio, and 3.5% corresponds to exposure to the Western European market. Finally, in terms of market cap, the bank is mainly exposed to large-cap stocks, with 86.4% of its portfolio, compared with 11.6% to mid-cap stocks.

- Banco Santander is a Spanish bank, based in Bobadilla del Monte and offering both retail and investment banking services. According to Reuters (2023), in 2022 Banco Santander was ranked the first largest bank in Spain, generating over €9.6 billion in profit all activities combined . According to Bloomberg, Banco Santander manages a total of \$129.9 billion in equity assets, invested in 4 268 securities. In terms of industry, the bank's portfolio is mainly exposed to the financials and technology sectors, representing 24.1% and 2.4% of the portfolio respectively. In terms of geographic region, the bank is mainly exposed to Latin America & Caribbean market, corresponding to 60.3% of its portfolio, and 28.5% corresponds to exposure to the Western European market. Finally, in terms of market cap, the bank is mainly exposed to large-cap stocks, with 32.6% of its portfolio, compared with 13.8% to mid-cap stocks.
- Barclays is an American bank, based in New York City, and offering universal banking services. According to the Wall Street Journal (2023), in 2022 Barclays was ranked the seventh largest investment bank in the world, generating over \$2.463 billion in revenues and representing a market share of nearly 3.1%. According to Bloomberg, Barclays manages a total of \$172.6 billion in equity assets, invested in 6 289 securities. In terms of industry, the bank's portfolio is mainly exposed to the technology and health care sectors, representing 27.9% and 10.5% of the portfolio respectively. In terms of geographic region, the bank is mainly exposed to North American market, corresponding to 87.9% of its portfolio, and 10% corresponds to exposure to the Western European market. Finally, in terms of market cap, the bank is mainly exposed to large-cap stocks, with 87.8% of its portfolio, compared with 7.6% to mid-cap stocks.
- Société Générale is a French bank, based in Paris, and offering universal banking services. According to Reuters (2022), in 2022 Société Générale was ranked the third largest bank in the France in term of market capitalization. According to Bloomberg, Société Générale manages a total of \$40.6 billion in equity assets, invested in 1 924 securities. In terms of industry, the bank's portfolio is mainly exposed to the financials and consumer discretionary sectors, representing 22.4% and 16% of the portfolio respectively. In terms of geographic region, the bank is mainly exposed to Western European market,

corresponding to 78.8% of its portfolio, and 15.8% corresponds to exposure to the Eastern European market. Finally, in terms of market cap, the bank is mainly exposed to large-cap stocks, with 42.1% of its portfolio, compared with 33.3% to mid-cap stocks.

- Unicredit Bank is an Italian bank, based in Milan, and offering both retail and investment banking services. According to Bloomberg, Unicredit Bank manages a total of \$13.6 billion in equity assets, invested in 564 securities. In terms of industry, the bank's portfolio is mainly exposed to the financials and energy sectors, representing 66.5% and 19.1% of the portfolio respectively. In terms of geographic region, the bank is mainly exposed to Eastern European market corresponding to 52.4% of its portfolio, and 42% corresponds to exposure to the Western European market. Finally, in terms of market cap, the bank is mainly exposed to mid-cap stocks, with 52.3% of its portfolio, compared with 32.8% to large-cap stocks.

During the prospectus drafting process, Volkswagen AG, which was the majority shareholder at the time, and the banks presented previously and acting as the Joint Global Coordinators, the Senior Joint Bookrunners and the Joint Bookrunners in the IPO process entered into an underwriting agreement for the offer and sale of the Preferred Shares to be issued on the primary market. Under these terms of the agreement, the banks have agreed to purchase up to 113,875,000 preferred shares, with each underwriter committed to purchasing up to the maximum number of shares in the offering as presented in the table 10 (Porsche AG, 2022b).

Table 10 : Underwriting Agreement

Name	Maximum number of Base Shares to be purchased	Maximum number of Greenshoe Shares to be purchased	Maximum percentage of purchased Base Shares and Greenshoe Shares
BofA Securities Europe SA	17 328 805	2 599 321	17,50%
Citigroup Global Markets Europe AG	17 328 805	2 599 321	17,50%
Goldman Sachs Bank Europe SE	17 328 805	2 599 321	17,50%
J.P.Morgan SE	17 328 805	2 599 321	17,50%
BNP PARIBAS	4 951 087	742 663	5,00%
Deutsche Bank Aktiengesellschaft	4 951 087	742 663	5,00%
Morgan Stanley Europe SE	4 951 087	742 663	5,00%
Banco Santander,S.A.	3 713 315	556 997	3,75%
Barclays Bank Ireland PLC	3 713 315	556 997	3,75%
Société Générale	3 713 315	556 997	3,75%
UniCredit Bank AG	3 713 315	556 997	3,75%
TOTAL	113 875 002		100%

Source: Data from IPO Prospectus

In other words, these Banks will purchase Preferred Shares from the Selling Shareholder's holdings, sell them to investors, and remit the purchase price, to the Selling Shareholder. In order to attract these underwriters, to with the aim of getting these banks as involved as possible in promoting the IPO to their various customers the prospectus also mentions the various commissions that could be paid to them. For each Underwriter a base fee of 0.6% of the gross proceeds of the Offer has been established, but the Selling Shareholder may also be asked to award a discretionary fee of up to 0.4%, with a maximum of 125 million euros to be paid.

5.6.4. Stock Performance from the first day of trading until 30 June 2023

On September 29, 2022, Porsche AG's Preferred Shares (50% of the total capital) were launched on the Frankfurt stock exchange. As already mentioned before, 25% of these shares were then allocated to the various early public investors on the primary market at the issue price of 82.50 EUR. This price was at the high end of the range announced (76.50 - 82.50 EUR) by the various IPO partners when the prospectus was created. At 9:00 a.m., the bell rang on the Frankfurt stock exchange and Porsche AG's share price jumped by more than +1.8%, reaching 84 EUR at 9:15. On this first day, the share price reached a high of 86.78 EUR (+ 5.2% on the issue price), before falling back to a closing price of 82.52 EUR (+ 0.02% on the issue price). During the first two days of trading, the share lost a low of 1.82% on its issue price, reaching 81 EUR. The price then

soared for the first time in October and November 2022, far exceeding the issue price by almost +36%, reaching a high of 112.15 EUR on November 22, 2022. The period from mid-November to mid-December was marked by a further downward trend in the share price, which fell to 91 EUR on December 22, 2022, a drop of almost -19% from its highest level since issue. The beginning of 2023 benefited Porsche AG's Preferred Shares, with the share price recovering by almost 31% to a high of 119 EUR on March 30, 2023. The share price then stabilized in a range between a high of 120.80 EUR and a low of 107.15 EUR. These trends and the stabilization of the P911 share price over the period from the IPO to the 30th of September 2022 are shown in figure 12 below.

Figure 12 : Evolution of Porsche AG's Preferred Shares from the emission to 30/06/2023



Source: Porsche AG's Data available on Bloomberg

6. Valuation

The method chosen for this thesis is a quantitative approach. Indeed, the objective is to find the Fair value for a Porsche AG's Share using 3 valuation models which are the Discount Cash Flows Method, the Multiples Valuation Method, and the Equity Added Value Method. The results found through these 3 valuation methods will therefore be presented in this chapter. These Fair values for a share found through the 3 valuation methods will then be compared to the initial Price of the public offering and the closing price for a share of the first trading day to better understand the valuation strategy used by the issuer and the Investments Banks involved in the Porsche AG's IPO.

The DCF as well as the EVA model of the company are based on the results reported by the company during the 5 years prior to the IPO, from 2017 to 2021, an expected forecast for the year 2022 and on a 5-year forecast up to 2027. The Multiples method is based on Porsche AG's peers' figures in 2021 and the company's expected figures for the year 2022 derived from the assumptions made for the purpose of the DCF and EVA valuation models.

6.1. Assumptions

6.1.1. Balance sheet

- Cash & Cash Equivalents:

Cash and Cash Equivalents are highly liquid assets that include cash on hand and short-term, readily convertible investments with original maturities of three months or less, providing funds readily available for immediate use.

In Porsche's case, according to the prospectus of the IPO presented by the company and the Investment Banks involved in the deal, these Cash & Cash Equivalent will amount to 5 872 million euros at the time of the IPO. This amount will therefore be considered as the reference amount to compute the Net Debt.

- Debt & Debt Equivalents:

Debt and Debt Equivalents include financial obligations such as loans, bonds and other borrowings, including any financial instrument or contractual arrangement with debt-like characteristics, requiring future repayment of principal and interest.

In the case of Porsche AG, Debt and Debt equivalents, as valued in the company's IPO prospectus, amounted to 3 338 million euros in short-term debt and 6 424 million euros in long-term debt, giving a Total Debt of 9 762 million euros. This level will be maintained in future share value assessments thanks to the various models used.

- Net Debt:

Net Debt corresponds to a company's total debt less cash and cash equivalents, which represents total indebtedness after taking into account available cash.

In the case of Porsche AG's IPO and according to the indications previously found in the prospectus, the company's Net Debt therefore amounts to 9 762 million euros – 5 872 million euros or 3 890 million euros.

- Preferred Stocks:

Preferred shares are a type of equity security representing ownership in a company that generally entitles the holder to fixed dividends and priority over common shares with regard to dividend payments or assets in the event of liquidation, but are generally devoid of voting rights.

In the case of Porsche AG, these preference shares do have voting rights, as explained above in the analysis of the new capital structure. As indicated in the company analysis above, the value of a Porsche AG preference share has been set at 82.50 and represents 50% of the capital, i.e. 455,500,000 shares or a capitalization of 37,578,750,000 euros. This level will be maintained in future Equity Value valuations through the different models used.

- Minority Interests:

As explained in the company's IPO prospectus, the levels of and Minority Interests are set at 7,000,000 million euros at the time of the IPO. This data is then used later to evaluate equity value with the various models.

- Net Working Capital and Change in NWC:

A company's Net Working Capital represents the difference between its current assets and liabilities and enables investors to assess the short-term economic health of the company.

For Porsche's valuation, in order to forecast net working capital and its variation, we estimate the following factors that make up this indicator: estimated future inventories, estimated accounts receivable and payable, estimated other current assets, estimated Account Receivables and Account Payables, estimated Accrued Taxes and estimated Other Accruals.

a) Inventories forecasts:

Future inventory is estimated using 2 key factors, namely inventory turnover, which subsequently determines Days Sales of Inventory (DSI) from the years prior to the IPO.

In Porsche AG case, the average Days Sales of Inventory between 2017 and 2021 is 66.11 days. It is therefore assumed that this average number will be used in the calculation of inventory for projections, as it enables Inventory Turnover to be calculated. The results of these inventories' projections are shown in the table 11 below.

Table 11 : Porsche AG's Inventories and Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Cost of Good Sold	16 688	18 629	21 256	21 598	24 281	27 183	30 431	34 067	38 138	42 695	47 797
Inventories	3 051	3 889	4 013	4 108	4 517						
Previous year Inventories	2 536	3 051	3 889	4 013	4 108	4 517	5 330	5 694	6 614	7 202	8 265
Nbr Days Sales of Inventory (DSI)	61,10	67,99	67,85	68,81	64,83						
Nbr Days in the period	365	365	365	366	365	365	365	366	365	365	365
Inventory Turnover	5,97	5,37	5,38	5,32	5,63						
Average days of Inventories					66,11						
Forecasted DSI						66,11	66,11	66,11	66,11	66,11	66,11
Forecasted Inventory Turnover						5,52	5,52	5,54	5,52	5,52	5,52
Forecasted Inventory						5 330	5 694	6 614	7 202	8 265	9 050

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

b) Account Receivables forecasts:

The estimated post-IPO accounts receivable for Porsche AG are based on an average Days Sales Outstanding (DSO) for the period from 2017 to 2021. This average DSO is therefore set at 11.96 days and will be the basis for calculating future Account Receivables estimates for the period 2022 to 2027. The results of these Account Receivables' projections are shown in the table 12 below.

Table 12 :Porsche AG's Account Receivables and Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Revenues	23 491	25 784	28 518	28 695	33 138	37 098	41 531	46 493	52 049	58 269	65 231
Account Receivables	593	759	842	1 082	2 280						
Previous year Account Receivables	591	593	759	842	1 081						
Days Sales Outstanding (DSO)	9,20	9,57	10,24	12,27	18,51						
Nbr Days in the period	365	365	365	366	365	365	365	366	365	365	365
Average DSO					11,96						
Forecasted Account Receivables						1 215	1 361	1 519	1 705	1 909	2 137

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

c) Account Payables forecasts:

The estimated post-IPO accounts payables for Porsche AG are based on an average Days Payable Outstanding (DPO) for the period from 2017 to 2021. This average DPO is therefore set at 49.75 days and will be the basis for calculating future Account Payables estimates for the period 2022 to 2027. The results of these Account Payables projections are shown in the table 13 below.

Table 13 : Porsche AG's Account Payables and Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Cost of Good Sold	16 688	18 629	21 256	21 598	24 281	27 183	30 431	34 067	38 138	42 695	47 797
Account Payables	3 048	3 134	2 582	2 335	2 447						
Nbr Days in the period	365	365	365	366	365	365	365	366	365	365	365
Days Payable Outstanding (DPO)	66,67	61,40	44,34	39,57	36,78						
Average DPO					49,75						
Forecasted Account Payables						3 705	4 148	4 631	5 198	5 820	6 515

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

d) Other Current Assets forecasts :

Other Current Assets forecasts for 2022 and forecasts for the period 2023-2027 are calculated on the basis of an average percentage of historical Revenues. In fact, as shown in following table, historically the average Other Current Assets represented 5% of Revenues this rate is therefore used to forecast Other Current Assets.

Table 14 : Porsche AG's Other Current Assets Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Revenues	23 491	25 784	28 518	28 695	33 138	37 098	41 531	46 493	52 049	58 269	65 231
Other Current Assets	1 158	1 279	1 427	1 994	734						
Other Current Assets as % of revenues	5%	5%	5%	7%	2%						
Average % of revenues					5%						
Forecasted Other Current Assets						1 785	1 998	2 237	2 504	2 804	3 139

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

c) Accrued Taxes and the Other Accruals forecasts:

The Accrued Taxes forecasts and the Other Accruals of Porsche AG are forecasted based on an average percentage computed on the basis of the 5 years prior to the IPO.

The table 15 presents the Accrued Taxes forecasts during the period post to the IPO based on an historical 0.69% percentage of Cost of Goods Sold.

Table 15: Porsche AG's Accrued Taxes Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
COGS	16 688	18 629	21 256	21 598	24 281	27 183	30 431	34 067	38 138	42 695	47 797
Accrued Taxes	166	189	201	154	65						
Accrued Taxes as a % of COGS	0,99%	1,01%	0,95%	0,71%	0,27%						
Average % of COGS					0,79%						
Forecasted Accrued Taxes						214	240	268	300	336	376

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

The table 16 presents the Other Accruals forecasts during the period post to the IPO based on an historical 32% percentage of Cost of Goods Sold

Table 16: Porsche AG's Other Accruals Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
COGS	16 688	18 629	21 256	21 598	24 281	27 183	30 431	34 067	38 138	42 695	47 797
Other Accruals	5 751	6 479	6 277	6 139	7 439						
Other Accruals as a % of COGS	34%	35%	30%	28%	31%						
Average % of COGS					32%						
Forecasted Other Accruals						8 581	9 606	10 754	12 039	13 477	15 088

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

Based on these estimated, value the Net Working Capital and its estimated change can now be easily found, and the details of the results are presented in the following table 17.

Table 17 :Porsche AG's NWC and Change in NWC

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Account Receivables & Forecasts	593	759	842	1 082	2 280	1 215	1 361	1 519	1 705	1 909	2 137
Inventories & Forecasts	3 051	3 889	4 013	4 108	4 517	5 330	5 694	6 614	7 202	8 265	9 050
Other CA & Forecasts	1158	1279	1427	1994	734	1 785	1 998	2 237	2 504	2 804	3 139
Account Payables & Forecasts	3 048	3 134	2 582	2 335	2 447	3 705	4 148	4 631	5 198	5 820	6 515
Accrued Taxes & Forecasts	166	189	201	154	65	214	240	268	300	336	376
Other Accruals & Forecasts	5751	6479	6277	6139	7439	8 581	9 606	10 754	12 039	13 477	15 088
NWC	- 4 163	- 3 875	- 2 778	- 1 444	- 2 420	- 4 169	- 4 941	- 5 283	- 6 126	- 6 656	- 7 653
Change in NWC		288	1 097	1 334	976	1 749	772	342	843	530	997

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

- Capital Expenditures:

Capital expenditures, also known as Capex, represent the use of money on a company's physical assets directly related to its activity. These expenditures can be made for the development of new activities, or as a long-term investment.

In order to assess the Capex required by a company in the future, it is normally necessary to start by estimating the investment plans for the coming years. However, in the case of Porsche AG, no strategies in terms of investment plans are clearly defined in the company's management and annual reports.

This is why our forecasted capex for the period 2022 to 2027 related to Porsche AG's case are based on an average of the Capex to Revenues ratio for the 5 years prior to the IPO as shown on the table 18.

Table 18 : Porsche AG's Capital Expenditures and Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Revenues	23 491	25 784	28 518	28 695	33 138	37 098	41 531	46 493	52 049	58 269	65 231
Capital Expenditures	1 762	2 093	2 044	1 547	1 442						
Capex/Revenues	8%	8%	7%	5%	4%						
Average Capex/Revenues					7%						
Forecasted Capex						2 413	2 702	3 025	3 386	3 791	4 244

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

- Invested Capital:

Invested capital refers to the total amount committed on a long-term basis by a company's shareholders, bondholders and stockholders to finance the company's normal operating cycle.

The invested capital forecast for Porsche AG is based on the initial invested capital amount in 2021 of 32 768 million euros, according to Bloomberg, from which in 2022 the sum between the CAPEX and the change in Net Working Capital is added. This exercise is therefore

repeated for the 5-year post-IPO forecast, as shown in the following table. The amount of invested capital used for year n will therefore be the Ending Invested Capital of this same year n.

Table 19 : Porsche AG's Capital Invested and Forecasts

	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Initial Invested Capital		32 768	32 461	34 103	36 463	38 644	41 501
Capital Expenditures		1442	2413	2702	3025	3386	3791
Change in NWC		-1749	-772	-342	-843	-530	-997
Ending Invested Capital	32 768	32 461	34 103	36 463	38 644	41 501	44 294

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

6.1.2. Income Statement

- Revenues:

Porsche AG's forecasted revenues are derived directly from the 5 years prior to the IPO. Indeed, the evolution of revenues generated by Porsche AG is based on an aggregation of the average revenue growth between the years 2017 and 2021. The trend for 2020 has been deliberately excluded, as it is not representative due to the Covid-19 epidemic which caused lockdowns in many regions where Porsche AG is very active and negatively impacted the sales of the company. Table 20 shows an average Revenues growth of 12% over the 5 years prior to the IPO (excluding 2020). This coefficient will be applied progressively each year, increasing Porsche AG's revenues by 12% a year and thus forecasting revenues for the expected year upcoming (2022) and the five years following the IPO.

Table 20 : Porsche AG's Revenues and Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Revenues	23 491	25 784	28 518	28 695	33 138						
Revenues growth		10%	11%	1%	15%						
Average R growth					12%						
Forecasted Revenues						37 098	41 531	46 493	52 049	58 269	65 231

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

- Cost Of Goods Sold:

Cost of goods sold forecasts for 2022 and forecasts for the period 2023-2027 are calculated on the basis of an average percentage of historical Revenues. In fact, as shown in table 21, historically the average cost of goods sold represented 73% of Revenues. It is therefore assumed that this average rate will be used to compute the COGS for the next 5 years.

Table 21 : Porsche AG's COGS and Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Revenues	23 491	25 784	28 518	28 695	33 138	37 098	41 531	46 493	52 049	58 269	65 231
Cost of Goods Sold	16 688	18 629	21 256	21 598	24 281						
% of Revenues	71%	72%	75%	75%	73%						
Average COGS growth					73%						
Forecasted COGS						27 183	30 431	34 067	38 138	42 695	47 797

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

- Depreciation & Amortization:

Depreciation represents the reduction in value of tangible assets over time, while amortization refers to the gradual reduction in value of intangible assets through regular instalment payments.

Regarding Porsche AG's case Depreciation and Amortization for post-IPO years are calculated on the basis of the Capital Expenditures of previous years, taking into account an average of 5 years of use. The result of this analysis is presented in the following table 22:

Table 22 : Porsche AG's D&A Forecasts

<i>(for CAPEX in)</i>	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
2018	419					
2019	409	409	409	409	409	409
2020	309	309	309	309	309	309
2021	288	288	288	288	288	288
2022	483	483	483	483	483	483
2023		540	540	540	540	540
2024			605	605	605	605
2025				677	677	677
2026					758	758
2027						849
Forecasted D&A	1 908	2 030	2 635	3 312	4 070	4 919

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

- Operating Expenses:

Operating expenses refer to the costs associated with running a business's day-to-day activities, including General and Administration Expenses and Selling and Marketing Expenses. These two main operating expenses needs to be estimated separately, as on the one hand Selling and Marketing Expenses can be estimated on the basis of Revenue trends but on the other hand, General and Administration Expenses are more subject to inflationary movements than to revenue growth.

- General and Administration Expenses Forecasts:

As mentioned above, these expenses are strongly correlated with consumer price movements, and in particular with the rate of inflation.

This is why, in order to estimate future expenses linked to General and Administration expenses, we use the results found previously on the growth rate of inflation in the worldwide economy. This growth rate will then be added to the previous expenses, with the main assumption being that the reference levels remain the same, only the final price will be subject to the rate of inflation.

Table 23 : General and Administration Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
General and Administration Expenses	1 028	1 103	1 029	1 095	1 426						
CPI growth						8,75%	6,52%	4,13%	3,56%	3,38%	3,33%
Forecasted G&A Expenses						1 551	1 652	1 720	1 781	1 842	1 903

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and IMF CPI growth rate

- Selling and Marketing Expenses Forecasts:

In contrast to previous expenses, Selling and Marketing Expenses are very strongly correlated with a company's Revenues. For this reason, the evaluation of Selling and Marketing Expenses levels for future periods is based on the historical percentage of Revenues represented by these expenses. The results for these expenses are shown in the following table 24.

Table 24: Selling and Marketing Expenses Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Revenues	23 491	25 784	28 518	28 695	33 138	37 098	41 531	46 493	52 049	58 269	65 231
Selling and Marketing Expenses	1 856	1 901	2 044	1 881	2 111						
S&M Expenses as % of revenues	8%	7%	7%	7%	6%						
Average % of revenues					7%						
Forecasted S&M Expenses						2 624	2 938	3 289	3 682	4 122	4 614

Source: Author's elaboration considering Porsche AG's Data from Bloomberg

On the basis of these two projections the total Operating Expenses Forecasts for the coming years can now be computed by summing these two components. The forecasts of total operating Expenses are presented in the table 25 below.

Table 25: Total Operating Expenses Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
G&A	1 028	1 103	1 029	1 095	1 426	1 551	1 652	1 720	1 781	1 842	1 903
S&M Expenses	1 856	1 901	2 044	1 881	2 111	2 624	2 938	3 289	3 682	4 122	4 614
Operating Expenses	2 884	3 004	3 073	2 976	3 537	4 175	4 590	5 009	5 463	5 963	6 517

Source: Author's elaboration considering Porsche AG's Data from Bloomberg

- Other Operating Income & Expenses and Financial Results:

The Other Operating Income & Expenses as well as the Financial Results of Porsche AG are forecasted based on an average percentage computed on the basis of the 5 years prior to the IPO.

The table 26 presents the Other Operating Expenses' Forecasts during the period post to the IPO based on an historical 4% percentage of Revenues.

Table 26 : Porsche AG Other Operating Income and Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Revenues	23 491	25 784	28 518	28 695	33 138	37 098	41 531	46 493	52 049	58 269	65 231
Other Operating Income	1142	813	846	953	1079						
Other OP Income as % of revenues	5%	3%	3%	3%	3%						
Average % of revenues					4%						
Forecasted other OP Income						1 303	1 458	1 633	1 828	2 046	2 291

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

The table 27 presents the Other Operating Expenses' Forecasts during the period post to the IPO based on an historical 3% percentage of Revenues.

Table 27 : Porsche AG's Other Operating Expenses and Forecasts

	2017	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Revenues	23 491	25 784	28 518	28 695	33 138	37 098	41 531	46 493	52 049	58 269	65 231
Other Operating Expenses	917	675	1173	897	1085						
Other OP Expenses as % of revenues	4%	3%	4%	3%	3%						
Average % of revenues					3%						
Forecasted other OP Expenses						1 264	1 415	1 584	1 773	1 985	2 222

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

The table 28 presents the Forecasts of Financial Results based on a percentage of Revenues linked to historical data from 2017 to 2021. Our analysis shows that financial results represent a constant 0.9% of revenues. So, the assumed percentage of revenue for the expected upcoming year and the 5-year forecast period regarding Financial Results is 0,9%.

Table 28 : Porsche AG's Financial Results and Forecasts

	2018	2019	2020	2021	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
Revenues	25 784	28 518	28 695	33 138	37 098	41 531	46 493	52 049	58 269	65 231
Financial Results	263	192	220	415						
Financial Results as % of revenues	1,0%	0,7%	0,8%	1,3%						
Average % of revenues				0,9%						
Forecasted Financial Results					344	385	431	483	541	605

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

- Tax Rate:

According to a study by PwC, German companies are subject to two taxes.

- The first tax concerns corporate income tax, which consists of a flat 15% levy that is then subject to a 5% surtax, giving an overall rate of 15.825%.
- The second tax refers to a business tax, which consists of a combination of a single 3.5% rate and an additional tax corresponding to a municipal tax (Hebesatz) depending on where the company is located. As Porsche AG is mainly located in the Stuttgart region, we will take the reference level for this region, which is 14%.

Adding these two taxes together, we can estimate our tax rate for Porsche AG at 29.825%.

6.1.3. WACC

The WACC is, in the futures Cash Flows valuation models, the minimum expectation rate of return for investors when they are investing in a company.

- Unlevered beta:

While calculating the WACC the first element of the analysis is the unlevered Beta. In our case we use the average 2021 worldwide unlevered Beta from Damodaran database of two industries : Auto & Truck as well as Retail(Automotive) respectively : 1 and 0.84 which give us an average unlevered beta of 0.92.

- Debt to Capital Structure, Equity to Capital Structure and Debt to Equity ratios:

According to the IPO prospectus, Porsche AG's enterprise Capital Structure at the time prior to the IPO is: Total Equity = 15 043 millions of euros + Total Debt = 9 762 millions of euros; meaning a Capital Structure at 24 805 million euros.

So, the Debt represents 39% of the total Porsche AG's Capital Structure and the Equity 61%. In the forecasts, these ratios will remain unchanged, as well as the Debt-to-Equity ratio of 0.65.

- Levered Beta

From the two previous assumptions as well as the one on the tax rate to be applied we can now compute the levered beta for Porsche AG's IPO valuation, which is 1.34, the results are detailed in the following table 29.

Table 29: Relevered beta

Unlevered Beta	0,92
Tax Rate	29,825%
D/E ratio	0,65
Levered Beta	1,34

Source: Author's elaboration

- Risk-free rate:

The risk-free rate represents the theoretical interest rate of an investment with no risk of financial loss.

As Damodaran (1999) explains in his work on risk-free rates, a company valued in a certain currency must have a risk-free rate corresponding to that currency. As Porsche AG is valued in euros, it seems logical to choose a risk-free rate corresponding to the currency in which it is valued, i.e. euros. Damodaran also explains that for companies that must be valued in euros, the benchmark

risk free rate should be the 10-year Government Bond German bond, as this has had the lowest yields in Europe in recent years and is therefore as close as possible to the reality of a default free rate.

In the case of Porsche AG, the reference risk-free rate will therefore be that of the German 10-year Government Bond at the IPO date of September 29, 2022 and will therefore be considered to be at 2.212%.

- The Equity Risk Premium:

Damodaran's (2023b) work tends to prove that while choosing the risk-free rate is rather easy, determining the Equity Risk Premium is a little more complicated. In particular, he highlights the fact that we cannot simply rely on the company's origin to determine the Risk Premium . Indeed, what if a company generates its revenues in several countries, and is therefore dependent on the risk of each of these countries? Damodaran's with his lambda approach which is based on the factor “λ” that measures the relative exposure of a firm to country risk is solving this issue. The equation (17) solving the Equity Risk Premium would now be as follows:

$$\text{Equity risk premium} = r_f + \beta (\text{mature Market Equity Risk}) + \lambda (\text{Country Risk Premium}) \quad (17)$$

In the Porsche AG case, we will use % of revenues of Porsche AG in a country / % of revenues domestically for the average firm in that country as a proxy to estimate “λ” and Damadoran's database with regard to Country default Spread.

The results of this analysis are shown on the following table 30:

Table 30: Porsche AG Lambdas

Region	2021				
	% of Revenues	Percent of GDP from Exports	Percent of GDP from Domestic economy	Lambda	Country Default Spread
China	31%	19,90%	80,10%	0,39	0,70%
North America	26%	12,50%	87,50%	0,30	0,00%
Western Europe	20%	50,50%	49,50%	0,40	1,01%
Gemany	12%	47,30%	52,70%	0,23	0,00%
Rest of the world	11%	29,10%	70,90%	0,16	4,32%

Source: Author's elaboration considering Data from World Bank and Damodaran Database

To solve the above equation one factor is still missing the Mature Market Equity Risk Premium as our analysis is based on a German Company we will use the 2021 Equity Risk Premium of Germany directly extracted from Damodaran's database and amounting to 4.24%.

Finally, we can now solve the above equation (17) and assume that the expected risk premium for Porsche AG shares will be 9.24%.

- Cost of Equity:

From the previous assumptions the Cost of Equity can now be computed using the CAPM formula shown as formula (7) in the literature review. It is assumed to remain unchanged during the expected year of 2022 and the 5 years forecasted.

Table 31: Porsche AG's Cost of Equity

Risk-free rate	2.212%
Levered Beta	1.34
Equity Risk Premium	9.24%
Cost of Equity	14.58%

Source: Author's elaboration

- Cost of Debt:

As well as the cost of Equity, Cost of Debt is assumed to remain unchanged during the expected year of 2022 and the 5 years forecasted. To compute the cost of debt, the Damodaran's (2021c) approach on cost of debt will be used. This method consists of adding to the risk-free rate the sum of the proportions in which a company generates revenues in different countries, multiplied by the credit spread of that country, and finally adding the company default spread based on rating agencies such as Moody's. This explanation can be sum up with the following equation (18):

$$r_d = r_f + \sum (\% \text{ Revenues in a country} \times \text{Country's CDS}) + \text{Company Default Spread} \quad (18)$$

Firstly, we need to use data from previous research on where Porsche AG's revenues are coming from as well as the CDS of that country which correspond to the first factor to be added to the risk-free rate to get the cost of debt.

Table 32 : Factors % of R and CDS to compute Cost of Debt

Country	% of revenues	CDS (2021)	% of R * CDS
China	31%	0,70%	0,22%
North America	26%	0,00%	0,00%
Western Europe	20%	1,01%	0,20%
Germany	12%	0,00%	0,00%
Rest of the world	11%	4,32%	0,48%
Sum of the factors % of R * CDS			1.58%

Source: Author's elaboration based on Porsche Ag's Data and Damodaran's Database

Secondly, as Porsche AG is not yet rated by the credit rating agencies, we cannot determine the company's default spread in this way. We will therefore use the company's interest coverage, i.e. EBIT on interest expenses based on historical data, and then use Damodaran's database on Ratings, Interest Coverage Ratios and Default Spread to determine the company's default spread.

Table 33: Average Porsche AG's Interest coverage ratio

Years	EBIT	Interest Expenses	Interest coverage ratio
2021	5 729	113	50.65
2020	4 397	129	34.08
2019	4 054	148	27.39
2018	4 552	92	49.48
2017	4 221	68	62.07
Average Interest coverage ratio			44.73

Source: Author's elaboration based on Porsche Ag's financial statements

From the previous results and Damodaran's database on Ratings, Interest Coverage Ratios and Default Spread we can conclude that Porsche AG's with an average Interest coverage ratio of 44.73 during the last years should be rated AAA and therefore has a company default spread of 0.69%.

By using the previous information as well as Damodaran's approach equation (18) on cost of debts we can compute the cost of Debt which is 3.8% in Porsche AG's case, as presented in the following table 34.

Table 34: Porsche AG's Cost of Debt

Risk Free Rate	2.212%
Sum of the factors % of R * CDS	1.58%
Company Default Spread	0.69%
Cost of Debt	3.80%

Source: Author's elaboration

- Weighted Average Cost of Capital (WACC):

Using all the assumptions previously described, the WACC can then be calculated using the formula (4) in the literature review. Table 35 shows the parameters to calculate the WACC. This WACC rate is therefore assumed at a level of 9.89% and will remain unchanged for the forecasted years.

Table 35 : Porsche AG's Weighted Average Cost of Capital

Cost of Equity	14.58%
E/Capital Structure	61%
Cost of Debt	3.80%
Tax Rate	29,825%
D/Capital Structure	39%
After tax WACC	9.89%

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

6.2. DCF Valuation

As mentioned previously in the literature review, the first valuation method used is the Discounted Cash Flow Valuation Method. In order to carry out this valuation method, the Free Cash-Flow to the firm must first be evaluated.

By using formula (1) from the literature review., and applying the above-mentioned assumptions, the results shown in Table 36 can be easily found.

Table 36 : Porsche AG's FCFF

	0	1	2	3	4	5
	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
EBIT	6 123	6 939	7 898	8 986	10 212	11 591
Tax (29.825%)	1 826	2 070	2 355	2 680	3 046	3 457
Profit after tax	4 297	4 870	5 542	6 306	7 166	8 134
D&A	1 908	2 030	2 635	3 312	4 070	4 919
Capex	2 413	2 702	3 025	3 386	3 791	4 244
Change in NWC	- 1 749	- 772	- 342	- 843	- 530	- 997
FCFF	5 540	4 969	5 494	7 074	7 975	9 807

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

As stated in the above formula (1), the calculation of FCFF start directly from EBIT. This table also prove that the company will generate positive cash flows over the forecasted period from the year 0 2022 to the fifth year 2027.

Once the Free Cash Flows have been determined, the Net Present Value of the Discounted Cash flows can be calculated using the first part of formula (2), which involves dividing the FCFF by the discounted factor in this case the WACC. The sum of these discounted cash flows represents, as presented in the table 27, 31 531 million euros.

Table 37 : Porsche AG's DCF NPV

	0	1	2	3	4	5
	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
FCFF	5 540	4 969	5 494	7 074	7 975	9 807
Discounted factor	1,0000	1,0989	1,2076	1,3271	1,4583	1,6026
DCF	5 540	4 522	4 549	5 331	5 469	6 119
NPV DCF	31 531					

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

To determine the enterprise value, a second step in formula (3) of the literature review must be applied here: the calculation of the discounted terminal value. But first the Terminal Value must be calculated, using formula (3) in the literature review. The terminal value represents the value of Porsche AG assuming perpetual business activity with constant average growth of 1.346% over 5 years. This represents that of German GDP growth, estimated according to previous GDP growth findings in the market overview session. Table 35 shows all the parameters considered in calculating Porsche AG Terminal Value, giving a Terminal Value of 88 440 million euros.

Table 38 : DCF model - Porsche AG's Terminal Value

FCFF _T	9 807
g	1.346%
WACC	9.89%
Terminal Value	88 440

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

The Terminal Value having now been found, the second part of formula (2) can now be used, i.e. to compute the present value of the Terminal Value using as discount factor the WACC adjusted for the total number of years. Table 39 shows the parameters used for this calculation and a Discounted Terminal Value of 55 185 million euros.

Table 39 : DCF model - Terminal Value Discounted

Terminal Value	88 440
Discount Factor	1.6026
Terminal Value Discounted	55 185

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

The enterprise value can now be obtained by adding the two previous results, i.e. the DCF NPV and the TV discounted as mentioned in the formula (2). In the case of Porsche, Table 40 shows an Enterprise Value of 86 716 million euros.

Table 40 : DCF model - Porsche AG's Enterprise Value

NPV DCF	31 531
Terminal Value Discounted	55 185
EV	86 716

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

From the Enterprise Value, the Equity value can now easily be computed using formula (9) of the literature review. Then, from the equity value the fair value of one share can naturally be found using formula (10) and remembering that Porsche has only 455.5 million shares outstanding. The Table 41 shows an equity value evaluated, using the DCF model, at 45 240 million euros and therefore a fair value of one share at 99.32 EUR.

Table 41 : DCF model - Porsche AG's EQV and Fair value of one share

Enterprise Value	86 716
Net Debt	3 890
Preferred Stocks	37 579
Minority Interests	7
EQV	45 240
nbr outstanding shares	455.5
Fair Value of one share	€ 99.32

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

6.3. Multiples Valuation

The second model used to value Porsche AG for its IPO is the Multiples model.

This model calculates Enterprise Value from comparables using ratios applied to the selected company via the targeted results for the IPO year of 2022.

6.3.1. Peers Group

The first step in this model is to define the comparable to be studied in order to calculate their ratios. In order to complete this study of comparable 5 companies similar in terms of industry and the countries in which their revenues are established. As Porsche AG operates in the segment of high-end or luxury car manufacturers, we have chosen these 5 competitors based on their business sector, but also on their customer target. We were also interested in their source of income. As Porsche derives a large part of its revenues from Western European countries, Asian countries such as China, and North American countries, we chose companies that derive most of their revenues from these regions. We have done this to ensure results that take into account the potential market risk of operating in these regions. Finally, for additional information, we decided to choose companies listed on the stock exchange, so as to be able to compare listed companies with a company wishing to enter the public market. These 5 companies are presented in the following table 42:

Table 42 : Porsche AG's peers

Ticker	Company Name	% Revenue in Europe	% Revenue in Asia (China if data available)	% Revenue in North America
MBG GR	Mercedes-Benz AG	38%	30% with 18% just in China	27%
VOW GR	Volkswagen AG	55%	21%	18%
BMW GR	BMW AG	36%	38%	23.6%
RACE IM	Ferrari	47.6%	12.2% just in China	27.6%
F US	FORD US	21.6%	14.7% just in China	49.7%

Source: Author's elaboration based on the 2022 Financial Report of each company

6.3.2. Multiples

The study of multiples is focused here on the ratios linked to the Enterprise Value, i.e. EV/Sales, EV/EBITDA and EV/EBIT as well as equity multiples.

As Porsche's IPO took place on September 29, 2022, it is assumed that the data used to calculate the ratios are based on the figures reported in 2022 by each of these 5 companies. The data collected are presented in table 43 and are all converted into millions of euros for companies that do not carry out their annual reporting in euros to make it easier to use and compare. The data presented in the table 34 are the enterprise value at the time of Porsche AG's IPO, the Sales result in 2022, the EBITDA in 2022 and the EBIT in 2022, Net Income in 2022 as well as the EPS Growth for 2022 of each of the 5 companies chosen to carry out the model.

Table 43 : Porsche Ag's Comparable Data

	Mercedes-Benz AG	Volkswagen AG	BMW AG	Ferrari	FORD US
Closing Share price on 29/09	52.43	155.68	68.79	190.05	12.72
Total Shares Outstanding	1 069 837 447	501 295 263	638 716 075	181 953 498	3 949 385 442
Equity Value	56 091 577 346	78 041 646 544	43 937 278 799	34 580 262 295	50 236 182 822
Net Debt	88 146 000 000	178 436 000 000	51 927 000 000	1 365 455 000	110 481 203 008
Enterprise Value	144 237 577 346	256 477 646 544	95 864 278 799	35 945 717 295	160 717 385 830
Financial Data					
Revenue 2022	150 017 000 000	279 232 000 000	142 610 000 000	5 095 000 000	148 549 812 030
EBIT 2022	15 721 000 000	19 769 000 000	13 985 000 000	1 243 000 000	23 341 165 414
EBITDA 2022	29 612 000 000	46 999 000 000	22 551 000 000	1 789 000 000	28 942 669 173
Net Income 2022	14 501 000 000	14 867 000 000	17 941 000 000	933 000 000	16 858 082 707
EPS Growth rate 2022	13.55	29.66	27.31	5.09	4.45

Source: Author's elaboration considering Porsche AG's Data from Bloomberg

From these data, the following ratios linked to Enterprise Value can now be easily calculated: EV/Sales, EV/EBITDA and EV/EBIT as well as the one linked to Equity Value such as P/E and PEG and the results are presented in table 44.

Table 44 : Porsche AG's Comparable Enterprise Value ratios

	Mercedes-Benz AG	Volkswagen AG	BMW AG	Ferrari	FORD US	Average Ratio
EV Multiples						
EV/Revenue	1,0x	0,9x	0,7x	7,1x	1,1x	2,1x
EV/EBIT	9,2x	13,0x	6,9x	28,9x	6,9x	13,0x
EV/EBITDA	4,9x	5,5x	4,3x	20,1x	5,6x	8,0x
Equity Value Multiples						
P/E Ratio	3,9x	5,2x	2,5x	37,3x	2,9x	10,4x
PEG Ratio	0,3x	0,2x	0,1x	7,3x	0,7x	2,0x

Source: Author's elaboration considering Porsche AG's Data from Bloomberg

From these results, Porsche AG's Enterprise Value can now be calculated. To do this, the following assumption applies: the average of each of these ratios can be multiply by the expected value of Sales, EBITDA, and EBIT for 2022 and the Net Income, as calculated previously for the Free Cash Flows.

First Table 45 is showing the results using the Enterprise Value Ratio for the calculation and by using the average EV/Sales ratio Porsche AG Enterprise Value is estimated at 79 309 176 014 euros, from the EBITDA/Sales it is estimated at 79 303 476 177 euros and finally using the comparable average EV/EBIT ratio Porsche AG Enterprise Value is estimated at 79 368 305 810 euros.

Table 45 : Porsche AG's EV using comparable ratios

Targeted Sales value in 2022	37 630 000 000	Targeted EBITDA value in 2022	9 857 586 490	Targeted EBIT value in 2022	6 123 393 589
Average ratio to be applied	2,1x	Average ratio to be applied	8,0x	Average ratio to be applied	13,0x
Excepted EV using the comparable EV/Sales average ratio	79 309 175 014	Excepted EV using the comparable EV/EBITDA average ratio	79 303 476 177	Excepted EV using the comparable EV/EBIT average ratio	79 368 305 810

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

To determine the Equity Value and finally the Fair value of one share using these 3 Enterprise Values derived from comparable ratios, the formulas (9) and (10) from the literature review can now be used. Table 46 shows the results of these calculations as well as the Equity

Value found using the P/E ratio. Thus, using the EV/Sales ratio of Porsche AG's comparable, the Equity Value is valued at 37 833 425 014 euros resulting in a Fair Value of one share at 83.06 euros. Using the EV/EBITDA ratio of Porsche AG's comparable, the Equity Value found is slightly higher than before, valued at 37 892 555 810 euros, while the Fair Value of one share is slightly also lower, at 83.19 euros. Using the EV/EBIT ratio of Porsche AG's comparable gives the lowest valuations. In fact, the Equity Value, using this ratio, is established at 37 827 726 177 euros and the fair value of one share at 83.05 euros. Finally, by using the P/E ratio Value we can find the highest Equity Value than from the previous ratios, with an Equity Value at 44 546 567 420 euros and a fair value of one share at 97.80 euros

In order to harmonize these figures, it is assumed that the average of the fair value of one share found using each of the ratios would be the fair value of one share related to the comparable model. Leading to the conclusion that from the Multiples Valuation Model, the fair value of one Porsche AG share should be 86.77 euros.

Table 46 : Multiples Valuation - EQV and Fair value of one share results

	EV/Sales ratio	EV/EBITDA ratio	EV/EBIT ratio	P/E Ratio
EV	79 309 175 014	79 368 305 810	79 303 476 177	
Net Debt	3 890 000 000	3 890 000 000	3 890 000 000	
Preferred Stocks	37 578 750 000	37 578 750 000	37 578 750 000	
Minority Interests	7 000 000	7 000 000	7 000 000	
EQV	37 833 425 014	37 892 555 810	37 827 726 177	44 546 567 420
Fair Value of one share	€ 83,06	€ 83,19	€ 83,05	97,80
	Average		€ 86.77	

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

6.4. Economic Value-Added Valuation

The third valuation model used to determine Porsche AG's IPO value is the Equity Value-Added Valuation Model, as mentioned in the literature review.

As previously demonstrated in formulas (12), (13) and (15) of the literature review, the Equity Value-Added valuation model enables to assess Enterprise Value, like the DCF model on discounted values and assumptions, but not based on Free Cash Flows but on Equity Value-Added.

To carry out this analysis, as with the DCF model, Enterprise Value is determined by calculating the expected value of Equity Value-Added for 2022 and a 5-year forecast extending from 2023 to 2027.

The calculation of Equity Value-Added forecasts is carried out using the results found previously relating to EBIT projections from 2022 to 2027, as well as the level of tax, the assumption on the invested capital projection and the WACC of 9.89% found on the purpose of Discounted Cash Flows valuation is also used here.

Formula (11) in the literature review can now be applied to calculate the Equity Value-Added for each forecast year, and the results are shown in table 47.

Table 47 : Porsche AG's EVA forecasts

	0 2022 E	1 2023 F	2 2024 F	3 2025 F	4 2026 F	5 2027 F
EBIT	6 123	6 939	7 898	8 986	10 212	11 591
Tax (29.825%)	1 826	2 070	2 355	2 680	3 046	3 457
NOPAT	4 297	4 870	5 542	6 306	7 166	8 134
Capital Invested _t	32 461	34 103	36 463	38 644	41 501	44 294
WACC	9.89%	9.89%	9.89%	9.89%	9.89%	9.89%
EVA	1 086	1 496	1 935	2 483	3 061	3 753

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

Based on these results, the net present value of Equity Value-Added can now be calculated using the first part of formula (12), in the literature review., which aims to find the Enterprise Value. This aims to the sum of the Equity Value-added of each forecasted year discounted by the present value of the WACC, results are shown in table 48.

Table 48 : Porsche AG's EVA NPV

	0	1	2	3	4	5
	2022 E	2023 F	2024 F	2025 F	2026 F	2027 F
EVA	1 086	1 496	1 935	2 483	3 061	3 753
Discounted factor	1,0000	1,0989	1,2076	1,3271	1,4583	1,6026
EVA discounted	1 086	1 644	2 337	3 295	4 464	6 014
NPV EVA	18 841					

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

To determine the enterprise value, the second step of the formula (12) of the literature review must be applied here: the calculation of the discounted terminal value. But first the Terminal Value must be calculated, using formula (13) of the literature review. As well as for the DCF model valuation the Terminal Value represents the value of Porsche AG assuming perpetual business activity with constant growth at the German GDP growth rate for 5 years à 1.346%. Table 49 shows all the parameters considered in calculating Porsche AG Terminal Value, giving a Terminal Value of 48 257 million euros.

Table 49 : EVA model - Porsche AG's Terminal Value

EVA _T	3 753
g	1.346%
WACC	9.89 %
Terminal Value	48 257

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

The Terminal Value having now been found, the second part of formula (12) can now be used, i.e. to compute the present value of the Terminal Value using as discount factor the WACC adjusted for the total number of years. Table 50 shows the parameters used for this calculation and a Discounted Terminal Value of 30 112 million euros.

Table 50 : EVA model - Porsche AG's Terminal Value Discounted

Terminal Value	48 257
Discounted Factor	1.6026
Terminal Value Discounted	30 112

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

The formula (12), that refers to the Market Value-Added which represents a company's value creation, can now be entirely computed and results shown on table 51 highlights that the Market Value-Added established for Porsche AG is 48 953 million euros.

Table 51 : EVA model - Porsche AG's Market Value-Added

NPV EVA	18 841
Terminal Value Discounted	30 112
MVA	48 953

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

The enterprise value can now be obtained by using formula (14), which consists in integrating the invested capital of the year 2022 with the Market Value Added, the result presented in table 52 is 81 414 million euros.

Table 52 : EVA model - Porsche AG's Enterprise Value

MVA	48 953
Capital invested _t	32 461
EV	81 414

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

As well as for the DCF Valuation model from the Enterprise Value, the Equity value can now easily be computed using formula (15) of the literature review. Then, from the equity value the fair value of one share can naturally be found using formula (16) and remembering that Porsche is using 455.5 million shares outstanding. The Table 53 shows an equity value evaluated, using the DCF model, at 39 939 million euros and therefore a fair value of one share at 87.68 EUR.

Table 53 : EVA model - Porsche AG's EQV and Fair value of one share

Enterprise Value	81 414
Net Debt	3 890
Preferred Stocks	37 579
Minority Interests	7
EQV	39 939
nbr outstanding shares	455.5
Fair Value of one share	€ 87.68

Source: Author's elaboration considering Porsche AG's Data from Bloomberg and assumptions

7. Conclusion

This project was conducted to inform the early investors and the potential futures investors of the role Investments Banks in the valuation strategy used while conducting an IPO. To highlight this strategy Porsche AG's IPO was used as a case study by firstly giving a clear financial and non-financial situation of the company prior and after the IPO.

Through the valuation models applied using assumptions, three Fair value of a share price were found. The lowest one was found running the Multiples Method Valuation model with a share price evaluated at 86.77 EUR. A slightly higher fair value of a share price was found using the Equity Value-Added Valuation with an estimated share price at 87.68 EUR. Finally, by conducting an Discounted Cash Flows Valuation a higher fair value was found at 99.32 EUR.

From these results and by comparing them to the issue price which was established at 82.50 EUR and the closing price of the first day fixed at 82.52 EUR, we can firstly conclude that the pricing strategy used behind the Porsche AG's IPO is an underpricing strategy that destroyed value for the company.

This underpricing can be explained by the asymmetry of information between investors and underwriters mentioned previously in the literature review section and proved in the analysis of the company with top-tier banks involved in the IPO. It can also be explained by the fact that Porsche AG's IPO was highly regarded by investors which resulted in a wide range of interests on the primary market. Finally, the banks involved in the valuation of Porsche AG have deliberately undervalued the price of Porsche AG shares in order to attract as many investors as possible due to the unfavorable stock market conditions at the time, thus guaranteeing them, as underwriters, a higher commission in addition to the potential gain they could generate by selling the shares held in their books on the secondary market.

This case study also confirms the empirical studies carried out in the past by Wasserfallen & Wittleder (1994) and Kiefer (2020) on the outcome of IPOs on the German market. Indeed, the results of our study show a detailed example of an underestimated IPO on the German market.

The limitations of this project are essentially linked to the fact that the valuations were based on assumptions that do not necessarily reflect market reality in the future, but also that the pricing models only integrate financial data and do not consider Porsche AG's non-financial data.

Nevertheless, this study also aims, through its 3 valuation methods and in-depth analysis, to prove that Porsche AG was in good health at the time of the IPO and could continue to perform better while creating value for its investors and the company. Indeed, using the DCF, we have seen that Porsche could potentially manage to generate large cash flows, which is both a good sign for investors and an alarming one. In the best-case scenario, Porsche AG could choose to reinvest this cash flow within its own company, to finance innovative new projects that are surely geared towards the transition to electric or even hydrogen-powered vehicles. This type of investment in new projects is often a preferable sign from the investor's point of view, as it guarantees a potential return on investment, provided the project is viable and relevant. In another case, the company might pay a dividend, but this could potentially disrupt the share price, as investors are less keen to do so, since it can sometimes be associated with a lack of new investments or projects. Using Equity Value Added, we were able to prove that Porsche AG guarantees its investors their capital because the cost of their capital to the company does not affect the return on investment as Equity Value is still positive at the end of the exercise. Finally, comparable analysis allowed us to assess the value of the company based on the market valuation of competitors the results of this analysis confirm the consistency of the results obtained using the other two methods, and thus clearly highlight the phenomenon of undervaluation in the case of Porsche AG.

In conclusion, Porsche AG's IPO should have created value for the company. In fact, this is a company with a solid financial track record, as demonstrated in the case study above, even in times of crisis such as covid 19. Indeed, Porsche AG has been able to maintain a stable volume of sales and vehicles produced in recent years. This has enabled the company to present very good economic indicators over the last 5 years, despite a period considered rather difficult for the automotive market. As demonstrated in the literary review, this factor : the economic health of a company is very important during the IPO process as well as in post-IPO conditions. Moreover, these good results tend to prove that the company also has a good management structure, which could have created additional value, as explained in the literature review. Finally, non-financial

factors such as the brand's commitment to innovative ecological transition projects, notably the electrification of its vehicles, and customer satisfaction could also have been factors influencing the valuation upwards.

Nevertheless, the investment banks decided differently in the case of Porsche AG, proposing a share price below the fair price, and thus destroying value for the company. This choice can be supported firstly by the nature of the capital that Porsche AG is offering to its investors. Indeed, by offering only ordinary shares without voting rights, it segregates investors into two classes: the decision-makers, who are in reality the historical shareholders (Volkswagen and Porsche Holding SE via VW), and the other minority shareholders, whose wishes ultimately have no influence on the company's strategic choices. Regarding this, the literature review emphasized the fact that changing the structure of ownership could lead to higher liquidity which is not the case here as the major ownership and decisions remains in the hand of the same shareholders. In addition, despite the fact that Porsche AG's IPO was widely followed by investors, another important factor may have influenced the destruction of Porsche AG's value by investment banks. Indeed, investors' renewed interest in the bond market due to rising interest rates, which favors less risky investments than equities such as bonds, may have prompted investment banks to revise the company's value downwards to ensure that investors remained attracted to the stock. This is directly linked to the “investors follow others” of the literature review with the fact that investors tends to follow others despite their own thoughts. This means that, in order to attract the most informed investors, the investment banks would have lowered the value of Porsche Ag's equity, thereby ensuring that other investors would follow. Finally, the destruction of Porsche AG's value by the investment banks was surely also influenced by the very long-term vision of the automotive market. The market is currently undergoing a complete overhaul, challenged by the new forms of transport being promoted by governments, and by new competitors such as Tesla, based entirely on electrification.

Future research could define how Investment Banks and Underwriters integrate Porsche AG's non-financial data into the valuation of the company. Another research idea related to this topic could be to examine the profits generated by investment banks and underwriters during Porsche AG's IPO to understand their real interest in participating in this type of corporate event.

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9. Annexes

9.1. Balance Sheet

9.1.1. Total Assets

Table 54 : Porsche AG's Assets Balance Sheet part

(in million EUR)	2017	2018	2019	2020	2021
Cash, Cash Equivalents & STI	4 970,00	5 224,00	6 377,00	7 913,00	11 021,00
Cash & Cash Equivalent	3 067,00	2 635,00	3 511,00	4 500,00	4 686,00
ST Investments	1 903,00	2 589,00	2 866,00	3 413,00	6 335,00
<u>Accounts & Notes Receivables</u>	<u>593,00</u>	<u>759,00</u>	<u>842,00</u>	<u>1 081,00</u>	<u>2 280,00</u>
Acc Receivables, Net	593,00	759,00	842,00	1 081,00	1 199,00
Notes Receivable, Net	-	-	-	-	1 081,00
<u>Inventories</u>	<u>3 051,00</u>	<u>3 889,00</u>	<u>4 013,00</u>	<u>4 108,00</u>	<u>4 517,00</u>
<u>Other ST Assets</u>	<u>1 158,00</u>	<u>1 279,00</u>	<u>1 427,00</u>	<u>1 994,00</u>	<u>734,00</u>
Derivative & Hedging Assets	-	-	-	103,00	-
Assets Held-for-sale	-	-	-	-	-
Taxes Receivable	51,00	81,00	95,00	163,00	155,00
Misc ST Assets	1 107,00	1 198,00	1 332,00	1 728,00	579,00
Total Current Assets	9 772,00	11 151,00	12 659,00	15 096,00	18 552,00
<u>Property, Plant & Equip, Net</u>	<u>9 358,00</u>	<u>10 704,00</u>	<u>12 453,00</u>	<u>12 309,00</u>	<u>12 717,00</u>
<u>LT Investments & Recivables</u>	<u>10 320,00</u>	<u>10 054,00</u>	<u>10 191,00</u>	<u>10 764,00</u>	<u>12 057,00</u>
LT Investments	8903	8 398,00	8 350,00	8 350,00	8 596,00
LT Receivables	1417	1 656,00	1 841,00	2 414,00	3 461,00
<u>Other LT Assets</u>	<u>5 569,00</u>	<u>6 250,00</u>	<u>7 063,00</u>	<u>7 322,00</u>	<u>8 056,00</u>
Total Intangible Assets	4 646,00	4 929,00	5 085,00	5 437,00	6 190,00
Deferred Tax Assets	370	730,00	1 355,00	817,00	867,00
Derivative & Hedging Assets	0	-	-	520,00	-
Investments in Affiliates	400	466,00	444,00	384,00	313,00
Misc LT Assets	153	125,00	179,00	164,00	686,00
Total Non-Current Assets	25 247,00	27 008,00	29 707,00	30 395,00	32 830,00
Total Assets	35 019,00	38 159,00	42 366,00	45 491,00	51 382,00

Source: Author's elaboration considering Porsche AG's Data from Bloomberg

9.1.2. Total Liabilities

Table 55 : Porsche AG's Liabilities Balance Sheet part

(in million EUR)	2017	2018	2019	2020	2021
<u>Payables & Accruals</u>	<u>3 214,00</u>	<u>3 323,00</u>	<u>2 783,00</u>	<u>2 489,00</u>	<u>2 512,00</u>
Accounts Payable	3 048,00	3 134,00	2 582,00	2 335,00	2 447,00
Accrued Taxes	166,00	189,00	201,00	154,00	65,00
Other Payables & Accruals	-	-	-	-	-
<u>ST Debt</u>	<u>1 770,00</u>	<u>2 215,00</u>	<u>2 239,00</u>	<u>2 657,00</u>	<u>3 128,00</u>
ST Borrowings	1 770,00	2 215,00	2 239,00	2 657,00	3 128,00
ST Lease Liabilities	-	-	-	-	-
<u>Other ST Liabilities</u>	<u>5 751,00</u>	<u>6 479,00</u>	<u>6 277,00</u>	<u>6 139,00</u>	<u>7 439,00</u>
Deferred Revenue	-	-	-	-	-
Derivatives & Hedging	-	-	-	255,00	-
Deferred Tax Liabilities	-	-	-	-	126,00
Misc ST Liabilities	5 751,00	6 479,00	6 277,00	5 884,00	7 313,00
Total Current Liabilities	10 735,00	12 017,00	11 299,00	11 285,00	13 079,00
<u>LT Debt</u>	<u>3 687,00</u>	<u>3 644,00</u>	<u>5 375,00</u>	<u>5 668,00</u>	<u>6 599,00</u>
LT Borrowings	3 687,00	3 644,00	5 375,00	5 668,00	6 599,00
LT Lease Liabilities	-	-	-	-	-
<u>Other LT Liabilities</u>	<u>5 397,00</u>	<u>6 021,00</u>	<u>8 264,00</u>	<u>8 314,00</u>	<u>8 769,00</u>
Accrued Liabilities	-	-	-	-	-
Pension Liabilities	3 466,00	3 792,00	5 438,00	5 932,00	5 525,00
Deferred Revenue	-	-	-	-	-
Deferred Tax Liabilities	614,00	650,00	681,00	685,00	782,00
Derivatives & Hedging	-	-	-	321,00	-
Misc LT Liabilities	1 317,00	1 579,00	2 145,00	1 376,00	2 462,00
Total NonCurrent Liabilities	9 084,00	9 665,00	13 639,00	13 982,00	15 368,00
Total Liabilities	19 819,00	21 682,00	24 938,00	25 267,00	28 447,00
<u>Preferred Equity and Hybrid</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>Share Capital & APIC</u>	<u>45,00</u>	<u>45,00</u>	<u>45,00</u>	<u>45,00</u>	<u>45,00</u>
Common Stock	45,00	45,00	45,00	45,00	45,00
<u>Treasury Stock</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>Retained Earnings</u>	<u>4 023,00</u>	<u>4 876,00</u>	<u>4 991,00</u>	<u>6 302,00</u>	<u>9 146,00</u>
<u>Other Equity</u>	<u>11 132,00</u>	<u>11 550,00</u>	<u>12 387,00</u>	<u>13 872,00</u>	<u>13 736,00</u>
Equity Before Minority Interest	15 200,00	16 471,00	17 423,00	20 219,00	22 927,00
<u>Minority/Non Controlling Interest</u>	<u>-</u>	<u>6,00</u>	<u>5,00</u>	<u>5,00</u>	<u>8,00</u>
Total Equity	15 200,00	16 477,00	17 428,00	20 224,00	22 935,00
Total Liabilities & Equity	35 019,00	38 159,00	42 366,00	45 491,00	51 382,00
Total Debt	5 457,00	5 859,00	7 614,00	8 325,00	9 727,00

Source: Author's elaboration considering Porsche AG's Data from Bloomberg

9.2. Income Statement

Table 56 : Porsche AG's Income Statement

(in million EUR)	2017	2018	2019	2020	2021
Revenues	23 491	25 784	28 518	28 695	33 138
Cost of Goods Sold	16 688	18 629	21 256	21 598	24 281
<u>Gross Profit</u>	<u>6 803</u>	<u>7 155</u>	<u>7 262</u>	<u>7 097</u>	<u>8 857</u>
D&A	2 884	3 004	3 073	2 976	3 537
<u>EBITDA</u>	<u>3 919</u>	<u>4 151</u>	<u>4 189</u>	<u>4 121</u>	<u>5 320</u>
Other Operating Expenses	917	675	1 173	897	1 085
Other Operating Income	1 142	813	846	953	1 079
<u>Profit before FR</u>	<u>4 144</u>	<u>4 289</u>	<u>3 862</u>	<u>4 177</u>	<u>5 314</u>
Financial results	- 98	263	192	220	415
<u>EBIT</u>	<u>4 046</u>	<u>4 552</u>	<u>4 054</u>	<u>4 397</u>	<u>5 729</u>
Tax	1 030	1 434	1 253	1 231	1 691
<u>Profit after tax (inc MI)</u>	<u>3 016</u>	<u>3 118</u>	<u>2 801</u>	<u>3 166</u>	<u>4 038</u>
Minority/Non Controlling Interest	-	5	5	4	6
<u>NI (ex MI)</u>	<u>3 016</u>	<u>3 113</u>	<u>2 796</u>	<u>3 162</u>	<u>4 032</u>
Preferred Div					
<u>NI - Preferred Div</u>	<u>3 016</u>	<u>3 113</u>	<u>2 796</u>	<u>3 162</u>	<u>4 032</u>

Source: Author's elaboration considering Porsche AG's Data from Bloomberg