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Relative Valuation for Value Investing: theoretical aspects and empirical evidence

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Introduction

In an era characterized by the proliferation of information and the simplification of investment accessibility, it is crucial to fully understand certain investment theories that can guide individuals to make informed decisions, by determining the true value of their investments. In this environment, one philosophy stands out significantly: Value Investing. Supported by luminaries like Benjamin Graham and Warren Buffett, it emerges as a cornerstone of wisdom and prudence within the complexities of financial markets. This enduring discipline has survived periods of both prosperity and crisis, firmly anchored to its fundamental premise: the search of undervalued securities relative to their intrinsic worth. As Warren Buffett famously affirmed, 'Price is what you pay, value is what you get.' The aim of this master's thesis is to comprehensively explore the Value Investing strategy, by presenting its historical roots, core principles, and practical applications. Additionally, a meticulous analysis of the performance of this investment philosophy in the modern financial landscape will be conducted, drawing conclusions on its efficacy and relevance in today's markets.

The first chapter introduces readers to the intriguing world of value investing. It starts by introducing the concept of valuation, dissecting common misconceptions, and exploring implementation contexts. Attention is then drawn towards the mechanics of value investing, examining the distinctions between passive and active investors, as well as between value and growth stocks. The discussion further delves into a comprehensive understanding of the two valuation methodologies: absolute and relative techniques. After a discussion on their both strengths and weaknesses, the chapter concludes with an overview of the primary financial statements necessary for implementing these approaches.

Among the various valuation methodologies, the second chapter focuses on the relative one, predominantly utilized within the American market, which aligns with our targeted research domain. Following an elucidation of the methodology, the chapter proceeds by examining the crucial role of standardization process in ensuring consistency and comparability across different companies, thereby facilitating efficient comparisons. Particular attention is directed towards three primary multiples that are frequently used, highlighting the type of companies to which they are most consistently applied, along

with critical points and calculation discrepancies. A significant portion of the chapter is dedicated to discussing the structured approach, known as “4 steps guide”, employed in multiple implementations, encompassing both theoretical and practical perspectives.

In the third chapter, an empirical study spanning the past two decades is conducted with the final aim of drawing conclusions about the performance of the value strategy. The analysis occurs in the context of the American Large Cap market, chosen for its leading position and efficiency within global financial markets. The first part of the analysis focuses on value investing itself, utilizing data from the iShares ETF issued by MSCI S&P500 Value. Performance trends are closely scrutinized, examining periods of both outperformance and underperformance, with consideration given to the macroeconomic environment for a deeper understanding of these fluctuations. Subsequently, a comparison is undertaken between the performance of the value ETF and the total S&P 500 index, providing valuable understanding of opportunity cost, the lens through which it is advisable to investigate investments. This comparison not only illuminates historical trends, but also provides valuable insights for navigating future investment environments, thereby contributing significantly to understanding the performance of the value strategy within the current financial landscape.

Chapter 1 - The Value Investing

1.1 Introduction to valuation

The concept of "valuation" is a crucial foundation in the realm of investments and finance, playing a vital role in uncovering the inherent value of financial assets such as stocks, bonds, and entire companies. It extends beyond the simple assessment of market prices, encompassing thorough analyses of historical data, predictions of future cash flows, and qualitative considerations. Throughout this thesis, we will carefully delve into the valuation methodologies, especially in determining fair stock prices, exposing the complexities and challenges involved to establish a strong basis for well-informed financial decisions and corporate strategies, with a peculiar focus on *relative valuation*. Valuation is more than a mere numerical analysis; it is a pivotal process that integrates economic theory with practical decision-making, ultimately influencing the global financial landscape (Cunningham, 2001)

1.1.1 Common misconceptions in valuation

Valuation has accumulated over time a series of misconceptions, which will be explored and dispelled in this context (Damodaran, 2012). Understanding the valuation process correctly is crucial for making informed decisions in investments and financial analyses.

- 1) Valuation is subjective, time-sensitive, and imprecise.

The valuation process is not as objective as idealists might think. Despite their quantitative nature, valuation models require personal assessments for inputs determination, resulting in a value shaped by biases. This often leads to setting the price first and then evaluating. To reduce bias, prior to the valuation, it is beneficial to avoid taking public positions on firm's value and to reduce personal stakes in the perception of whether the firm is undervalued or overvalued. Moreover, when relying on assessment provided by third-party, it is crucial to consider the biases of the analyst before making decisions based on it. Other two common misconceptions revolve around the notions of precision and timelessness. Financial markets constantly receive information that can affect specific firms, entire sectors, or the overall market. As new information emerges, it becomes evident that the value of a firm needs to be adjusted accordingly. Value is therefore a dynamic concept that needs to be constantly updated to reflect the most current information landscape. Valuation inherently involves uncertainty as it requires projecting

future cash flows and discount rates, as will be further explained in the subsequent discussion on the concept of margin of safety (Klarman, 2011). This concept offers a buffer for such uncertainty. Different investments have different levels of valuation precision, with mature companies typically having more accurate valuations than younger ones. In essence, valuation is a well-defined process, but there are significant degrees of freedom that influence the process through the input variables, the estimates, and the forecasting of future cash flow. Specifically, the latter aspect tends to have less impact on relative valuation methods reliant on multiples, as will be further explored. At the same time, the valuation process must be structured to integrate and reflect new incoming information. This adaptability is crucial, considering that financial markets essentially function as information processors.

2) Process over outcome

Contrary to the belief that the final product (the value) is the only factor of importance, the valuation process itself plays a crucial role. In fact, it allows investors to gain insights into the factors influencing the asset's value and to address fundamental questions about its worth. A strong valuation process leads to better long-term financial outcomes, improving aspects such as decision-making and risk assessment (Damodaran, 2012)

3) The effectiveness of valuation decreases as the model becomes more quantitative

The complexity of models tends to increase the number of inputs required to evaluate a firm, raising the probability of errors. In today's information-rich environment, the ability to discern between important and irrelevant information is imperative. Analysts must consider these three critical principles in any valuation process: restrict the use of inputs to the essential ones; recognize the trade-off between incorporating more information and the associated costs and errors in estimation; understand that models are tools, the valuation of companies is performed by individuals. This problem affects partially all the methods involved in financial markets analysis, spanning from robust quantitative models to valuation techniques, mainly because of the inherently low signal-to-noise ratio in financial data. Excessive sophistication makes the models largely susceptible to noise and errors, highlighting the importance of embracing simplified assumptions and structures to effectively navigate these challenges (Damodaran, 2012)

1.1.2 Implementation contexts of valuation

Valuation is a versatile tool with broad applications across various domains, each with its own context and meaning. Its function is not the same in all contexts, and the next section outlines its use in corporate finance, acquisition analysis, and portfolio management. (Damodaran, 2012) When evaluating investment prospects, examining possible acquisitions, or making financial decisions inside a corporate structure, the use of valuation tools offers crucial information for making informed and strategic decisions.

- Valuation in Corporate finance

In corporate finance, the main aim is to maximize the overall value of the company. The decisions made by a company, such as the formulation of dividend policies or the selection of projects, across various dimensions directly influence its intrinsic value.¹ Paying attention to this cause-and-effect relationship allows for sustainable growth and an increase in the company's overall value. In this context, valuation serves to correctly understand the drivers of the company's performance and must be viewed as an attribution exercise, facilitating informed decision-making actions.

- Valuation in Acquisition process

Value assessment is a crucial component of acquisition analysis. The potential acquirer must figure out a reasonable price for the targeted company before making an offer. Similarly, the target company must determine its own fair worth before deciding whether to accept or reject the offer. First, it is crucial to consider the impact that a change in management and restructuring might have on the target firm. The strategic vision and operational direction are shaped by management, while the organizational dynamics and structure are shaped by restructuring. Understanding the impact of these possible changes allows us to manage obstacles, preserve staff morale, and make sure the adjustments enhance the company's long-term viability and performance. In addition, there is a risk of distortions in valuations, with the possibility of overestimating the value of the target firm, especially in hostile takeover scenarios, or, on the contrary,

¹ <https://corporatefinanceinstitute.com/resources/fpa/corporate-finance-industry/>

underestimating the value of the takeover by the bidding firm. Such differences in value might result in financial miscalculations, which may influence negotiations, investment choices, and general financial health. This emphasizes the importance of careful consideration and precision in valuation evaluations. The synergy between the two firms engaged in the purchase is another important factor to consider. Synergy represents the added value derived from combining the activities, expertise, and resources of the two entities. This may lead to operational efficiencies, cost savings, and a combined value greater than the sum of its individual parts. Fully understanding and accurately assessing synergy is essential to ensure that the acquisition leads to concrete benefits for both parties (Damodaran, 2012)

-Valuation in portfolio management

Investment philosophy largely influences how valuation functions in portfolio management. Passive investors, whose strategy centers around replicating market indices, assign a minimal role to valuation (Walla, 2016). Their priority lies in tracking overall market trends rather than performing in-depth analyses of individual stocks value. Active investors, on the other hand, use in-depth research and a higher focus on valuation indicators to make wise investment choices. Even within this category, various forms of investment exist, each shaping the role of valuation differently. Some cases will now be presented, acknowledging that in some scenarios, valuation assumes a pivotal role, while in others, it adopts a more peripheral function.

1. Fundamental Analysis

The valuation of a company holds a central position in fundamental analysis. The underlying philosophy is grounded in the idea that the value of a firm can be understood by examining its financial characteristics. Analysts consider factors like revenue growth, debt levels, management quality and risk assessment to estimate the true value of a company, aiming to determine whether it is overvalued or undervalued. (Graham, 1976). The essence of this long-term strategy is grounded in three fundamental assumptions: the measurability of the link between value and financial factors, this relationship's durability across time, and the correction of deviations between a company's market price and its

intrinsic value within an acceptable time span (Damodaran, 2012). In fundamental analysis, analysts might use various methods to determine the inherent value. Absolute valuation involves discounted cash flow (DCF) analysis, providing a detailed perspective on the company's future cash flows. Conversely, relative valuation relies on market multiples such as price/earnings and price/book value ratios, comparing the company to industry peers. Each approach has its advantages and drawbacks. Absolute valuation delves into long-term financial health but is sensitive to future estimates, while relative valuation offers an instant overview susceptible to market fluctuations. The choice between absolute and relative valuation depends on the analyst's preference, the availability of data, and the specific circumstances of the analysis (Horan, 2023). Analysts may also opt for a hybrid approach, combining both methods for a comprehensive understanding. Nowadays, it is crucial to acknowledge that the dynamic nature of financial markets and the evolving economic landscape introduce challenges to the traditional methods of valuation. Technological advancements, shifts in consumer behavior, and global economic trends are among the external factors that can impact a company's valuation. Moreover, the growing importance of environmental, social and governance (ESG) criteria complicates the analysis, requiring analysts to evaluate a company's long-term viability and risk through the lens of these factors. Incorporating all these evolving factors into fundamental analysis is crucial for efficiently assessing a company's valuation in an ever-changing financial landscape. Fundamental analysis is the basis of our thesis, serving as the cornerstone for all the valuations presented.

2. Franchise Buyers

Franchise buyers strategically concentrate on a limited number of businesses where they possess a profound understanding, actively seeking undervalued firms for acquisition. They avoid getting involved in complex scenarios affected by constant changes for the elevated levels of risk and uncertainty they face when making forecasts. On the contrary, an in-depth understanding is more likely to result in a precise valuation. In addition to concentrating on businesses within their expertise, franchise buyers should actively look for undervalued companies. This underscores the crucial role of valuation in their decision-making process.

3. Chartists

Chartists believe that market prices are influenced not only by financial variables but also significantly by investor psychology. This means that emotions can play a significant role in price movements (Hirshleifer, 2001). Technical analysts can gain insights into the psychology of investors and possible future price directions by utilizing data obtained from trading activities, such as price fluctuations and trading volume. Indeed, the underlying assumption guiding the work of chartists is the belief that price patterns are predictable. Valuation plays a peripheral role in this context, but chartists can still utilize it to determine support and resistance levels. As an example, a key level could be a certain fundamental value at which a security is likely to find support or face resistance. In technical analysis, the support line represents a price level below which it is believed that a security will have difficulty falling further. Many chartists identify the support line by examining historical price lows. On the contrary, the resistance line represents a price level above which it is believed that a security will have difficulty rising further. Typically, chartists identify the resistance line by looking at historical price highs. Instead of relying solely on historical price data, analysts can use valuation to obtain a range of values. This suggests that, based on the valuation, one would expect the price to move within this range (Damodaran, 2012)

Another commonly recognized method of utilizing valuation for fair price assessment within the context of chart (or technical) analysis is to use the fair price as a sort of signal to decide the best time to close a trading position. While entry signals are typically well-defined, deciding when to exit the market often lacks consensus due to subjective factors, such as trader's time horizon or risk tolerance. In these cases, the fair price can indicate when a long trade opportunity has reached its limit.

4. Information Traders

The philosophy driving this approach lies in recognizing the profound impact of information on market prices. Traders aim to grasp how new information can impact the value of assets, strategically making trades right before or shortly after this information becomes available. Traders seek to profit from good news by buying assets and, on the flip side, swiftly selling when faced with bad news. This proactive strategy is rooted in the belief that staying ahead of changes in the information landscape is vital for trading success (Damodaran, 2012). Following this theory, an individual could refrain from purchasing a company considered undervalued if they anticipate forthcoming negative

information that might decrease its market price. Likewise, they may choose to not sell overvalued stocks if they anticipate positive information that could raise the market price. In this context, valuation could be used if there is a relationship between a company's valuation and how its market price responds to new information. This approach has become more and more challenging over time because new information is incorporated at extreme speeds by the market, and simultaneously markets reaction to similar news in similar contexts has shown to not be coherent across time.

5. Market Timers

Market timers are individuals or entities that seek to predict and capitalize on market movements to generate profits. They employ various strategies and analyses to identify opportune moments for entering or exiting the market. Valuation becomes integral to market timing in two ways. First, it is possible to define the market's value and compare it to its actual state. The second approach entails valuing all stocks. If the count of undervalued stocks surpasses that of overvalued ones, it suggests a potential undervalued market, presenting a buying opportunity (Damodaran, 2012).

6. Efficient Marketeters

The philosophy of these analysts is that the best estimation of a company's actual value is reflected in its current market price. In an efficient market, prices accurately and quickly incorporate all relevant information, posing a challenge for investors to consistently attain above-average returns by capitalizing on market inefficiencies (Fama, 1970). In this context, valuation is not aimed at determining whether a stock is overvalued or undervalued, but rather at understanding why a stock has a particular price and the potential for growth and risk associated with this price. This means that in this context, a kind of reverse engineering operation is carried out: starting from the current quoted price, one attempts to retroactively understand which factors contributed to determining that price (Damodaran, 2012).

1.2 Value investing

Value Investing stands as one of the world's most renowned investment philosophies, built upon the concepts of intrinsic value and the market price of a company (Graham and Klein, 2009). The price of an investment is the amount of money required to acquire that

security in the market, while intrinsic value is the value that should be depicted, considering various aspects of the company's reality. In the realm of investments and asset management, every financial or tangible asset holds a value that serves as the linchpin for successful decision-making. It's important not only to discern this value but also to comprehend the origins of its worth. Ideologically, following this philosophy is not challenging, but the difficulty lies in understanding, through one's analyses, the true intrinsic value, given the various methods to calculate it and, therefore, a certain subjectivity in personal interpretations during the calculation phase.

The father of value investing is Benjamin Graham, also known as the dean of Wall Street. Born in London in 1894, Graham spent his childhood in New York. Following a successful academic journey, he decided to forego further pursuits in academia and turned his attention to his personal venture, the Graham – Newman Partnership, the investment company in which Warren Buffett would become a part of around 30 years later. Graham enjoyed a period of modest satisfaction until the crisis and stock market crash of 1929, a turning point that influenced the development of his own theories. Starting his teaching career at the Columbia Business School, Benjamin Graham, along with David Dodd, wrote the first book laying the groundwork for Value Investing, titled "Security Analysis". This was succeeded by "The Intelligent Investor," considered by Buffett as "the best book about investing ever written" These influential works played a pivotal role in defining and disseminating the principles of Value Investing.

The purpose of valuation is to determine the intrinsic value of an asset – what we already called the *fair price* - representing its financial valuation while considering factors such as future cash flows, related risks, and other elements. The final goal is to determine if stocks are undervalued, market price below its value or overvalued, market price above intrinsic value. Value investors view undervaluation as an opportunity to purchase a security at a discount to its estimated true value, with the possibility of profit when the market corrects, and the asset's price reflects its true intrinsic value. Conversely, overvaluation serves as a warning flag, indicating that the market has driven the price of the security higher than its true worth. In such a scenario, cautious investors would consider selling the security, expecting the market to correct lower as it realizes the overestimation (Graham, 2009)

The determination of the intrinsic value is assessed through a combination of quantitative and qualitative filters, aimed at providing a comprehensive assessment of the asset's financial value and potential risks. Various approaches will be further presented to illustrate different methods used in this determination.

However, the calculation of intrinsic value is not immune to errors since it is partly based on predictions. This is where the concept of the margin of safety becomes crucial, serving as the basis for prudent investing. As represented in Figure 1, the margin of safety acts as a buffer, suggesting the purchase of stocks at a substantial discount compared to their inherent value. In essence, the greater the difference between a stock's market price and its intrinsic value, the more robust the margin of safety. This strategic approach provides more protection against uncertainties and enhance the stock's resilience to future market downturns (Klarman, 2011).



FIGURE 1 - VALUE INVESTING MECHANISM Source:
Author's personal elaboration

At the core of value investing lies the cyclical and volatile nature of the market. In his famous work "The Intelligent Investor", Graham personifies the ongoing market movements through the metaphor of "Mr. Market," a fictional character that lacks rationality.

In the context of a \$1,000 shareholding, Mr. Market offers different valuations every day, influenced by his subjective judgment of the stock's value. While some of these assessments may align with the company's true intrinsic worth, others might be skewed by emotional factors such as irrational exuberance or pessimism. A prudent investor should not let Mr. Market's daily quotes influence their perception of a company's value unless they agree or seek to negotiate. Indeed, an investor could capitalize on

opportunities by selling when Mr. Market offers an excessively high price or buying when his valuation is low (Graham, 1973).

The irrationality behavior of the market, exemplified by the metaphorical character "Mr. Market, vividly illustrates why market prices are not always aligned with fundamental business values. This inconsistency becomes the basis for market swings, offering opportunities for value investors to capitalize on these fluctuations and optimize portfolio returns over the long term. Benefiting from the market's emotional shifts involves smartly buying from pessimistic investors and selling to hopeful ones, all while staying realistic. It's crucial to avoid blindly following the market's assigned numbers and, instead, rely on logical evaluations. A successful value investor's strategy is built on making rational decisions and resisting emotional influences in the market.

From this discussion, it becomes evident that the presupposition underlying value investing is that markets are inefficient. Value investors argue that emotional reactions, market sentiment, short-term focus, and various other factors can lead to pricing discrepancies in the market creating opportunities for investors to buy undervalued stocks and, over time, benefit from the correction of these discrepancies. Value investing often involves a long-term perspective, as it may take time for the market to recognize and correct the perceived undervaluation (Walsh, 2008). It's evident that this perspective diverges from the efficient market theory's assertion that prices reflect all available information (Fama, 1970).

1.2.1 Passive and active investor

Investors can be categorized into two types - the defensive, or passive, and the enterprising, or active (Graham, 1973).

In passive investing, the strategy aims to maximize returns while minimizing the buying and selling of securities. The defensive investor is primarily focused on safety and financial freedom, with the primary objective of avoiding losses (Walla, 2016). He follows an investment strategy focused on replicating a market index rather than actively trying to beat the market. Passive investors often use index funds, which are mutual funds or Exchange Traded Funds (ETFs) designed to mimic the performance of a specific market index, such as the S&P 500. Instead of actively selecting individual stocks, passive

investors invest in all the securities included in the index. By acquiring shares of funds that encompass a wide range of securities within a specific index, passive investors achieve portfolio diversification.

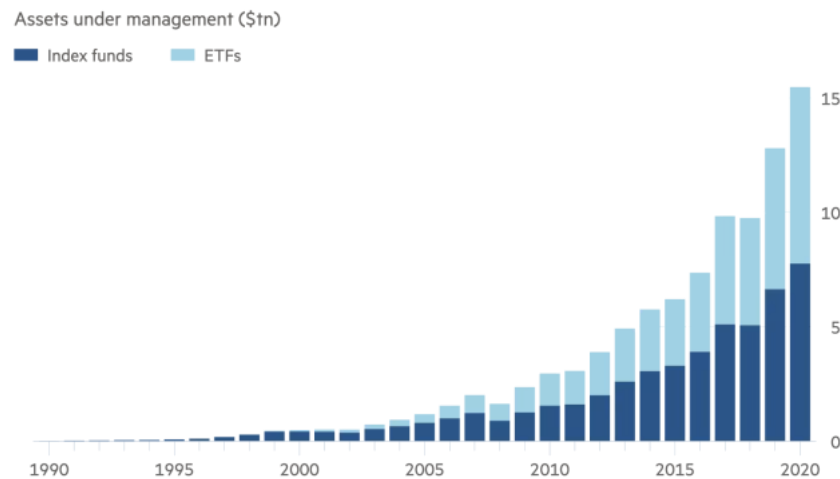


FIGURE 2: THE GROWTH OF INDEXING Source: The Financial Times (2021)

The chart above illustrates the growth of index investing over the years, affirming the rising popularity of passive investment strategies.² A common strategy is the buy and hold approach. It is a long-term investment approach in which an investor purchases financial securities and holds them in their portfolio for an extended period, ignoring short-term market fluctuations. The main goal is to benefit from the long-term growth of the value of investments over the years. This also helps to avoid commission costs. Another possible methodology for the defensive investor is dollar-cost averaging. This strategy involves making small investments at regular intervals over long periods of time. Especially in volatile markets, dollar-cost averaging helps investors avoid significant losses in the short term³. In this way, the risk of achieving an extreme positive or negative outcome is nullified. In his explanation of the passive investor, Graham recommends maintaining a combination of high-quality stocks and bonds, characterized by their notable safety and reliability.

Active investors, on the other hand, are the ones willing to dedicate time and effort to their portfolio, with the aim of achieving above-average results. This strategy demands a comprehensive grasp of financial markets, continual monitoring of economic trends,

² <https://www.ft.com/content/a2e11698-88de-4fe9-a05f-dc618fed0f23>

³ <https://www.investopedia.com/articles/basics/07/grahamprinciples.asp>

and the capacity to make prompt decisions (Walla, 2016). They frequently participate in the buying and selling of securities, dynamically adjusting their portfolio composition in response to emerging market information and refining their strategies in alignment with evolving economic and financial conditions. It's important to recognize that active investing encompasses various styles and approaches. Some active investors may focus on fundamental analysis, diving deep into a company's financials, management, and growth prospects. Others may adopt a technical analysis approach, relying on historical price patterns and trading volumes to make investment decisions. Furthermore, active investors often engage in tactical asset allocation, strategically shifting their investments across different asset classes based on their outlook for market conditions. This dynamic approach allows them to capitalize on short-term opportunities and manage risks effectively. It's worth noting that active investing requires not only a solid understanding of financial markets but also discipline and resilience, as active strategies may involve higher levels of risk and volatility. While all passive investors may somehow resemble each other, each active investor is extremely different from the other, basing their hopes and assumptions of success exactly on their distinctiveness.

1.2.2 Growth investing

By analyzing the literature on Value Investing, it can be observed that this strategy is consistently compared to the Growth Investing strategy.

In the context of Growth Investing, the approach is primarily focused on identifying companies with significant long-term growth potential with respect to other firms, instead of intrinsic value considerations typical of value investing. Growth-oriented investors seek companies that exhibit robust development prospects, typically in growing sectors or those with innovative new technologies⁴. The assessment of these companies may rely on indicators such as sales growth, market share acquisition, technological innovation, and other factors indicating potential future success. This approach necessitates a long-term perspective and a strong belief in the company's ability to capitalize on emerging growth opportunities. Growth stocks are distinguished by a higher level of risk when compared to value stocks, primarily due to their association with young or emerging

⁴ <https://corporatefinanceinstitute.com/resources/career-map/sell-side/capital-markets/a-guide-to-growth-investing/>

companies. This dynamic introduces greater uncertainty about their potential for future success, but it may also entail a potentially higher average return.

One of the main differences compared to Value Investing is that profits are not distributed to shareholders; instead, they are reinvested for capital appreciation. This approach aims to accelerate growth by financing ambitious projects, such as expansions and innovations. Opting to reinvest not only has the potential to bolster market capitalization, but also secures sustainable growth. Finally, investors in growth stocks hope that this strategy leads to a significant appreciation of stock value over the long term, offering more robust returns (Lakonishok, 2004).

Moreover, high-interest rates tend to undermine the performance of growth stocks while favoring value stocks, and vice versa. An explanation for this phenomenon may be found in the way investors evaluate the current value of future cash flows connected to each stock. When interest rates are high, the present value of future cash flows, often projected further into the future for growth stocks, is discounted at a higher rate. This diminishes the current attractiveness of growth stocks, which frequently promise substantial profits in the more distant future. In periods of high-interest rates, the higher cost of borrowing and opportunity cost drive investors toward safer investment options, such as value stocks. On the other hand, growth stocks may become more attracting during low-interest rate periods due to lower borrowing costs and lower opportunity costs associated with less hazardous options. Moreover, highly innovative companies leading in research and development frequently depend extensively on debt financing. This reliance may stem from both funding needs to support their innovative activities and tax motivations, as interest expenses can be deducted from total taxable income. Higher interest rates, therefore, tend to disproportionately affect - even on the debt side - this kind of companies.

Two common cases where growth investing is applied are the following:

- Small-caps stocks: stocks from small companies listed on the stock market, characterized by a modest market capitalization. Investing in small-cap stocks provides an opportunity to potentially capitalize on the growth prospects of emerging businesses, although it requires a keen awareness of the associated volatility and risk factors.

- Technology and healthcare stocks: These refer to companies that introduce new methods or technologies not yet available in the market, offering considerable opportunities for growth and the potential for rewarding investments. However, it's imperative that investors handle these markets with a thorough awareness of the sectors' dynamic nature and regulatory effects.

1.3 Valuation approaches

Analysts use a wide range of models in practice, ranging from the simple to the sophisticated. In general terms, there are two approaches to valuation. In absolute analysis, the primary goal is to determine the value of an asset by looking at its expected future cash flows and calculating their present value. On the other hand, relative valuation involves assessing the value of an asset in relation to comparable assets. This method relies on metrics like earnings multiples, cash flow ratios, or sales multiples to determine the relative value of the asset. Both methods play crucial roles in financial analysis, providing complementary perspectives that contribute to a comprehensive understanding of an asset's value in the market (Horan, 2023). This section will examine both approaches.

1.3.1 Absolute valuation

Absolute valuation aims to reveal the inherent value of a company, investment, or project by relying on financial metrics. The Discounted Cash Flow (DCF) method emerges as a crucial instrument in absolute valuation, highlighting the significance of future cash flows in grasping the potential financial performance of a company and facilitating decisions pertaining to profitability and long-term value. The present value principle, which states that an asset's worth is the present value of its projected future cash flows, is the basis of this valuation methodology (Damodaran, 2012).

$$\text{Value} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t}$$

t = time

CF = cash flow in period t

r = discount rate

Cash flow represents the inflow and outflow of money during a specific period and can take various forms. In the case of stocks, it is commonly represented through dividends, while for bonds, it typically takes the form of coupons and face value. Based on the "time value of money," according to which an amount tomorrow has a different value than it does today, the cash flows are discounted by a discount rate. This last one reflects the required return or cost of capital, and it increases in proportion to the associated investment risk. Risk varies across different assets, ranging from default-free zero-coupon bonds, which are considered less risky, to equities, which are characterized by higher risk. DCF can be considered one of the most widely used methods by analysts, but it involves some subjective evaluations. In fact, to implement the method, it will be necessary to estimate future cash flows and the correct discount rate to transform these values into a figure that indicates the company's valuation at the time of analysis.

1.3.1.1 Approaches to Discounted Cash Flow

There are different types of DCF models, each sharing the fundamental concept, but differing in only a few specific dimensions that will now be presented (Damodaran, 2012). The choice of a model relies on the specific characteristics of the situation at hand.

- Equity Valuation and Company Valuation

A distinction between the models is represented by Equity Valuation, which focuses on equity claims, and Firm Valuation, which considers the entire company.

Equity Valuation primarily concentrates on determining the value of the equity part, placing shareholder interests at the forefront. In equity valuation, cash flows typically refer to Free Cash Flow to Equity (FCFE), which are the funds available for shareholders after debt payments and reinvestments. The applied discount rate, instead, represents the expected return from equity investors, reflecting the cost of equity capital.

$$\text{Value of equity} = \sum_{t=1}^{t=n} \frac{\text{CF to equity}_t}{(1 + k_e)^t}$$

The Dividend Discount Model (DDM) is an alternative to the typical Free Cash Flow to Equity (FCFE) method for equity valuation⁵. The equity value in this model is calculated

⁵ <https://www.investopedia.com/terms/f/freecashflowtoequity.asp>

by adding the present value of the estimated future dividends, which are the model's source of cash flow.

On the other hand, company Valuation provides a holistic understanding of the company's overall worth, considering the interests of all claimholders in the valuation process. This approach acknowledges the diverse sources of financing and their respective claims on the company's value. The cash flows considered are derived from the company's assets, occurring before debt payments but after reinvestments. In this context, the used discount rate considers the average cost of a company's capital, considering both debt and equity to accurately represent the interests of all financiers.

$$\text{Value of firm} = \sum_{t=1}^{t=n} \frac{\text{CF to firm}_t}{(1 + \text{WACC})^t}$$

Typically, equity and firm valuation should provide the same results unless there is a mismatch between the cash flows and discount rates employed. If equity valuation employs the Weighted Average Cost of Capital (WACC) as the discount rate, it may lead to an overestimation compared to the true value. Conversely, if firm valuation uses only the cost of equity as the discount rate, it may result in an undervaluation. Ensuring alignment between the appropriate cash flows and corresponding discount rates is crucial for accurate valuation assessments.

- Cost of Capital versus APV Approaches

A company can raise capital through both debt and equity. While debt financing provides the advantage of tax deductibility, it also exposes the firm to increased risk of potential difficulties in repaying debt. The overall impact can be either positive or negative

The cost of capital, mentioned previously in the Firm valuation, incorporates the tax benefit resulting from debt. However, it's important to note that pre-debt cash flows do not explicitly reflect this advantage (Mauboussin and Callahan, 2023). This deliberate omission helps prevent the potential error of double-counting tax benefits that arise from the use of debt.

Another method used is the Adjusted Present Value (APV), which decomposes the company's value into two primary components to separately address the two effects of

debt financing previously mentioned. This entails initially valuing the business as if it were unlevered and summing the net effects of debt financing.

$$\text{APV} = \text{PV of Unlevered firm} + \text{PV of expected tax benefits of debt} - \text{Expected bankruptcy costs}$$

In contrast to the cost of capital, the Adjusted Present Value (APV) approach aims to explicitly reveal the financial effects of debt. It achieves this by distinguishing between the company's intrinsic value when it is debt-free and the increased value that is ascribed to the tax advantages that come with debt. This divergence allows the APV technique to provide a more precise insight of the impact of debt on the overall value of the company. However, it's essential to note that, under the assumption of accurate inputs, both approaches ultimately provide the same result. The divergence in methodologies lies in the path taken to arrive at this result - while the cost of capital approach adjusts the discount rate to incorporate the tax benefits, the APV method separates the components of value to account for the effects of debt financing individually. Despite these distinct approaches, their convergence toward the same valuation result shows how reliable and consistent the valuation process is when applied correctly (Damodaran, 2012).

- Total Cash Flow and Excess Return Model

The distinction between the Total Cash Flow Model and the Excess Return Model lies in their methodologies for managing cash flows.

The Total Cash Flow Model performs an extensive evaluation by accounting for all the cash flows that an asset produces. This method considers cash flows from a range of sources, such as finance, investments, and operating operations. These cash flows are then carefully discounted to determine their present worth.

On the other hand, Excess Cash Flow is a more specific term related to the surplus cash flow available after covering the required return. The concept behind this model is that the remaining cash represents the value created by the investment. To determine the value of the asset, the present value of excess return is then added to the capital invested in the asset.

Here again, while both approaches produce the same outcomes, they direct attention to different elements. The Excess Return Model underscores a crucial perspective: not all profits add value; what really improves an investment's value proposition is the excess return (Damodaran, 2012). By focusing on this surplus, the Excess Return Model provides a nuanced assessment of financial flexibility, offering insights crucial for investors and decision-makers. This distinction becomes particularly relevant when lenders want to ensure that there will be sufficient cash flow to pay off debt and still have money left over for other strategic goals.

1.3.1.2 Limitations

As previously explained the estimation of cash flows and discount rates in DCF introduces a degree of inherent error. In stable companies with well-defined assets generating easily predictable cash flows, the valuation can be considered relatively straightforward. The true complexity in valuation arises when attempting to use DCF in companies that deviate from the idealized model, as it may result in an inaccurate assessment (Armstrong, 2001). In these cases, its implementation faces some challenges and may require adaptation. Later, some of the principal cases will be discussed. It is imperative for practitioners to recognize these limitations to guarantee a fair and well-informed use of DCF in financial assessments.

- Distressed companies

Estimating the value of companies in financial troubles within the Discounted Cash Flow (DCF) framework poses significant challenges. The inherent uncertainty surrounding their survival introduces complexities in accurately predicting the timing and magnitude of potential positive cash flows. Additionally, determining an appropriate discount rate becomes precarious due to the heightened risk associated with distressed companies. It is inevitable to arrive at a negative equity or company value when attempting to find the present value of negative cash flows. Given its primary reliance on positive cash flow estimates, the conventional DCF technique becomes less appropriate in such scenarios. (Damodaran, 2012). This limitation highlights the need for alternative valuation methods or adjustments that can appropriately capture the unique dynamics and financial difficulties of distressed companies.

-Firms with unutilized assets and licenses

The discounted cash flow reflects the value of all assets in the company. Unused or underutilized assets imply that potential revenue streams from those assets are not fully considered, leading to a possible undervaluation of future cash flows and, consequently, an underestimation of the overall value of the company. In these cases, analysts are advised to consider valuing these assets at full utilization or assessing them based on external market values. By adding the value of these assets with the one derived from the DCF analysis of other assets, it is possible to obtain a more accurate worth representation of the company (Damodaran, 2012).

A similar situation arises with companies possessing unused patents, which, despite not generating immediate or future cash flow, hold inherent value that must be considered. The solution to address this challenge aligns with the previously described approach for underutilized assets.

- Private Firms

Private companies may not be required to disclose the same amount of information as public companies. The main difficulty is determining a discount rate that appropriately accounts for the investment's risk (Damodaran, 2012). For private companies, determining an appropriate discount rate is more complex due to the absence of market data, making the precise assessment of risk challenging. The solution is to examine comparable publicly traded companies.

- Firms in the restructuring or acquisition process

Restructuring a company involves altering its operations, finances, and strategies, making the estimation of future cash flows more complex and increasing the overall risk for the company. It is still possible to complete the DCF, even if it is more difficult, by including the impact of the new modifications into the updated valuation. This necessitates closely monitoring the changes and thoroughly analyzing them.

A comparable scenario arises in the valuation of a firm for acquisition. During the evaluation, it is crucial to consider both the potential synergy between the acquiring and acquired firms, if any, and the impact of changing management. In this context, like companies that are restructuring, the effects of both factors need to be carefully examined

and included in the DCF process to properly evaluate the target company. (Damodaran, 2012)

1.3.2 Relative valuation

Relative valuation involves evaluating a company by comparing its financial metrics to those of similar companies in the same industry. (Sharma and Prashar, 2013). A common variable, such as earnings or book value, is used to standardize this comparison. A detailed analysis of the most used multiples in relative valuation, the Price-to-Earnings ratio, Price-to-Book Value ratio, and Revenue multiples, will be provided in the next chapter. To better understand the concept of relative valuation, let's consider an example in the real estate sector. Imagine that you need to assess the cost of House A in the neighborhood. In this case, you search for comparable houses (House B, C, and D) and examine features such as size, number of bedrooms, and bathrooms to grasp the value of House A. Analyzing recent sales prices of comparable properties provides a valuable tool for assessing the value of House A. Similarly, the evaluation of a company's worth can be assessed by comparing the performance of similar companies.

Relative valuation operates on the assumption that the market is on average efficient, but it can misprice individual stocks (Damodaran, 2012). As previously mentioned, comparisons based on multiples are used to correct these errors over time. Both absolute and relative valuations assume that over time errors will be corrected. The average efficiency assumption ensures that any mispricing of individual stocks is expected to be resolved over time, providing a return to the investor who recognized the opportunity. However, relative valuation, centered on wide market comparisons, offers a more immediate detection of errors, and enables a quicker correction compared to the absolute one. Let's explore an example to better understand how people reason under both approaches. A relative valuation analyst might contend that a high-tech company is undervalued based on market trends if it is selling at a P/E ratio of 15 while the sector average is 30. This deviation is expected to be promptly recognized and corrected. On the other hand, an absolute valuation analyst might argue that this affirmation is inaccurate, as there could be an overestimation of the market. A discounted cash flow analysis is required to precisely evaluate the company and find its intrinsic value. While relative valuation offers a broad analysis, absolute valuation can deepen the understanding of a company's characteristics, thus contributing to a more informed assessment. The

combined use of both approaches can provide investors with a more comprehensive and balanced perspective.

1.3.2.1 Approaches to Relative Valuation

Relative valuation can be approached in various ways. Some methods compare multiples across different companies, while others compare actual multiples to the past ones. Another distinction lies in the choice between using multiples or fundamentals.

- Cross-sectional versus past-present comparisons

Cross-sectional analysis involves comparing the financial metrics of a particular asset to those of its industry competitors. However, to be consistent, this method necessitates assumptions. If the valuation of our company, determined by a specific multiple, is lower than the one of our competitors, it implies that our company may be undervalued. Conversely, if the valuation is higher, that company is probably overvalued. This affirmation is valid if, for example, competitors' numbers are in line with the market. However, it's important to note that this analysis is subject to short-term market swings as well as shifts in the industry or the company's fundamentals over time (Damodaran, 2012).

On the other hand, past-present comparisons involve comparing the current multiples of an asset to the one of past time periods. This approach can be applied to established businesses, but not to young companies. Here, again, it is crucial to make assumptions for comparability: the fundamentals of the firm must remain unchanged over time. If there have been changes in the fundamentals, the comparison loses its consistency, as can significantly impact valuation metrics, leading to inaccurate assessments. To gain a clearer understanding of this concept, let's consider a hypothetical scenario with a company that has consistently produced positive and steady profits over time, resulting in a favorable Price-to-Earnings (P/E) ratio. However, increased competition and a change in consumer preferences negatively affect earnings over time. Since lower earnings lead to a higher P/E ratio, if the change in fundamentals was not considered, the company's historical valuation would indicate overvaluation. Analysts' assessments of the company's value would be erroneous if they only consider the past P/E without considering the company's drop in profitability. This example shows how changes in the

company's fundamentals can affect its value measurements and possibly cause misinterpretations if they are not carefully considered.

- Comparables and Fundamentals

Two common methods that can be used in relative valuation are "comparables " and "fundamentals" (Dema et al., 2012).

The most used approach in relative valuation is to assess a company's value by comparing the multiples of one firm to the ones of similar companies. These two topics will be analyzed in the next paragraph. Moreover, as we will see, this topic requires a certain prudence, and assumptions to avoid a misleading outcome.

In another alternative approach, the focus is on establishing a direct connection between valuation multiples and the fundamental aspects of the firm itself, rather than comparing them to other companies. These fundamentals are evaluated using the methodology of Discounted Cash Flow (DCF). Unlike DCF, this approach provides a direct understanding of how multiples respond to changes in the firm's underlying financial factors. For instance, if the assessment predicts a decrease in profit growth, the Price to Earnings (P/E) ratio might decline as investors may become less inclined to pay a premium based on prospects. Although this approach does not provide a final number indicating overvaluation or undervaluation of the company, it offers precious information about the dynamics of the business.

1.3.2.2 Limitations

Relative valuation is commonly employed for its simplicity and ease of applicability, but it comes with certain limitations. Firstly, this approach is not recommended when there is a small number of comparable firms, as it could limit comparability and the reliability of relative valuations. In addition, the use of multiples may not be meaningful for firms in early stages or with negative financial performance. In these cases, it might be more prudent to consider alternative valuation approaches to ensure a more accurate and comprehensive assessment.

Second, multiples in relative valuation can be prone to misuse and manipulation as analysts may selectively pick comparable firms that confirm their preconceived idea. This can distort the valuation, creating a false confirmation of their own opinions. Moreover,

there's another risk when using multiples in cross-sectional comparison. As previously explained, the inherent assumption in relative valuation is that the market is generally efficient, but individual stocks within it may be mispriced. This implies that the comparison between firms using multiples leaves room for imprecision, as the comparable firms themselves might be either overvalued or undervalued. For an accurate and fair assessment, it's crucial to recognize biases, implement transparent valuation procedures, and approach the multiples of other comparable firms with a skeptical eye, considering the possibility that they may be either overvalued or undervalued (Damodaran, 2012)

1.4 Financial Statements overview

The analytical robustness of value investing is rooted in the meticulous scrutiny of financial statements. In this paragraph, a comprehensive understanding of these financial documents is undertaken, recognizing them as indispensable tools for delving into fundamental aspects of a company's valuation. The focal points of attention include assets, the financial structure, profitability, and risk. This careful examination is essential for gaining a thorough insight into a company's valuation, allowing effective decision-making. The analysis of these topics is based on three fundamental financial statements, namely the balance sheet, income statement, and cash flows, with each assuming a fundamental role in understanding a company's financial health. The balance sheet, shown in Figure 3 provides an overview of a company's assets and financing composition (debt and equity), offering a consolidated view of its financial position. On the other hand, the income statement, as depicted in Figure 4, gives details about the profitability, outlining revenues, expenses, and the resulting net income over a designated period (quarterly or annually). Finally, the cash flow statement, shown in Figure 5, sheds light on the flow of cash from operating, investing, and financing activities during a given period. Essentially, it strives to elucidate the nature of cash flows and the reasons behind any alterations in the cash balance throughout that period.

Assets		Liabilities	
Long-lived real assets	Fixed Assets	Current Liabilities	Short-term liabilities of firm
Short-lived assets	Current Assets	Debt	Debt obligations of firm
Investments in securities and assets of other firms	Financial Investments	Other Liabilities	Other long-term obligations
Assets that are not physical, like patents and trademarks	Intangible Assets	Equity	Equity investment in firm

FIGURE 3 - THE BALANCE SHEET Source: A. Damodaran, "Investment Valuation" (2012)

Gross revenues from sale of products or services	Revenues
Expenses associated with generating revenues	- Operating Expenses
Operating income for the period	= Operating Income
Expenses associated with borrowing and other financing	- Financial Expenses
Taxes due on taxable income	- Taxes
Earnings to common and preferred equity for current period	= Net Income before Extraordinary Items
Profits or losses not associated with operations	- (+) Extraordinary Losses (Profits)
Profits or losses associated with changes in accounting rules	- Income Changes Associated with Accounting Changes
Dividends paid to preferred stockholders	- Preferred Dividends
	= Net Income to Common Stockholders

FIGURE 4 - THE INCOME STATEMENT Source: A. Damodaran, "Investment Valuation" (2012)

Net cash flow from operations, after taxes and interest expenses	Cash Flows from Operations
Net cash flow from divestiture and acquisition of real assets (capital expenditures) and disposal and purchase of financial assets; also includes acquisitions of other firms	+ Cash Flows from Investing
Net cash flow from the issue and repurchase of equity, from the issue and repayment of debt, and after dividend payments	+ Cash Flows from Financing
	= Net Change in Cash Balance

FIGURE 5: THE CASH FLOW Source: A. Damodaran, "Investment Valuation" (2012)

1.4.1 Assets

The primary focus is on the domain of assets, whose analysis and comprehension are indispensable for company valuation. Assets, representing the various resources a company owns, are fundamental as they define its wealth and directly impact its ability to generate long-term value (Subramanyam, 2014). By analyzing asset information within the balance sheet, investors can determine if a company is overvalued or undervalued, obtaining a comprehensive understanding of the asset structure that facilitates the identification of opportunities and the formulation of informed decisions. In accounting, an asset refers to a valuable resource under the ownership or control of a company with the power to generate future benefits. Accounting standards usually require assets to be recorded on the balance sheet at its historical cost, representing the initial expenditure made to acquire the asset. Certain assets may incur adjustments over time, such as impairment charges, depreciation, or amortization, to reflect changes in their value. This ensures that the company's assets and the changing situations surrounding them are appropriately reflected in the financial records.

These assets take different forms, broadly categorized as long-term and short-term, financial, and non-financial, tangible, and intangible. Long-term assets, like real estate, contribute to sustained growth, while short-term assets, such as raw material or inventory, offer liquidity and flexibility. Another distinct category worthy of consideration is the one of financial assets, which includes tradable instruments like stocks and bonds. Finally, there is the category of intangible assets, exemplified by intellectual property. This diversity not only reveals the company's physical possessions but also shows the richness and variety within its overall portfolio. Consequently, accounting standards may vary depending on the nature of the asset, but it is possible to identify certain principles which are usually applied regardless of the asset type. First, book value is the most widely accepted assessment of an asset's value, with historical cost being the best estimate unless there is strong evidence to the contrary. Second, market value and estimation of it are viewed with skepticism in accounting practices, as they can easily be manipulated and are subject to high volatility. This cautious approach reflects concerns regarding the accuracy of these values in expressing an asset's true value in financial statements. Finally, when there are several options, using lower valuations is preferred (Wahlen et al., 2018).

1.4.2 Debt and Equity

Within the balance sheet, a critical area of focus for investor-relevant information revolves around the composition of financing, encompassing both debt and equity. This data is typically contained within the liabilities section of the balance sheet. Like the treatment of assets, this section is subject to strict accounting principles that are applied for the liability's valuation. Initially, accountants must decide whether to classify the figures as liabilities or equity. Liabilities represent the financial commitments that a company holds towards external parties or entities, delineating the economic obligations that need fulfillment. Current liabilities encompass obligations that a company is required to fulfill within one year, such as accounts payables, short-term borrowings or a part long-term borrowing. On the other hand, non-current liabilities are obligations with maturities extending beyond one year, such as long-term loans from a bank or long-term bonds issued by the company to investors. (Wahlen et al., 2018)

Shifting focus to the equity section, it pertains to the capital provided by the company's investors. Equity can be categorized into equity capital, which includes preferred stock, common stock, and treasury stock, as well as retained earnings.

Each individual figure requires careful examination, rooted in accounting principles, to achieve accurate valuation. While an in-depth exploration of the accounting principles for each figure is beyond the scope of this thesis, it's important to highlight a widespread practice: like the treatment of assets, values are typically recorded using historical prices with adjustments, rather than relying on estimations or market values.

1.4.3 Firm's Profitability

Financial statements are essential for evaluating a company's profitability and the returns on its invested assets, with the income statement being a key tool employed by accountants. This financial document provides insights into a company's operating activities during a specified period, facilitating an understanding of its overall financial performance. Fundamental analysis delves into the underlying principles of measuring earnings and returns in accounting, revealing how these principles are practically applied to assess a firm's success and efficiency in resource utilization. According to Damodaran (2012), two core principles guide this measurement. The first one revolves around accrual accounting, where revenue generated from the sale of a product or service is

acknowledged in the specific period when the transaction occurs, whether it be the completion of the service or the sale of the good, either entirely or substantially. The second principle involves the classification of expenses into three separate categories: capital, financing, and operating expenses. This classification offers an organized framework for comprehending and evaluating the different kinds of expenses related to a firm. Operating expenses cover the day-to-day operational aspects of a business, involving expenses such as salaries or materials used. These costs are integral to the continuous functioning of the company and are directly linked to revenue generation. Financing expenses arise from non-equity funding for a business, typically exemplified by interest payments from borrowed funds. They refer to the monetary expenditures related to capital structure management of a company. Lastly, capital expenses are costs associated with long-term investments in assets, like equipment or property. Although these expenditures do not immediately impact the income statement, they are capitalized and gradually depreciated over time, playing a role in shaping the company's long-term profitability. As previously shown in Figure 4, operating income can be derived by subtracting operating expenses from revenues. To estimate net income, financing expenses are then deducted from operating earnings. Capital expenditures are systematically expensed over their useful lives through depreciation or amortization. The income statement offers stakeholders a snapshot of the firm's profitability in absolute terms. Evaluating the firm's profitability in terms of percentage returns is equally essential for gaining a comprehensive understanding of its financial performance, providing investors with additional valuable insights. The first profitability ratio that will be presented is the ROA (return of assets), which assesses the company ability to generate earnings through the efficient utilization of its assets.

$$\text{ROA} = \text{EBIT} (1 - \text{Tax}) / \text{Total Assets}$$

A high ROA denotes an effective use of assets in income creation, while a lower ROA raises the possibility of inefficiencies. Utilizing operating income (EBIT - Earnings Before Interest and Taxes) instead of net income presents a more nuanced measure of Return on Assets (ROA), offering a clearer picture of the true return on the company's assets. (Damodaran, 2016) This approach ensures that financing operations are excluded, providing a more accurate assessment of the company's operational efficiency in generating returns from its assets.

However, Return on Invested Capital (ROIC) is regarded as a more accurate metric for assessing returns as it considers the entire capital employed by the firm, encompassing both debt and equity. ROIC offers a more precise measure by establishing a relationship between operating income and the total capital invested in the company. In this context, capital is defined as the combined book value of debt and equity, adjusted for cash holdings.

$$\text{ROIC} = \text{EBIT} (1 - \text{Tax}) / \text{Total Invested Capital}$$

Moreover, the ROIC can be compared to the cost of capital, which represents the rate of return that a company must achieve on its investments to satisfy its investors, both debt and equity holders. If the ROIC is higher than the cost of capital, it indicates that the company is generating returns exceeding the investors' expectations. This is generally seen as a positive sign, suggesting that the company is creating value. On the other hand, if the ROIC is lower than the cost of capital, it suggests that the company is not yielding adequate returns to compensate investors for the associated risks. This misalignment raises concerns about the efficacy and profitability of the company's investments (Damodaran, 2012).

Another common profitability ratio is The Return on Equity (ROE), calculated by dividing the net income, which accounts for taxes and interest expenses, by the book value of common equity.

$$\text{ROE} = \text{Net Income} / \text{Shareholders' equity}$$

ROE holds particular significance for equity investors as it provides the percentage return they obtain on their investment. Like ROA and ROIC, a high ROE typically indicates that shareholders equity is being used effectively to create profits, which improves the financial success of the business. On the other hand, a lower ROE can raise questions about the company's capacity to maximize returns for its stockholders.

1.4.4 Risk

A crucial element in the valuation of a company entails conducting a thorough evaluation of risk, a dimension frequently lacking systematic categorization in financial statements. This paragraph will investigate how accountants assess this aspect, recognizing its fundamental significance. Before delving into accounting measures of risk, it is essential

to address two important topics. First, when assessing risk through accounting documents, particular attention is put on default risk. This entails measuring the uncertainty surrounding a company's ability to meet its fixed financial obligations, such as interest payments or loan repayments. In practical terms, the analysis centers on evaluating the likelihood of the company failing to meet payments associated with loans or bonds. Nevertheless, there is a more comprehensive aspect of risk that is not considered by conventional financial statements and ratios, which goes beyond the narrower focus on default risk. This general risk encompasses the unpredictability or fluctuation in a company's earnings compared to the predicted ones. It assumes particular significance for creditors and investors as it goes beyond the mere ability to meet specific financial obligations. Instead, it explores the broader realm of assessing the overall predictability and financial health of an enterprise, bringing to light potential challenges in sustaining a consistently stable financial performance. This comprehensive perspective offers valuable insights for stakeholders, allowing them to assess not only the company's ability to meet current financial obligations but also its long-term strength and ability in managing potential financial uncertainties. Second, accounting risk assessments often provide a static perspective, evaluating a company's capacity at a specific moment to fulfill its commitments. This method captures a snapshot of the firm's financial standing at a given time, ignoring potential long-term developments. Although useful, this static approach may restrict a thorough understanding of company risk as it ignores dynamic factors and evolution over time.

There are two main categories of accounting risk measures. The first one involves disclosures made in footnotes on balance sheets, specifically addressing potential obligations or losses in values. Essentially, they provide additional information beyond the numerical values presented in the balance sheet, offering insights into potential risks that could impact the company's financial well-being. In recent years, there's an increasing call for companies to be more transparent. An example of this is seen in contingent liabilities, representing potential financial obligations dependent on specific circumstances. This demand for transparency has intensified due to recent significant losses incurred by companies, emphasizing the need for clearer disclosure and calculation. The second category consists of ratios that help investors to evaluate liquidity and default risk. This diverse range of measures provides a comprehensive method to grasp the financial well-being of a company and identify the potential risks it may

encounter. Now, attention will be directed towards examining financial ratios explicitly crafted to assess the inherent financial risk within a company (Damodaran, 2012).

In the preceding paragraph, an overview was presented on profitability ratios, with a focus on metrics like ROE and ROIC. Now, attention will be directed towards the financial ratio frequently used to evaluate the risk a company is exposed to.

The initial focus will be on ratios pertaining to short-term liquidity risk, integral for safeguarding a company's everyday financial stability. This analysis is fundamental as it directly influences the company's capacity to fulfill short-term obligations such as creditor payments, supplier settlements, and other urgent financial commitments. (Subramanyam, 2014). The two ratios under consideration are:

- Current ratio: it is a financial measure designed to assess a company's ability to cover its short-term liabilities using its short-term assets.

$$\text{Current ratio} = \text{Current assets} / \text{Current liabilities}$$

These short-term assets usually consist of cash, inventory, and accounts receivable; on the other hand, the current liabilities include obligations such as short-term debts and accounts payable. A current ratio greater than 1 indicates that the company holds more short-term assets than obligations, suggesting a potentially strong short-term financial position. However, an excessively high current ratio could indicate that the business's resources are not being used at their full potential. It's crucial to note that the interpretation of the current ratio can vary among industries, making it imperative to consider industry benchmarks when evaluating the financial health of a particular company.

- Acid test: also known as Quick Ratio, it is a financial measure designed to assess a company's ability to cover its short-term obligations using its most easily convertible assets.

$$\text{Acid test} = (\text{Current Assets} - \text{Inventory}) / \text{Current liabilities}$$

The acid-test ratio provides insight into a company's immediate liquidity position and its ability to cover short-term obligations without relying on the sale of inventory. This exclusion ensures a focus on the assets that can be quickly

converted into cash, providing a more precise evaluation of a company's immediate liquidity position.

- Turnover ratios: this set of financial metrics measure how well a business turns its assets and liabilities into revenue or cash flow. These ratios encompass various dimensions, including inventory turnover, accounts receivable turnover, and asset turnover. For instance, inventory turnover carefully analyzes how quickly a business sells and restocks its stock, offering a measure of inventory management efficiency. The accounts receivable turnover, on the other hand, measures the efficiency of payment collection from customers. Asset turnover evaluates the efficiency with which the business uses its resources to produce revenue. These indicators help stakeholders understand how well a business uses its resources to generate income by providing insightful information about operational efficiency. A detailed examination of turnover ratios helps in understanding areas of improvement and opportunities, thereby improving the overall financial performance of a company.

On the flip side, attention can be directed towards ratios that delve into long-term solvency, providing a comprehensive perspective on a company's ability to meet its long-term financial obligations (Subramanyam, 2014). These ratios provide information on the capital structure and debt management capabilities of the company.

- Interest coverage ratio: it is a financial measure designed to evaluate a company's capacity to pay interest on outstanding debt.

$$\text{Interest coverage ratio} = \text{EBIT} / \text{Interest expenses}$$

A greater interest coverage ratio suggests that the business makes enough money to comfortably pay for its interest costs. On the other hand, a lower ratio can indicate possible difficulties paying interest. This ratio is frequently used by creditors and investors to evaluate the risk of a company's debt and its long-term ability to pay off its debt.

- Debt ratios: Unlike interest coverage ratios, which focus solely on interest obligations, debt ratios offer a more holistic view of the company's financial structure and leverage. These ratios go beyond interest payments and strive to

evaluate the company's capacity to repay the principal amount on its outstanding debt. This assessment is carried out by establishing a relationship between the company's debt and either its total capital or equity, depending on the specific ratio used.

$$\text{Debt to capital ratio} = \text{Debt} / (\text{Debt} + \text{Equity})$$

$$\text{Debt to equity ratio} = \text{Debt} / \text{Equity}$$

The first provides information on how much funding comes from debt compared to the overall amount of capital used. A higher debt-to-capital ratio might be an indication of increased financial risk because it implies a greater reliance on debt for funding. The second one provides a measure of financial leverage, indicating how much debt is used to fund the company relative to its equity base. A higher debt to equity ratio may suggest higher financial risk, as it indicates a larger portion of financing coming from debt rather than equity. This thorough understanding is beneficial to stakeholders because it facilitates the assessment of the company's long-term financial risk and its capacity to efficiently handle principal and interest repayments.

Chapter 2 - The Relative Valuation

In the first chapter, two distinct strategies for assessing a company's value were briefly mentioned, along with a brief explanation of their mechanisms. Starting with previously introduced topics, the primary objective of relative valuation is to assess the value of assets by comparing them with similar entities, also called peers or comparables (Dema et al., 2009). Relative valuation involves two main aspects. Firstly, when assessing the value of assets in a relative context, it is essential to standardize prices. This typically involves converting prices into multiples of earnings, book values, or sales. Secondly, the challenge lies in identifying comparable firms. Given the inherent differences among businesses, finding truly similar firms can be complex. Even within the same industry, variations in risk, growth prospects, and cash flows exist. Consequently, determining how to appropriately account for these differences becomes a critical consideration when comparing pricing across multiple firms.

The broad acceptance of relative valuation can be attributed to various factors. First, by relying on multiples and similar firms, the relative valuation minimizes the need for elaborate and explicit assumptions, accelerating the valuation process. Unlike the intricate nature of absolute valuation, which involves forecasting future cash flows and selecting an appropriate discount rate, relative valuation allows for a more straightforward analysis. This efficiency not only accelerates the assessment process but also enhances accessibility, positioning it as the favored choice for those seeking a rapid yet insightful valuation methodology. At the same time, given less need to impose assumptions and estimate some of the input variables, this methodology is by far less arbitrary than Discounted Cash Flow method. However, this also implies a lower degree of flexibility. Relative valuation also stands out for its ease of understanding and communication, especially when compared to the complexities of discounted cash flow valuation. This communication simplicity is especially valuable when conveying financial concepts to a non-specialized audience. Moreover, relative valuation, as opposed to intrinsic valuation, is also a dynamic approach that mirrors the prevailing market sentiment. Rather than fixating on determining the inherent value of an asset, it focuses on assessing the relative value. Because of its inherent responsiveness, it is a very useful instrument for analysts and investors who are trying to align their assessments with the real-time movements of the market. This provides a comprehension that goes beyond the intrinsic value calculations offered by discounted cash flow methods. Suppose for example that there is

a period of notable interest and price variations in the automotive sector. During this phase, the stocks of traditional companies in this industry attract investor attention. By considering, for example, the price-to-earnings (P/E) ratio of these traditional automotive companies in comparison to their competitors, relative valuation immediately reflects the growing investor interest, potentially indicating higher valuations. On the other hand, absolute valuation based on discounted cash flow may not promptly reflect this changing scenario. As DCF relies on long-term forecasts and a discount rate that may not immediately account for the new market enthusiasm, it might underestimate the current value of these traditional automotive stocks. This implies that these stocks might be traded at a price that exceeds their intrinsic value, solely due to the prevailing momentum in the market. In this example, relative valuation proves to be a more responsive tool to rapidly changing market dynamics, allowing investors to capture market enthusiasm more promptly than absolute valuation (Damodaran, 2012).

The advantages of relative valuation are accompanied by inherent drawbacks, some of which have been mentioned in the preceding chapter. Firstly, the simplicity of assembling a relative valuation by combining a multiple with a set of comparable firms may lead to inconsistent value estimates, as crucial factors like risk, growth, or cash flow potential might be overlooked. Secondly, the increased sensitivity to market view could become a weakness instead of a strength: since multiples reflect market sentiment, employing relative valuation to assess an asset's value can yield values that are excessively high during periods of overvaluation in comparable firms or overly low during undervaluation phases. Thirdly, the lack of transparency in underlying assumptions makes relative valuations particularly susceptible to manipulation. However, it's worth noting that this issue is partially shared with discounted cash flow-based methods. Analysts may exhibit bias since they have the discretion to choose the foundational multiple for valuation and select comparable firms. This gives them the ability to justify nearly any desired value through strategic decision-making. In other words, relative valuation from being a tool to investigate and assess market opportunities may become just a stratagem to construct an ex-post narrative to justify already made and biased decisions.

2.1 Standardization

The price of a stock is determined by dividing the total value of a company's equity by the total number of shares outstanding. Since each company may have a different amount

of equity and a different number of shares outstanding, their stock prices will be inherently different. For instance, the stock prices of two firms may change even though they have the same total equity value due to differences in the number of outstanding shares. Therefore, drawing judgments about the relative valuation or financial position of companies based solely on a comparison of stock prices without taking other aspects into account may be inaccurate.

To avoid misleading conclusions, investors often focus on metrics such as financial multiples, which allow them to standardize values (Sharma and Prashar, 2013). This could be done in several ways which will now be presented

- 1) Standardization through earnings multiple⁶: Earnings multiples continue to be the predominant method for evaluating relative value, providing a fair and intuitive method to assessing the value of a company. By relating a stock's price or a company's value to its earnings, one can determine the amount investors are willing to pay for each unit of income generated. Despite the existence of several earnings multiples, the two most common ones are the following:

-P/E ratio: This is one of the most used valuation multiples when buying a share. It is calculated by dividing the price of a share by earnings per share (EPS).

-Equity value/EBITDA: This multiple provides a broader view of the valuation than the previous one, proving valuable in business acquisition or when facing challenges associated with the P/E ratio. This multiple evaluates the company's ability to make profits while considering the entire financial structure, including both debt and equity in the valuation

In both cases, a lower multiple of earnings indicates that investors are paying less per unit of earnings.

- 2) Standardization through Book Value: This ratio determines if a business or stock is overvalued or undervalued by comparing the market price to its book value. Market price (numerator) represents the current value at which a security or asset is exchanged on the financial market, while the book value refers to the total value

⁶ <https://www.investopedia.com/ask/answers/061515/which-metric-should-i-pay-more-attention-evebitda-or-pe.asp>

of a company's assets that shareholders would receive if the company were to be liquidated. Book value is calculated as the difference between assets and liabilities⁷. Its calculation, initiated from the original acquisition price and adjusted for factors like depreciation or impairments, may introduce certain drawbacks. Various strengths and limitations are associated with this ratio that will be explored in greater detail in the following paragraphs. But, just to give an idea, Book Value multiples are usually more suited for banks and credit institutions. Further elaboration on this topic will be provided later in this chapter.

- 3) Standardization through Revenue Multiple: The Price-to-Sales (PS) ratio and Value-to-Sales (VS) ratio are revenues multiples that establish a connection between a company's equity or enterprise value and its revenues.⁸ In the first one, particularly interesting for equity investors, the market value of equity is divided by total revenues. This ratio essentially indicates the amount an investor is willing to pay for each unit of revenue (sales) generated by the company. VS ratio, on the other hand, uses the enterprise value as numerator. By including both equity and debt, it considers the influence of the entire capital structure, providing a broader overview of the financial well-being. In either case, a high PS or VS ratio indicates that the investor is willing to pay a premium for each unit of income created. This may signify optimism about future growth prospects, but it could also indicate overvaluation. Furthermore, in the case of VS, a high value may suggest a high level of debt. The converse holds true in the scenario of a low PS or VS. Unlike earnings and book value, revenue indicators are less influenced by accounting principles. In fact, revenues provide a common baseline, allowing the comparison of companies from various markets using various accounting systems. Moreover, as these ratios focus on the top line (revenue) rather than the bottom line (profit), they are easier to use also with young companies. The fact that revenues are less influenced not only by accounting principles, but also by some degree of arbitrariness and discretion of the managers, makes them a purer measure, and a more forecastable one, because less prone to the noisy choices of the managers, often lead by the needs of that accounting moment.

⁷ <https://corporatefinanceinstitute.com/resources/accounting/book-value/>

⁸ <https://www.wallstreetprep.com/knowledge/revenue-multiple/>

4) **Standardization through Industry-Specific Multiples:** The ratios previously discussed are commonly used to assess the valuation of companies across various sectors. However, specific industries may have unique characteristics that make traditional multiples less meaningful, requiring the use of sector specific ratios (Damodaran, 2012). An example is provided by the first dot-com companies, where analysts attempted to evaluate their worth by dividing the market value of each company by the number of hits generated by the company's website. However, there are some drawbacks related to these types of ratios. The first one is related to potential overvaluation or undervaluation as investors might lack a reference point or benchmark for what constitutes a reasonable valuation. Investors who are unaware of what is a high, low, or average measure may apply these multiples without a clear understanding. The second challenge pertains to the inherent difficulty in establishing a direct correlation between these sector-specific metrics and fundamental financial measures, like revenues and profits. For instance, consider the scenario of a visitor to a company's website: does each visitor necessarily lead to increased revenues? A comprehensive comprehension of this relationship is crucial for accurate valuation processes.

2.2 Multiples implementation: A Four-Step Guide

As highlighted earlier, the simple application of multiples increases the risk of misuse. To properly use them and identify potential abuse by others, four fundamental steps provided by Damodaran's works should be followed. First, it is crucial to establish consistent and uniform definitions for the multiple to ensure standardized measurement across the firms under comparison. The second step involves a full understanding of the cross-sectional distribution of the multiple, spanning not only the targeted sector but also encompassing the broader market. Moving on to the third step, a deep analysis of the multiple is essential, encompassing an understanding of the underlying fundamentals influencing it and the mechanisms through which changes in these fundamentals impact alterations in the multiple. Finally, the last step entails the identification of suitable comparison firms, coupled with careful attention to control for any consistent differences that may exist among these companies. The four steps will now be presented in a specific manner.

2.2.1 *Definitional tests*

Various methods exist for calculating each multiple. As various calculation methods produce different outcomes, achieving accurate comparisons necessitates the standardization of multiples, guided by two fundamental principles.

The first one is the concept of consistency which affirms that *“If the numerator for a multiple is an equity value, then the denominator should be an equity value as well. If the numerator is a firm value, then the denominator should be a firm value as well”* (Damodaran, 2012). As an example, consider the price-earnings ratio, which remains consistently defined due to both numerator and denominator being equity value. Similarly, the Enterprise value to EBITDA multiple exhibits consistency, as both values are measures of firm value.

The second principle is the one of uniformity. Ensuring a meaningful comparison requires a uniform definition of the multiple within the group of companies compared. One potential challenge that may arise involves the utilization of varying time frames across different companies when employing ratios. A company might assess earnings over a 6-month period, while another over one year. Another challenge arises from the use of distinct accounting principles, a consequence of the specific regulations in each market. For this reason, it is usually better to base the analysis and the selection of peer groups on geographical areas and regulatory jurisdictions. Both challenges introduce complexities that must be carefully considered for an accurate assessment

2.2.2 *Descriptive tests*

Understanding the distributional characteristics of a multiple is crucial for its effective utilization in assessing market conditions. Having insights into what constitutes a high, low, or typical value for the multiple enhances its utility in identifying potentially undervalued or overvalued firms. Moreover, the impact of outliers and the identification of potential biases in the estimation process must be deeply understood for accurate valuation assessments. Outliers are values which are incredibly high or low compared with the other values. Outliers encompass a lot of different situations: from measurement errors to statistical anomalies due to very peculiar situations that arise in a given timeframe. A good way to guarantee robustness with respect to outliers is to take in account median values instead of average ones.

From the other side, biases are usually related to some underlying hidden characteristics of the stock, or the sector taken in account. It could be related to geographical areas, recent events, etc.

Analysts often focus on understanding how a multiple relates to others within an industry, neglecting the comparison to the broader market that could provide crucial insights into whether a sector is overvalued or undervalued. This broader perspective is essential because, despite operating in different sectors, various stocks compete for the same investment funds and are subject to comparable market dynamics. Standard statistics, such as average and standard deviation, serve as the starting point. Although the extremes values often offer little insight, examining percentile values, such as the 10th, 25th, 75th, and 90th percentiles, proves beneficial in assessing what constitutes a high or low value for the multiple within the group. These percentile markers provide a valuable tool for evaluating the relative position of a specific multiple compared to its counterparts in the market.

Certain ratios, like the price-to-earnings (P/E) ratio, can display a wide range of outcomes due to fluctuations in stock prices or earnings, without an upper limit (Khan, 2009). The P/E ratio, for example, may vary from 0 to 1000 or even higher. However, these extreme cases can significantly skew average values, making them unrepresentative of the overall data set. A notable scenario is when a company experiences a sudden drop in earnings, causing a spike in the P/E ratio and generating outliers that disproportionately impact the calculated average. To address this issue and provide a more balanced view of the data, the inclusion of median values is a useful technique, helping to mitigate the influence of outliers and capture the central tendency in a more robust manner.

For each multiple, there exist firms where the computation of that specific multiple is not feasible. In the case of PE, if a company reports negative earnings per share, the ratio lacks significance and it is typically not computed, resulting in the exclusion of such firms from the analysis. This is not a rare event, especially for growth stocks. Even though the sample size is substantial, omitting firms – in this case those having financial challenges - introduces bias to the selection process, leading to an unbalanced perspective in the statistical analysis. To avoid this skewed analysis, one first solution could be recognizing and incorporating the bias into the analysis, which in this case means adjusting the average P/E ratio to account for the exclusion of firms experiencing financial losses. A

second alternative involves summing the overall market value of equity and net income (or loss) for all entities within the group, irrespective of their financial position, and then calculating the price-earnings ratio using this aggregated approach (Khan, 2009). Both these choices are particular methods of adjusting multiples measurements with respect to characteristics. Let's examine three companies and compare the price-earnings ratio using three distinct calculation methods.

Company A: Earnings = \$1 million, Market Value of Equity=\$10 million

Company B: Earnings = -\$500K, Market Value of Equity = \$8 million

Company C: Earnings = \$2 million, Market Value of Equity = \$15 million

1) Average P/E: $(P/E_A + P/E_B + P/E_C)/3 = ((\$10M/\$1M) + (\$8M/-\$500K) + (\$15M/\$2M))/3$

This calculation will be skewed due to the negative earnings of Company B, as dividing by negative earnings deviates from the conventional interpretation of the price-earnings ratio

2) Median P/E: in ascending order we have PE_B, PE_A, PE_C

Median PE Ratio = PE_A (since it's the middle value)

This provides a measure less influenced by extreme values.

3) P/E on Aggregate values: Aggregate Earnings = \$1M - \$500K + \$2M = \$2.5M

Aggregate Market Value of Equity = \$10M + \$8M + \$15M = \$33M

PE Ratio = $\$33M / \$2.5M = 13.2$

This example illustrates that the P/E ratio calculated using the aggregate values method provides a consolidated overview, considering all firms and alleviating the influence of extreme values, particularly in sectors where negative earnings are widespread.

A third alternative entails employing a different multiple that is calculable for every firm within the sample. In the context of the P/E ratio, its substitute could be its reciprocal counterpart, the earnings yield, which is applicable even to firms experiencing financial losses

2.2.3 Analytical Tests

It is often argued that the preference of relative over absolute valuation is rooted in the perception that the former requires fewer assumptions, as already mentioned. However, to be more precise, the key differentiation does not lie in the number of assumptions, but rather in their nature: those underlying a relative valuation are implicit and unexpressed, whereas absolute valuations demand explicit assumptions (Damodaran, 2012). Before utilizing a multiple, it is essential to analyze the fundamentals that influence the valuation multiple at which a company should be traded and understand how changes in these fundamentals can impact the multiple. But it is also true that absolute valuation requires forecasting. Statistically speaking, provided a decent signal-to-noise ratio, forecasting and estimation require the highest possible number of observations. This is required to get robustness, and for the assumptions of most of the underlying theorems – a lot of them are asymptotic – to be triggered. Financials are reported – in the best case – 4 times per year. This means that in a 4-year timeframe – which, financially speaking is a huge time, becoming even bigger, given the acceleration of the amount of information, regimes, events that can happen in such a time – you have 16 observations. And, for the reason already outlined, it is likely that these observations are produced by different Data Generating Processes. Sensitivity of absolute valuation with respect to cash flows forecasting is very strong and forecasting those kinds of values is a really hard task (Armstrong, 2001). The Big Data era provided some alternative ways to attack this problem. Satellite images, geospatial data, etc. as well as algorithms able to process these alternative data to produce insights changed in a non-trivial fashion the landscape of financial forecasting. Just to give the sketch of the idea, imagine a company whose business revolves around commercial centers. Having satellite images of the parking slots of its commercial centers around the world allows for example to measure the number of cars of people coming to do shopping. Having this information continuously flowing over time, allows for instance to predict if next quarter sales will be larger or lower than the previous one, providing a strong competitive advantage in forecasting cash flows close in time (Baillarin et al., 2020).

That said, Valuation multiples are influenced by three fundamental factors: risk, growth, and cash flow-generating capabilities (Damodaran, 2012). These variables play a crucial role in explaining why multiples vary across companies operating within the same sector. Simply comparing these multiples between different stocks without considering these

underlying factors can be misleading. For instance, deeming a stock with a lower PE ratio as cheaper than one with a higher ratio may overlook the fact that the latter could possess a higher expected growth rate, justifying its elevated valuation. Simultaneously, a lower P/E for a stock may obscure underlying risks, emphasizing the importance of a nuanced risk assessment. Moreover, incorporating considerations of cash flow-generating potential enhances the evaluation. A stock with a seemingly lower P/E may fail to reflect its strong cash flow resilience, while a higher P/E might signal confidence in sustained cash flow generation. Ignoring these variables may lead to incorrect conclusions about the relative attractiveness of stocks. A comprehensive evaluation that goes beyond mere numbers is essential for a more accurate understanding of a stock's relative appeal in the market.

The second step entails grasping how the multiple adapts to changes in fundamentals, as a well-informed judgment relies on a profound grasp of how the PE ratio reacts to fluctuations in the growth rate. Understanding that for example firms with higher growth rates generally lead to higher P/E ratios is just the starting point. This understanding, in fact, falls short when faced with the analysis of a company experiencing a growth rate double that of the sector average. The key consideration involves determining the exact adjustment required in the PE ratio - whether it should be double or twice more than the industry's average PE ratio. Many analyses mistakenly assume a linear relationship between multiples and fundamental. However, deriving multiples from a discounted cash flow (DCF) model provides a more in-depth perspective on the relationship between fundamental variables and multiples, enabling analysts to make more accurate and informed company valuations (Damodaran, 2012). In practical terms, this means analyzing how a single variable (such as the growth rate, net income, or discount rate) influences the value of the multiple while keeping all other variables constant. However, it is essential to recognize a key element known as "*companion variable*." This distinctive factor, identified through a meticulous examination of multiples across companies within a specific sector or the broader market, assumes an important role in clarifying the core nature of each corresponding multiple. By focusing on the companion variable, analysts not only refine the precision of valuations but also reveal the complex interplay of factors shaping each multiple. This approach enriches the depth of financial analysis, offering a clearer picture on the valuation process.

2.2.4 Application tests

In the relative valuation, utilizing multiples entails a close collaboration with similar enterprises to accurately determine the value of a company or its assets. A comparable firm is one that shares analogous characteristics in terms of cash flows, growth potential, and risk with the company under evaluation (Horan, 2023). While financial valuation doesn't explicitly demand a link to the same industry or sector, analysts typically associate firms within the same sector. The underlying concept is that a more legitimate analysis is facilitated when firms are inherently similar in fundamentals. Analysts adopt different approaches; some adhere to strict criteria, seeking nearly identical firms across all dimensions, while others embrace a broader perspective, allowing for differences in one or more variables. This choice is naturally contingent on the nature of the sector and the scale of the companies involved. Depending on the sector type, additional characteristics, such as company size, may be considered to offer a more precise yet narrow comparison. The intricacies of making comparisons become more pronounced when dealing with diverse accounting standards and multiple currencies, introducing challenges that demand careful consideration and strategic handling. This complexity necessitates the implementation of meticulous control measures to guarantee precise assessments of the relative value of a company or its assets. Comparing and evaluating financial metrics becomes even more crucial as global markets evolve and intertwine (Dema et al., 2009). Nowadays companies operating within a specific industry often extend beyond national borders, becoming incorporated and traded on multiple markets worldwide. This international dimension introduces complexities into the valuation process, as economic conditions, regulatory environments, and market dynamics can vary widely across different regions. Conducting a meticulous analysis to navigate complexities is vital. However, finding identical firms proves an unfeasible task; inherent differences are always present, necessitating continuous consideration. These differences can vary in scale, ranging from minor distinctions in certain aspects to more substantial variations in others. In addressing these disparities, three strategic approaches come into play, providing valuable tools to mitigate the impact of divergences and facilitate a more accurate assessment (Damodaran, 2012)

- 1) Subjective Adjustments: This is the method that naturally emerges from the discussions in previous chapters. In relative valuation, the selection of an appropriate multiple and the choice of firms included in the sample are the two

crucial steps. Once the average multiple is computed, each individual firm is juxtaposed against this benchmark for further scrutiny. If there is a deviation, subjective assessments come into play. These assessments may justify differences by attributing them to key variables such as growth prospects, cash generation capabilities, and risk considerations. For example, if a firm exhibits a P/E ratio of 20, in contrast to the average of 10, it would be a mistake to categorically label it as overvalued. Instead, the emphasis should be on exploring whether this variance can be justified by, for example, expected growth prospects. This approach recognizes that a higher P/E ratio may not necessarily signal overvaluation, as it could reflect the market's optimism regarding the company's future expansion and earnings potential. By carefully considering both quantitative and qualitative dimensions, conclusions are drawn, and informed decisions are made regarding a company's true worth in the market.

- 2) **Modified Multiples:** this approach aims to adjust the multiple by accounting for the primary variable that holds significant influence: the companion variable (Damodaran, 2012). An illustration of this is found in the PEG (Price/Earnings to Growth) earning multiple, which can be considered a modification of the P/E ratio. It involves dividing it by the anticipated growth rate in Earnings Per Share (EPS) for a given company, thereby yielding the Price/Earnings-to-Growth (PEG) ratio. The underlying assumption of this method is that firms are comparable across all variables except the one represented by the companion variable. Subsequently, the adjusted ratios are systematically compared during the assessment of companies within a specific sector, thereby enabling a more precise valuation. This method offers a valuable tool for discerning variations in performance providing a clearer understanding of the relative valuation of each company within the sector.
- 3) **Sector regression:** The adjustment of multiples, as mentioned earlier, becomes feasible when firms differ across one variable. If there are variations across multiple variables, it is better to consider conducting a regression analysis between the multiple and the respective variables (Horan, 2023). The objective of regression is to comprehend how changes in independent variables influence the dependent variable. In the case of the P/E ratio (dependent variable), the

regression aims to understand how it responds to alterations in, for example, annual revenue and percentage growth in earnings (two independent variables). Subsequently, this regression model can be utilized to estimate predicted values for each company.

However, the robustness of the predictions is contingent upon the stability of the relationships and the extent of comparability among the firms under consideration. If the relationship between the multiple and its associated variables is not constant, outliers may surface, exerting a disproportionate impact and leading to significant fluctuations in coefficients. This unpredictability erodes the reliability of predictions, introducing a level of uncertainty. Similarly, an insufficient number of firms can compromise the robustness of outcomes, emphasizing the importance of an adequately sized and representative sample for more trustworthy predictions. Nevertheless, as observed, the definition of a comparable firm does not confine the selection exclusively to companies within the same sector. Particularly in sectors where the number of companies is not notably high, one can leverage the "market regression" approach. This method involves incorporating a diverse array of companies spanning various sectors, providing a more expansive dataset for analysis. The outcomes of the market regression are then utilized to derive predicted values for individual companies. This broader approach aligns with the idea that in certain contexts, a broader market perspective can improve the robustness and accuracy of the valuation process. The market regression offers three distinct advantages over other analyzed approaches. Firstly, unlike subjective assessments, it introduces a quantitative method for understanding the influence of variable changes on multiples. This approach brings a level of precision and objectivity that subjective assessments lack. Secondly, as already said, it serves as a practical solution for sectors facing challenges due to an inconsistent number of comparable firms. Thirdly, this analysis goes beyond individual firms to provide valuable insights into the entire sector. It effectively categorizes industries as either overvalued or undervalued, offering a broad understanding on their positioning relative to the broader market context. (Damodaran, 2012)

In this case as well, recent technological and modeling developments due to the advent of Big Data and Machine Learning and AI algorithms can potentially disrupt the principles by which peers were identified to form the analysis group, replacing a heuristic approach, not always easy to measure, with a completely data-driven approach.

2.3 Four step process: application

This section will concentrate on the practical four-step process for 3 main ratios: Price-to-Earnings, Price/Earnings to Growth, Price-to-Book Value

2.3.1 Price to earnings ratio

Thanks to its simplicity, the P/E ratio is widely employed as a straightforward tool for making decisions on relative valuation. Let's start by redefined the P/E formula

$$PE = \text{Market price per share} / \text{EPS}$$

If the P/E ratio is higher than the industry peers or historical benchmarks, it is commonly interpreted as an indication of overvaluation. Conversely, a P/E ratio that is lower is often seen as a sign of undervaluation⁹

Despite its simple formula, various methods exist for calculating it, introducing challenges related to consistency. The numerator of the ratio, for example, could be the current market price or an average of the price over the last 6 months. Likewise, the bottom part of the ratio can originate from different sources. This could include the earnings per share recorded in the latest fiscal year (current PE), the earnings over the last four quarters (trailing PE), or the expected earnings per share in the forthcoming fiscal year (forward PE).¹⁰

The absence of consistency in the choice of the denominator becomes problematic particularly when evaluating high-growth firms for two main reasons. Firstly, in such companies, different EPS estimates can result in significant divergent outcomes, particularly when compared to stable. Second, the impact of management options plays

⁹ <https://www.investopedia.com/terms/p/price-earningsratio.asp>

¹⁰ <https://economictimes.indiatimes.com/markets/stocks/news/how-to-read-the-pe-ratio-for-smart-investing/articleshow/106277101.cms?from=mdr>

a crucial role. High-growth companies commonly issue many employees stock options relative to their total outstanding shares, leading to a substantial difference between diluted and primary EPS (Damodaran, 2012)

Similarly, establishing uniformity in EPS among companies is a challenging task. This difficulty arises from the adoption of different accounting methodologies during acquisitions, differences in treating options within diluted EPS, and the discretionary decisions made by companies regarding the expensing or capitalization of items. These varied practices contribute to disparities in reported earnings, subsequently influencing PE ratios.

Subsequently, understanding the distribution of PE ratios among sectors and the broader market is crucial for gaining insights into what is considered a high or low value (Nicholson, 1960). As mentioned, PE ratios are prone to skewness, with no upper limit but constrained to a minimum of 0. This consequently leads to an average PE that is often higher than the median. This disparity is attributed to the influence of outliers, making the average less representative of the central tendency. To address this issue, a common practice is to establish a rule, on a case-by-case basis, where a cap is set to prevent distortion. For instance, PE ratios exceeding 100 are capped at 100.

A discounted cash flow model can be employed to extract the P/E determinants and to understand how the result evolves in response to changes in these fundamental elements.

- Payout ratio and ROE: There is a positive correlation between the PE ratio and both the payout ratio and ROE. An increase in the payout ratio or ROE leads to an increase in PE, despite the growth rate; and conversely, a decrease in the payout ratio or ROE results in a decrease in PE, regardless of the growth rate.
- Risk: cost of equity or the discount rate, both reflecting the firm's riskiness, are inversely proportional to the PE ratio. As the cost of equity or discount rate increases, the PE ratio tends to decrease, suggesting investors' expectations for a higher return to balance the higher risk. Conversely, the opposite holds true, indicating investors' readiness to accept a lower return in exchange for a more stable investment (Nicholson, 1970).

- Growth rate in earnings: expected growth rate in earnings, particularly in high-growth phases, contributes significantly to PE variations. A higher growth rate generally leads to an increased PE ratio, under the condition that the return on equity surpasses the cost of equity, and vice versa. However, there is another factor to consider in this analysis: the interest rate. During periods of low-interest rates, the PE ratio is more sensitive to changes in expected growth rates compared to high-interest-rate environments. This is attributed to the impact of interest rates on the present value of future cash flows. Higher interest rates tend to diminish the PV of future cash flow. As a result, the differences in expected growth rates have a less pronounced impact when compared to scenarios with lower interest rates. In other words, because of the stronger discounting effect on future cash flows in contexts with higher interest rates, the effects of changing growth rates are more moderate.

At this point the P/E can be used to assess and make judgments regarding valuation. Disparities in fundamentals lead to differences in PE ratios across time, markets, industries, and firms, which must always be considered. The P/E ratio can be compared in different ways, as will be presented below

- Comparing a Market's PE Ratio across Time: In relative valuation, a common practice involves comparing the market PE ratio to its historical average to assess potential overvaluation or undervaluation. While historical comparisons provide insights, this approach demands caution due to the dynamic nature of financial fundamentals. Let's delve into some common examples to illustrate this point. First, a potential decrease in interest rates tends to lower the cost of equity for the market, potentially leading to an increase in the PE ratio, and vice versa. Second, an increased aversion to risk among investors generally leads to a higher equity risk premium, contributing to a lower PE. Third, a reduction in the anticipated earnings growth across firms typically leads to a decline in the market PE ratio. Rather than solely comparing PE ratios over time, a more precise analysis involves assessing the actual PE ratio against the predicted PE ratio adjusted for the existing fundamental factors

- Comparing PE Ratios across Countries: P/E ratios can be compared across countries to identify potentially overvalued or undervalued markets (Damodaran, 2012). Again,

relying solely on this comparison can be misleading, as various financial fundamentals must be considered. For instance, higher real interest rates and increased risk tend to result in lower P/E ratios for a country, while higher expected growth rates or Return on Equity (ROE) can lead to higher P/E ratios. Understanding the interplay of these factors is crucial for an accurate assessment of a country's market valuation.

- Comparing PE Ratios across Firms in a Sector: This is the most used approach for comparing P/E. However, it has some challenges. First, there is not a clear definition of a comparable firm. Analysts usually choose firms in the same group, but this is not always the best solution because, even though they are part of the same sector, they can still present differences in fundamentals. Moreover, the choice of comparable firms can be affected by bias. Second, differences persist in any case, and it is difficult to address them with subjective assessment. For example, it is difficult with subjective valuation to say how high a P/E should be for a company that has a certain expected growth rate compared to another. For this thing, it is better to use sector regression, as explained earlier.

- Comparing PE Ratios across Firms in the Market: as a universal definition of comparable firms does not exist, the sample can hold firms that come from different sectors. First, the comparison in the entire market allows to compare a higher number of firms, making the valuation more accurate. Second, it allows us to understand whether a certain sector is overvalued or undervalued. However, since we are talking about firms in various sectors, new differences arise, so the best method for valuation is the use of multiple regression (Damodaran, 2012)

2.3.2 The PEG ratio

Another earnings multiple used as a valuation indicator is the PEG ratio, which establishes a connection between the PE ratio and the expected growth rate. By incorporating the expected growth rate, this ratio is linked to the theme of “modified multiple” previously described. This ratio can be applicable solely to firms that have a projected growth rate in earnings and could be particularly useful in high-growth sectors, where the expected growth rate is a crucial factor in evaluating investment opportunities. The ratio offers a metric to control for differences in expected growth rates. The formula for PEG is as follows:

$$\text{PEG} = \text{PE ratio} / \text{Expected growth rate}$$

In evaluating companies using the PEG ratio, if the expected growth rate is lower than the PE ($\text{PEG} > 1$), the company could be perceived as overvalued, while if the expected growth rate is higher than the PE ($\text{PEG} < 1$), it could be seen as undervalued¹¹.

Starting with the four steps analysis, the first point is to define the multiple to provide uniformity and consistency. First, given the equity-focused nature of the PEG ratio, it is essential to use the expected growth rate in earnings per share. Second, expected growth rate in earnings should be aligned with the corresponding PE ratio, taking into consideration whether it is based on current or trailing. The use of the forward PE ratio should be avoided to prevent potential issues of double counting growth. Third, it is important to maintain the same time frames over which the expected growth rates are measured.

Once the multiple has been defined, understanding the distribution of PEG becomes crucial. The data on PEG distribution in the US market reveals a pattern closely mirroring that of PE ratios (Damodaran, 2012). However, unlike P/E ratios, not all firms have a PEG, as analysts may omit consideration of young firms and their associated expected growth rates in their calculations. This omission has the potential to introduce bias into the analysis and representation of distribution.

PEG ratios are commonly employed in the analysis of technology firms, primarily due to the distinctive characteristics and the substantial potential for future earnings growth within the sector. According to Nasdaq data, on average, the PEG ratios of technology companies are lower than those of the broader market. This observation might be interpreted as a sign of potential undervaluation by analysts. However, such conclusions require a careful examination of various fundamental factors, which represents the third step of the analysis. The average PEG tends to be higher than the median in both cases. This discrepancy suggests the presence of potential outliers that have an upward skewing effect on the average. Consequently, the median, being less sensitive to extreme values, could be considered a more robust measure in this case.

¹¹ <https://www.investopedia.com/terms/p/pegratio.asp>

Like the Price/Earnings (P/E) ratio, the discounted cash flow model can be utilized to identify the factors that influence the PEG and understand their impact. Let's now examine a few examples to illustrate the impact of specific changes. First, the relationship between PEG ratios and growth exhibits a U-shaped correlation: the PEG ratio first declines with an increase in growth rate before beginning to rise once more (Schnabel, 2009). This also suggests that PEG comparisons across firms with significantly different growth rates is challenging. The dynamics differ when considering risk and payout ratio. In the case of risk, an increase typically leads to a decrease in the PEG ratio. On the other hand, with an increase in the payout ratio, the PEG tends to rise, reflecting the distribution of more dividends.

At this point, the PEG ratio can be utilized to assess and make judgments regarding valuation. Unlike the PE ratio, this ratio is specifically employed for comparisons between firms within the same industry. Various methodologies for applying this ratio in the context of valuation will now be presented (Damodaran, 2012).

- Direct comparison: Directly comparing firms on PEG ratios is a common method to assess whether a company is overvalued or undervalued. However, the precision of this comparison depends on the similarity of fundamentals between the firms. A company that appears overvalued based on PEG ratios might be reasonably valued when additional considerations such as risk and returns on equity are subjectively assessed.

- Controlled comparisons: The subjective assessment embedded in the direct comparison approach lacks precision. If the PEG ratio and variations in fundamentals among different firms are present, employing a regression method can provide a more objective and structured approach, as in the case of PE ratio.

However, in situations where there are substantial differences, the recommendation is to opt for the valuation through PE ratio, as it offers a simpler alternative.

2.3.3 Price to book value multiple

Moving away from the sphere of earnings multiples, another commonly utilized metric for relative valuation is the book value ratio, which provides insights into how investors perceive the worth of a stock. Let's define its formula

$$\text{PBV} = \text{market price per share} / \text{Book value of equity per share}$$

Typically, if the market price is below the book value of equity, $\text{PBV} < 1$, stocks are often perceived as undervalued. While when the price is higher than the book value, $\text{PBV} > 1$, stocks may be considered overvalued¹².

As mentioned in the preceding paragraphs, there are strengths and drawbacks associated with this ratio. The three primary advantages of price book value (PBV) include its simplicity and intuitiveness for comparisons, its applicability to firms with negative earnings (unlike PE ratios), and its ability to provide a fair valuation, assuming consistent accounting principles. On the other hand, the primary drawback arises from the prevalence of disparities in accounting standards across firms and countries, which has the potential to compromise the consistency of ratio comparisons. Secondly, this ratio may have limited significance in sectors primarily consisting of intangible assets, such as the technology industry. Lastly, persistent negative earnings can result in a negative PBV ratio.

Starting with the first step of the analysis, consistency is met in this case as both values pertain to equity. However, consistency may be influenced by the denominator's calculation. In scenarios involving various classes of shares in circulation, allocating book equity among these various classes can pose challenges. Moreover, the book value of equity should not consider the part related to preferred stock, aligning with the typical focus of market value exclusively on common equity. To avoid these problems and enhance consistency, in certain situations, a broader formula can be employed:

$$\text{PBV} = \text{market value of equity} / \text{Book value of equity}$$

However, uniformity challenges arise in the calculation of BV of equity. Usually, both the book value of assets and liabilities are based on historical costs and, when necessary,

¹² <https://www.investopedia.com/investing/using-price-to-book-ratio-evaluate-companies/>

adjusted for depreciation. Every country has its own accounting principles, which can significantly impact the calculation of the book value of equity, leading to potential inconsistencies. Additionally, it is crucial to use the same type of BV of equity. For instance, if a company uses the current BV of equity, comparable firms should also adopt the same approach. The second challenge, which can be mitigated when dealing with a large sample of firms, pertains to the estimation of the market value of options in circulation. This value needs to be accurately assessed and then added to the market value of equity

To understand what constitutes a high or low value, it is crucial to examine the distribution of the PBV ratio. Data from the USA in 2011 reveals a positively skewed distribution, characterized by a median lower than the mean. This positive skewness results from two primary factors: positive outliers and companies exhibiting a negative book value of equity. In the first case, extreme values exert a considerable impact on the mean, causing it to be higher. Conversely, the median, being less susceptible to the influence of outliers, remains less affected. Additionally, companies with negative net book values add complexities as PBV cannot be conventionally calculated for them. These companies contribute to a right-skewed tail of the distribution, but this time with low (or even negative) PBV values. (Damodaran, 2012)

The Dividend Discount Model can also be applied in this scenario to extract the determinants of the PBV ratio. While the underlying principles resemble those of the earnings value, their impact differs.

- Return on equity: When a company achieves a higher return on equity, it typically results in an increase of the PBV ratio. An increase in ROE implies that the company is generating more profit relative to the equity invested by shareholders. Consequently, investors may be inclined to pay a premium for the stock, viewing it as a sign of potential future growth. Companies should pay attention to produce a ROE as high as possible. How? A method can be provided by the “5 competition forces” framework provided by Porter. These forces, summarized in the picture below, determines how competitive and appealing an industry is



FIGURE 6 - PORTER'S FIVE FORCES Source: Author's personal elaboration

- Payout and growth rate: in both high growth and stable periods, a higher PBV is associated also with an elevated payout ratio and growth rate of the company
- Risk: Conversely, the PBV tends to decrease as the associated risk of the company rises.

Once the determinants have been understood, the analysis can progress towards the comparison of ratios across firms to draw conclusions about relative valuation

PBV ratios vary across firms for several reasons and these differences are essential for accurate and meaningful comparisons of price-book value ratios among firms. The most common approach to estimating PBV ratios for a firm is to choose a group of comparable firms, to calculate the average PBV ratio for this group, and to base the PBV ratio estimate for a firm on this average. The adjustments made to reflect differences in fundamentals between the firm being valued and the comparable group are usually made subjectively. As seen before, there are drawbacks associated to this approach, so two approaches are suggested by Damodara's works to analyze firms with low PBV ratios and high ROE, or high PBV ratios and low ROE

- 1) Matrix approach: it creates a link between price-to-book value ratios and excess return, calculated as the difference between ROE and cost of equity.
Overvaluation is considered when high PBV but low excess return, while undervaluation when low PBV but high excess return

- 2) Regression approach: If the relationship between ROE and PBV ratio is robust and linear, the regression method can be employed to predict the price-to-book ratios for all companies within the sector. This prediction can then be used to identify firms that may be undervalued (if their market PBV is lower than predicted) or overvalued (if their market PBV is higher than predicted).

Chapter 3 - Empirical Analysis: evaluating Value Strategy performance using SPX Value ETF versus SPX ETF

This chapter introduces an empirical study on the market performance of value-oriented strategies over the last twenty years, retrospectively analyzing strengths and weaknesses of these approaches and examining periods of both outperformance and underperformance. The aim is to present a comprehensive evaluation that sheds light on the environments in which these strategies are favored and those in which they struggle, delving into the underlying factors behind these trends and seeking to uncover any potential patterns over time. For this purpose, the iShares ETF¹³ issued by MSCI S&P500 Value will be examined. This value ETF will be compared to the ETF from the same S&P500¹⁴ family, utilizing it as a benchmark for analysis, and observing its daily performance. Consistency is achieved through comparing ETFs belonging to the same family. The selection of the American Large Cap market as a shared backdrop and controlled bias for the analysis stems from its leading position in terms of both capitalization and geographic influence within the global financial markets. Additionally, it is considered the most efficient market in the world, making it an extremely solid foundation for evaluating any type of strategy.

This chapter is organized as follows: the first section introduces the concept of ETF, tracing its origins, architecture, and typical applications for both institutional and non-institutional investors. In the second section, we examine the value strategy identified through the appropriate ETF, providing detailed insights into its construction and composition. In the third section, the focus shifts to the actual empirical analysis, where the performance of the value strategy is measured, deconstructed, and analyzed from various perspectives using a variety of analytical tools and performance indicators, all appropriately introduced. This part aims to present the key findings of the empirical analysis on the implementation of value strategies in the current financial landscape.

¹³ <https://www.ishares.com/us/products/239728/ishares-sp-500-value-etf>

¹⁴ <https://www.ishares.com/us/products/239726/>

3.1 Introduction to ETFs

Considered one of the most significant financial innovations in decades, ETF (Exchange-Traded Funds) are hybrid investment products that combine many characteristics of mutual funds with the trading features of stocks. ETFs is a type of pooled investment product traded on the stock exchange that aims to closely replicate a reference benchmark (Lettau and Madhavan, 2018). Born as a revision of the pre-existing mutual funds, ETF embodies the principles of passive management and cost-effectiveness. However, the most distinctive feature lies in their ability to be traded throughout the entire day, offering a flexibility not found in the traditional practice of mutual funds, which are typically priced and traded once a day after the close of the market (Ben-David et al. 2017). Over time, ETFs have evolved into a versatile financial instrument, well-suited for a variety of investment strategies and aligning with the preferences of different investors. Initially crafted to replicate the performance of large-capitalization equity indices, they have transcended traditional boundaries and expanded their reach across all major asset classes, including stocks, bonds, commodities, and even cryptocurrencies. The types of ETFs have also expanded to include those tracking specific currencies, sectors, or ESG criteria. This adaptability has not only attracted a diverse range of investors but has also contributed to the growing popularity of ETFs in global financial markets.

Launched by State Street¹⁵ in 1993, the first ETF listed in the United States, the SPDR S&P 500 ETF, identified on stock exchanges by the ticker symbol "SPY", aimed to replicate the S&P 500 index¹⁶ (Lettau and Madhavan, 2018). According to Statista data¹⁷, it remains still today the biggest ETF with market capitalization of \$365 billion as of January 2023.

Subsequently, further ETFs were introduced, with the objective of mirroring other significant large-capitalization US indices, such as the Dow Jones Industrial Average (in 1998) and the Nasdaq 100 (in 1999). Since their introduction in the 1990s, the popularity of ETFs has surged dramatically. The figure below illustrates a remarkable increase in the number of worldwide exchange-traded funds (ETFs) from 2003 to 2022. According

¹⁵ Established in 1792 in Boston, State Street is an important financial services company. Its investment management division, State Street Global Advisors (SSGA), is renowned for introducing the first ETF in 1993 and remains still today one of the world's largest asset management companies.

¹⁶ The S&P 500, short for Standard & Poor's 500, is a market-capitalization-weighted index that includes the 500 largest publicly traded firms in the United States.

¹⁷ <https://www.statista.com/statistics/1316435/largest-etfs-market-cap-global/>

to Statista data¹⁸, in 2022, the global count of ETFs reached 8,754, a substantial rise from 276 in 2003. As of 2022, ETFs worldwide managed assets totaling nearly \$10 trillion.

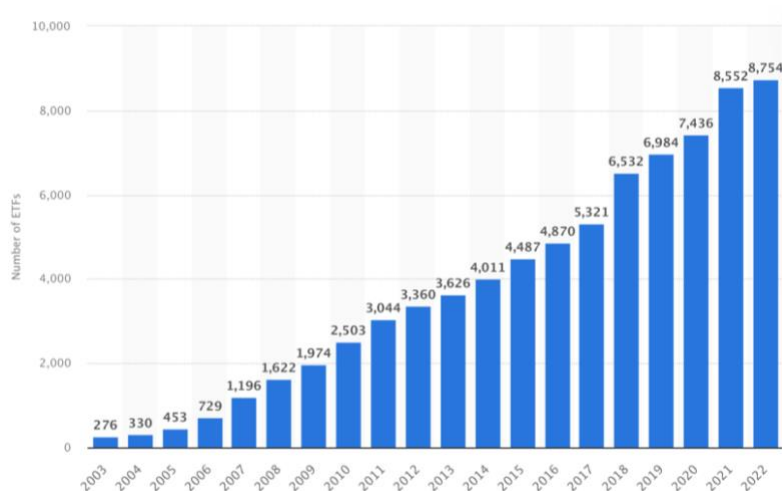


FIGURE 7 - GLOBAL GROWTH OF ETF. Source: Statista (2023)

3.1.1 Pros and Cons of Investing in ETFs

Exchange-Traded Funds offer various advantages and disadvantages for investors. One primary strength is their negotiability and liquidity. Similar to regular stocks, ETFs can be bought and sold intraday at market prices, providing investors with greater flexibility compared to mutual funds, typically traded once daily at market close. According to Liebi (2020), ETFs generally offer liquidity due to their structured design and exchange trading, allowing investors to trade securities with flexibility and minimal price impact. Nevertheless, the actual liquidity of an ETF may vary depending on factors like fund size, market participants, and overall market conditions. Another significant advantage of ETFs is their inherent diversification, offering investors access to a diverse range of assets within a single fund, which might be challenging to achieve otherwise. Diversification not only broadens investment exposure but also diminishes specific risks tied to individual stocks or securities. In the event of underperformance in a particular segment of the portfolio, such as stocks within a specific sector, the losses can be balanced by other components, thereby assisting in reducing the overall investment risk. Although certain types of risks associated with ETFs have decreased, there are still potential risks that can arise from both physical and synthetic ETF. In the first case, security lending comes with the potential risk of the security borrower defaulting. In the second case, the

¹⁸ <https://www.statista.com/statistics/278249/global-number-of-etfs/>

default risk of the counterparty in the derivative contract poses a potential threat to synthetic ETFs. Collateral is needed for both kinds of agreements (Ben-David et Al, 2017). Moreover, ETFs frequently feature lower expense ratios in comparison to actively managed funds, rendering them cost-effective for investors (Liebi, 2020). This cost efficiency is a result of the typical passive investment strategy employed by ETFs, where the objective is to replicate the performance of a specific index. However, transactions involving less liquid or smaller-sized ETFs may incur higher management costs, as their lower market capitalization and trading volume could result in increased fees, impacting the overall profitability of the investment. Investors also should be aware that, although ETFs provide a convenient means to access a wide market or sector, they do not present a chance for superior performance compared to the benchmark. While the uncomplicated nature of ETFs is beneficial for passive investors aiming for market returns, individuals seeking higher returns through active strategies might need to consider alternative investment options. Additionally, the accessibility and simplicity of trading ETFs make them suitable for a wide spectrum of investors, spanning from institutional participants to individual investors. Transparency plays a crucial role in the attractiveness of ETFs. Investors indeed can make informed decisions and monitor their investments through the disclosure of the ETF technical data sheet, including composition and replication type, as well as daily maintenance information. However, it is essential to note that this transparency is more pronounced in physical ETFs. In contrast, synthetic ETFs, which introduce complexities through derivatives and non-traditional structures, may lack clarity in their composition and replication methods.

3.1.2 Physical and synthetic ETFs

The method by which an exchange-traded fund (ETF) or other investment fund seeks to replicate the performance of a benchmark index is known as index replication. ETFs mainly use two replication types: physical replication and synthetic replication (Ben-David et al.,2017). The choice between the two is determined by the objectives and strategies of the ETF manager as well as other factors including transparency, liquidity, and cost.

The physical replication method represents the conventional strategy of physically acquiring some or all the securities contained in the target index. In the complete physical replication method, the ETF holds all the securities comprising the target index in the

same proportions (weights). While this replication method allows for a more precise tracking of the index compared to sampling, it incurs higher trading costs due to periodic rebalancing needed to account for new additions and exclusions from the index. On the other hand, sampling replication permits the ETF to selectively acquire a subset of securities from those included in the target index (Liebi, 2020). The purpose of this carefully selected sample is to replicate the dynamics that characterize the performance of the reference index by creating a portfolio that is similar to it. Replication using this method has lower trade costs than full replication, although the tracking inaccuracy is generally higher.



FIGURE 8 - PHYSICAL ETF Source: JustETF

A synthetic ETF functions in a distinctive manner. It does not directly hold physical stocks, but instead it enters into agreements with financial institutions, typically investment banks, allocating funds to derivatives and swaps¹⁹. Through these swap contracts, both parties mutually commit to trade cash flows: the counterparty agrees to provide the return of the specified index or asset in exchange for a predetermined fee (swap commission) and the performance of the collateral portfolio (Ben-David et al, 2017). There are two types of synthetic replication structures depending on how the collateral portfolio is held: Unfunded Swap and Funded Swap. This ETF type is appreciated for its ability to access markets that may be difficult or even impossible to enter through conventional methods, while also reducing annual management costs and minimizing tracking error²⁰. Despite these distinct advantages, it is crucial to recognize

¹⁹ It refers to a derivative contract, in which two parties agree to exchange future payments, to predetermined conditions

²⁰ Expressed as a percentage, the tracking error represents the difference between the ETF return and that of the reference benchmark. A low tracking error signifies that the ETF closely mirrors the benchmark, while a high tracking error indicates a larger divergence. The disparity is subject to factors like fees, transaction cost and the ETF's replication method.

the inherent counterparty default risk associated with these ETFs (Kosev and Williams, 2011). This risk entails the possibility that the counterparty may not meet its financial obligations, potentially resulting in the loss of all borrowed securities by the ETF, along with a capital loss equivalent to the value of those securities. To mitigate this risk, continuous monitoring and the implementation of security measures are essential. One common practice among ETF managers is to request securities as collateral for the entire loan duration, with the preference for the collateral value to exceed the monetary value of the loan.

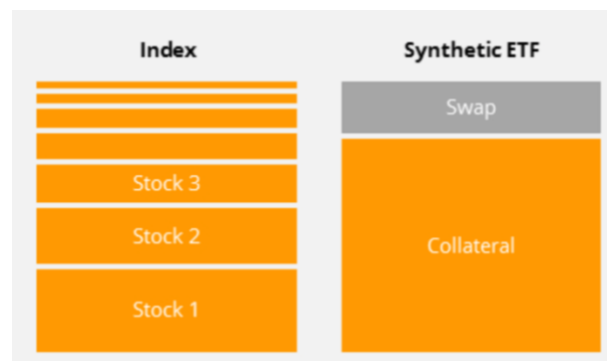


FIGURE 9 - SYNTHETIC ETF Source: JustETF

However, in the American market, this type of ETF is not widespread due to regulations imposed by the US Securities and Exchange Commission in 2010 that prohibit new fund launches by asset managers lacking pre-existing sponsorship of a synthetic ETF (Aramonte et al., 2017).

3.1.3 The ETF architecture

The underlying structure of both physical and synthetic ETFs can be categorized into a primary market and a secondary market (Liebi, 2020). Designed as open-ended entities, ETFs are subject to continuous fluctuation of ETF shares in response to market demand and supply dynamics. The mechanism of issuing and withdrawing new shares is commonly referred to as the "creation and redemption" process (Latteau and Madhavan, 2018)

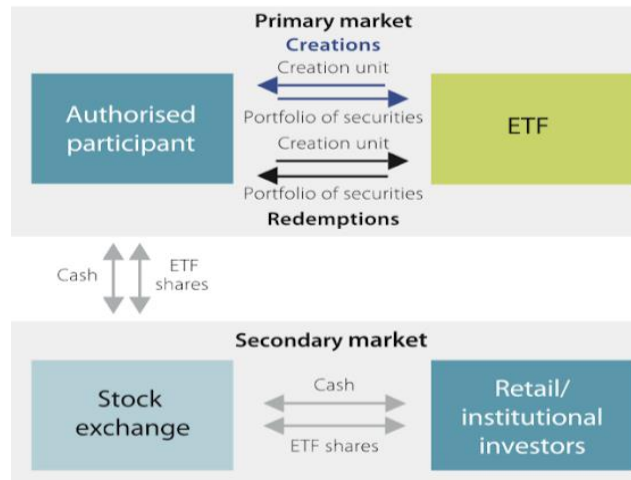


FIGURE 10: THE ETF ARCHITECTURE Source: RBA

Unlike a mutual fund, the ETF avoids direct interaction with capital markets. As illustrated in the above figure, the procedure starts with the ETF fund generating shares in large blocks (from 25'000 to 200'000) and entering into a contractual agreement with authorized participants (APs), usually a market-maker or big financial institution, who provide a portfolio of stocks similar to the holdings of the ETF in exchange. Following this issuance, ETF shares enter the secondary market, providing a platform for both retail and institutional investors to participate in the trading of shares via the stock exchange. APs can also initiate a redemption process, exchanging the shares with the ETF for a block of underlying securities or an equivalent cash value. To summarize, "creations" involve augmenting the supply of ETF shares, while "redemptions" pertain to a reduction in the total issued shares of the ETF.

For a full understanding of the ETF mechanism, it is essential to explore the distinctive pricing mechanisms of both primary and secondary markets. In the primary market, the price of an ETF share is based on the net asset value (NAV) calculated from the underlying assets within the fund. Conversely, in the secondary market, prices are influenced by the interplay of demand and supply forces, enabling them to be traded either at a premium or discount relative to the NAV. These variances can be exploited by Authorized Participants (APs) to implement strategic arbitrage opportunities, maximizing their potential for profit. Nevertheless, such price discrepancies are typically minor (Kosev and Williams, 2011)

3.2 Analysis of the S&P 500 Value ETF

The following information about methodology for index construction and index composition are obtained from two sources: the official document titled "S&P U.S. Style Indices Methodology"²¹ and the fact sheet provided by S&P Dow Jones Indices, a division of S&P Global, in October 2023.

3.2.1 Methodology for index construction

S&P Dow Jones Indices offers methodology for constructing their style indices within the S&P indices family, including the S&P 500, S&P MidCap 400, S&P SmallCap 600, S&P Composite 1500, S&P 900, and S&P 1000. These style indices classify stocks based on specific investment styles, such as value, growth, or blend. Let's delve into the methodology, with a focus on the Value style index construction for the S&P 500.

In the construction of the value ETF, it is interesting to observe the implementation of relative valuation explained in the second chapter. The S&P 500 Value ETF indeed employs three metrics, which will be referred to as "value factors" from this point forward, to isolate value stocks within the broader S&P 500 Universe: Book Value to Price Ratio, Earnings to Price Ratio, and Sales to Price Ratio. If earnings data from three years ago is not accessible, the Two-Year Change in Earnings per Share (Excluding Extra Items) over Price per Share is utilized as an alternative. Similarly, if earnings from two years ago are missing, we turn to the One-Year Change in Earnings per Share (Excluding Extra Items) over Price per Share. If there is no earnings data from one year ago, the factor is designated as zero. In the same manner, if sales data from three years ago is not accessible, the Two-Year Sales per Share Growth Rate is utilized as an alternative. Similarly, if sales from two years ago are missing, we turn to the One-Year Sales per Share Growth Rate. If there is no sales data from one year ago, the factor is again designated as zero.

Style Scores are generated through a multi-step process starting with the calculation of raw values for each factor across companies within the S&P Total Market Index (TMI)

²¹ <https://www.spglobal.com/spdji/en/documents/methodologies/methodology-sp-us-style.pdf>

universe. These initial scores then undergo a trimming process, where extreme values are adjusted to the 90th percentile, followed by a standardization process, whereby each company's raw score is normalized based on the mean and standard deviation of the entire dataset. The final Growth Score and final Value Score for each company are calculated by taking the average of the standardized values of their respective growth and value factors. This methodology ensures that each company is assigned both a Growth Score and a Value Score, reflecting their relative positions in terms of growth and value metrics.

For example, for a Stock A, we have:

$V_j, X =$ Standardized value of Value Factor j for stock A, $J=1$ to 3.

At this point, growth and value scores are used to establish rankings. A high Growth Score corresponds to a superior Growth Rank, while a low Value Score is indicative of a lower Value Rank.

Following the ranking process, each company's Growth Rank is divided by its Value Rank, yielding a ratio. This ratio is then organized in ascending order, leading to the formation of three style baskets:

- 1) Growth Basket: Formed by companies positioned at the forefront of this sorted list, with higher Growth Ranks and lower Value Ranks reflecting their emphasis on growth-oriented characteristics, this basket accounts for 33% of the total index market capitalization.
- 2) Blended Basket: Formed by companies positioned in the middle of this sorted list, with balanced mix of growth and value-oriented characteristics., this basket accounts for 34% of the total index market capitalization.
- 3) Value Basket: Formed by companies positioned at the tail end of this sorted list, with higher Value Ranks and lower Growth Ranks reflecting their emphasis on value-oriented characteristics, this basket accounts for 33% of the total index market capitalization.

The initial step in constructing the Style indices involves utilizing the previous divisions provided by the Style baskets. Companies within the Value basket have their entire float market capitalization directed solely to the Value index, while companies within the

Growth basket allocate their entire float market capitalization exclusively to the Growth index. Both the Value index and Growth index are defined as pure style indices.

Companies in the middle are distributed among the growth or value index based on their growth/value score distance from the average point of Value Scores and Growth Scores of companies in the respective Style basket.

For example, for Company A, the % of float market capitalization within the Value Index (WV,A) and Growth index (WG,A) is calculated as follows:

$$WV,A = DG, A / (DG, A + DV, A).$$

$$WG,A = DV, A / (DG, A + DV, A).$$

where DG,A and DV,A represent how far Company A deviates from the center of each Style basket. The sum of the two percentages must be equal to 1.

If WV,A = 0.4, it means that 40% of Company A's float market capitalization is in the Value Index, while the remaining 60% is in the growth index.

For practical reasons, the methodology provides rounding rules to avoid low percentages of stock's market capitalization. If WV,A is equal to or greater than 0.8, it is rounded up to 1.0, meaning that the entire market capitalization of that stock is assigned to the Value Index. Similarly, if WG,A is equal to or greater than 0.8, it is rounded up to 1.0, meaning that the entire market capitalization of that stock is assigned to the Growth Index.

Based on historical data, the methodology document indicates that the total market capitalization is roughly evenly split between the growth and value indices. However, it's important to note that fluctuations in stock prices could influence this split over time. Moreover, the procedure for assigning stocks in the blended basket to a specific index, whether it be value or growth, ensures a stable and controlled transition of stocks between the indices over time, as well as the avoidance of intersection between stocks with a mix of value and growth characteristics.

Annually, in December, the S&P U.S. Style Indices undergo a comprehensive rebalancing, which takes place after the market's closure on the third Friday of that month. This process falls within the scope of index maintenance. The growth and value indicators are determined following the conclusion of the final trading day of the preceding month. Closing prices recorded as of the second Friday of December are utilized to recalibrate the index weights for both value and growth index. This index maintenance necessitates

an overhaul of all previously examined steps, such as the resetting of style scores and midpoint averages for growth and value. Aside from the annual maintenance, other adjustments to the U.S. Style Indices occur in response to specific needs, aligning with the guidelines of the parent index. Typically, modifications for the parent index precede their execution by a period of two to five days.

The management S&P U.S. Style Indices are overseen by a dedicated Index Committee comprised of seasoned professionals who are employed full-time by S&P Dow Jones Indices. Periodic meetings are held by the committee, during which various matters related to the indices composition and performance are discussed, such as potential company changes, new index entrants and noteworthy events in the market landscape. Furthermore, the Index Committee has the authority to update policies governing criteria for company selection, handling of dividends, share quantities, and other related matters. Given the potential market impact of information regarding index changes and related discussions, all deliberations within the Index Committee are treated as confidential by S&P Dow Jones Indices. However, S&P Dow Jones Indices' Index Committees have the authority to make exceptions to methodology if necessary, providing clients with ample notice when deviations from standard rules occur. Additionally, these committees conduct annual reviews of index methodologies to ensure they align with objectives and remain effective, occasionally seeking input from external sources through consultations.

3.2.2 Index composition

According to its factsheet of 29 December 2023, S&P Value index is composed of stocks from the financial sector (22%), healthcare sector (19%), and industrials sector (12%) and Consumer Staples (10%), all of which are typically considered value sectors. The S&P Value index's top 10 stocks by index weights are as follows, listed from largest to smallest: Berkshire Hathaway B (BRK.B), JP Morgan Chase & Co (JPM), Exxon Mobil Corp (XOM), Johnson & Johnson (JNJ), UnitedHealth Group Inc (UNH), Chevron Corp (CVX), Bank of America Corp (BAC), Walmart Inc (WMT), Home Depot Inc (HD), and Intel Corp (INTC).

With a market capitalization of approximately \$26 trillion, which accounts for more than half of the total market capitalization of the S&P, the S&P Value index reflects a diversified portfolio of stocks representing sectors known for their value characteristics that historically demonstrate resilience and stability. By including companies with

stable earnings, strong fundamentals, and attractive valuations, the index aims to provide exposure to investments that have the potential to outperform over the long term.

3.3 Performance metrics

In the preceding section, we examined the construction and composition of the ETF S&P 500 Value Index. Another ETF utilized for our analysis is the total S&P ETF, which acts as a benchmark. To assess the performance of the two ETFs in terms of both returns and risk, established recognized metrics from the literature commonly utilized by professionals will be employed (Caporin and Lisi; 2011; Billio et al., 2015; Caporin et al, 2014). These indicators differ in the aspects of performance they focus on, each emphasizing one or more characteristics while disregarding others.

- Sharpe Ratio: developed in 1966 by William F. Sharpe, the Sharpe ratio is widely recognized as a measure of risk-adjusted performance. By considering the risk level taken to achieve an investment, it allows an effective evaluation of investment performance. This ratio certainly represents the most natural and intuitive metric in a mean-variance framework with a close historical connection to the literature. The Sharpe ratio is calculated by subtracting the risk-free rate of return from the average return of the investment, and then dividing it by the standard deviation of the investment's returns. Thus, let μ to be the expected return and σ to be the standard deviation of returns (in our case both computed historically), then let r to be the risk-free rate (in our case equal to zero), then the Sharpe Ratio formula is given as:

$$SR = \frac{(\mu - r)}{\sigma}$$

As an evaluation metric, the ratio is usually taken in annualized form to obtain a more clear and interpretable number. Annualization is achieved by multiplying the ratio obtained at a certain frequency, such as daily, by the square root of the number of periods in a year dictated by that frequency (Rollinger and Hoffman, 2013).

- Information Sharpe Ratio: When beating the benchmark is the goal, this statistic is especially useful. Structurally, it resembles the Sharpe ratio; however, instead of assessing risk-adjusted returns in relation to the risk-free rate, it compares them to a specific benchmark (Kidd, 2011). When the numerator of the Sharpe ratio is positive, indicating the portfolio has beaten its benchmark, a low denominator suggests a consistent pattern of outperformance, while a high denominator implies sporadic outperformance. The preference is for consistent outperformance. Conversely, when the numerator is negative, indicating underperformance, a low denominator suggests consistent underperformance, whereas a high denominator suggests sporadic underperformance. The preference here is for the second case.

- Sortino Ratio: a restriction of the Sharpe ratio that focuses on downside risk management rather than overall risk. The concept suggests that the investor perceives fluctuations in returns differently depending on whether they are positive or negative relative to expectations. This asymmetric view entails that the investor is primarily concerned about negative surprises, deviations below the average return, while positive deviations are welcomed as they positively impact capital (Rollinger and Hoffman, 2013). To capture this distinction, the Sortino ratio is calculated by using the negative semi deviation as denominator, defined as the standard deviation only with respect to returns that fall below the mean. There are different preferences for calculating semi-deviation. In this proposed work, the methodology involves creating a new vector from the series of returns, by taking only the negative returns (not those below the mean) and replacing positive returns with 0. The standard deviation is then computed based solely on this vector containing the negative part.

- Drawdown (maximum and average): Measures related to drawdowns hold significant importance for investment professionals and give important insights about risk associated with an investment. Taking historical data, this metric provides information about the maximum potential loss an investor might experience over a specific time frame (Caporin and Lisi, 2011). A larger drawdown indicates a higher level of risk, while a smaller drawdown indicates a

more stable investment. Thanks to its nature, this metric is useful in the timing of market entry. Two ways to calculate drawdown exist. The first and most used method is the maximum drawdown, in which for each point the drawdown is calculated as the difference between the portfolio's performance at that time and the highest peak it has reached up to that given time. The other method is the average drawdown, which involves summing all observed drawdowns during a specific timeframe and then dividing the total by the number of drawdowns observed. Let P_t to be the level of our profit and loss curve at time t and E_t to be the maximum value reached by our curve until time t , then the drawdown at each time t will be given by:

$$D_t = P_t - E_t$$

- Calmar Ratio: The structure is similar to the Sharpe ratio, but the risk measure used as the denominator is instead the maximum drawdown recorded by the portfolio (Magdon-Ismail and Atiya, 2004). In this way, this metric provides performance information adjusted for the risk of large losses.
- Value-at-Risk: it represents the percentile n in the distribution of returns, typically set at 5% or 1%. It informs investors about the maximum potential loss that could happen with a confidence interval of $1-n$. For example, if the VaR is set at 5%, you are evaluating the maximum potential loss with a 95% probability of not exceeding that loss. Value-at-Risk is an extremely debated measure. The main criticism stems from its lack of uniformity, as it overlooks what happens in the tails, focusing only on the threshold of risk. Clearly, for a reliable measure of Value-at-Risk, it is necessary to understand the probability distribution of investment returns (Caporin et al., 2011)
- Conditional Value-at-Risk: this measure is introduced to address the limitations posed by the non-homogeneity of Value-at-Risk, as well as its confinement to the threshold of the danger zone. Conditional Value-at-Risk is the expected value of returns beyond the percentile set by Value-at-Risk.²² This makes CVaR more

²² https://www.investopedia.com/terms/c/conditional_value_at_risk.asp

appreciated and used by both academics and practitioners, allowing a more accurate risk management.

3.4 Empirical Analysis

In this section, the metrics mentioned earlier were utilized to evaluate the value strategy itself, utilizing data from the iShares ETF based on the S&P Value Index. Subsequently, this value ETF was then compared to the total S&P market ETF to conduct a comprehensive analysis. By juxtaposing the performance of the value strategy against the broader market, insightful conclusions can be drawn regarding its efficacy relative to overall market trends. To do so, the data were downloaded from Yahoo Finance, and subsequently analyzed using Python programming through Google Colab by using the package QuantStats.

The empirical analysis starts with an examination of the value strategy's ability to generate returns over time in accordance with the assumed risk units. In this regard, it is useful to analyze the rolling 6-month performance of both the Sharpe and Sortino indicators.

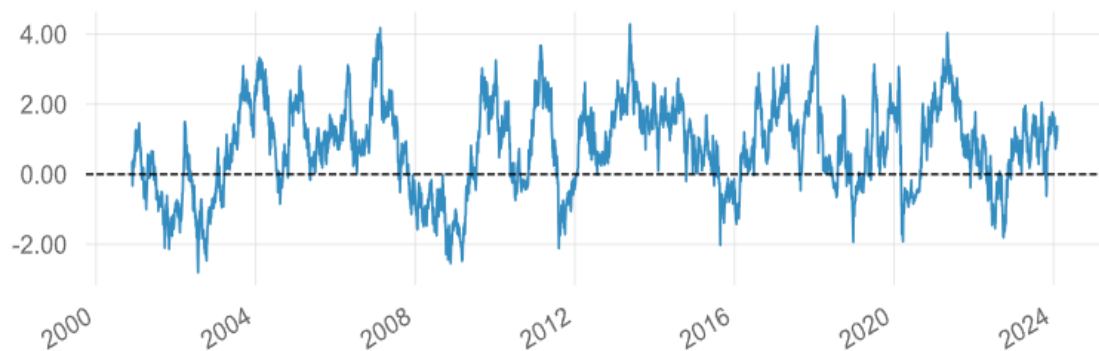


FIGURE 11 - THE ROLLING SHARPE (6 MONTHS) OF SPX VALUE. Source: Author's personal elaboration based on YahooFinance Data

Looking at the rolling Sharpe Ratio, it can be seen how the strategy has strongly rewarded the investor in various time periods over the past 23 years of observations. In particular, the strategy offered significant risk-adjusted performance from 2004 to 2008, reaching remarkable peaks of Sharpe Ratio up to 4. Subsequently, it experienced alternating periods of rapid growth and decline during the market turbulence following the subprime

mortgage crisis, before gaining sustained strength post-2012. Until 2020, the trend was rather irregular, although it reached the peak of 4 again. After the pandemic crash, the value strategy, like the broader market, benefited from the post-pandemic rally, reaching the maximum around 4 again. However, it then continued with a markedly irregular trend.

It is worth noting that periods of decline and negative values have frequently coincided with broader economic downturns. A prime example is provided by the 2008 crisis period, as previously mentioned, followed in 2011 by the negative period due to the US sovereign debt crisis, the pandemic crash of 2020, and the strong instability and uncertainty of the subsequent period and the present days. Indeed, geopolitical events are currently unfolding at a speed at which the strategy does not seem to have time to adjust.

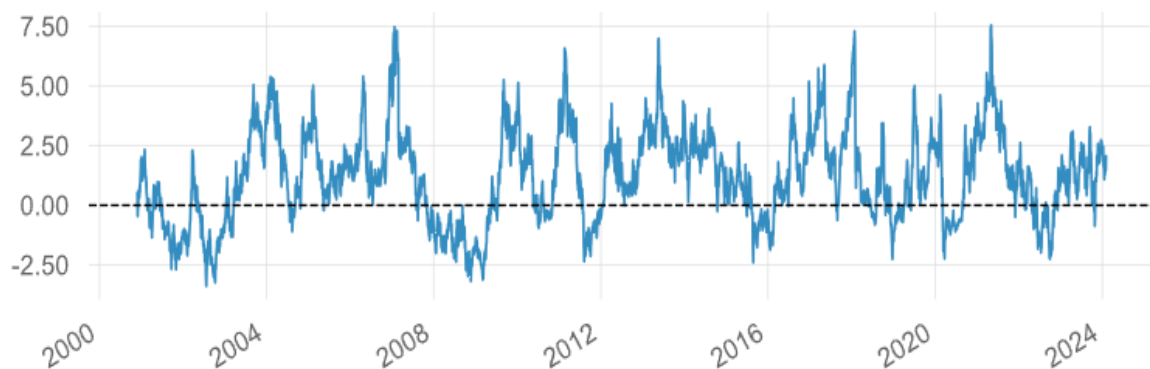


FIGURE 12 - THE ROLLING SORTINO (6 MONTHS) OF SPX VALUE. Source: Author's Personal Elaboration based on YahooFinance Data

The Sortino ratio exhibits a similar trend to the rolling Sharpe Ratio. Acting as a scaled version that emphasizes loss volatility over overall volatility, the Sortino ratio typically yields higher values. From the graph above, it is possible to observe that, while the peaks reached by the Sharpe Ratio were around 4, the Sortino Ratio's maximum values are around 7.50. This indicates that nearly half of the volatility component identified by the Sharpe Ratio was of a positive nature.

Moving to the assessment purely from the risk side, it is essential to profile the value strategy in terms of drawdown occurrences. Figure 13 highlights the five drawdown periods that have had the greatest impact on performance. In other words, these are periods during which the investment experienced the most significant decrease from its peak performance levels. To gain a deeper understanding of this concept, the so-called

"Underwater" graph (Figure 14) allows us to iteratively detect over time the drawdown phases and their extent.



FIGURE 13 - WORST 5 DRAWDOWNS PERIODS OF SPX VALUE. Source: Author's personal elaboration based on YahooFinance Data



FIGURE 14 - UNDERWATER PLOT OF SPX VALUE. Source: Author's personal elaboration based on YahooFinance Data

Once again, the patterns observed in the drawdowns coincide with major macroeconomic events, highlighting a certain interconnectedness between economic events and market performance. A notable initial drawdown followed the period of the attack on the Twin Towers and the subsequent conflicts²³, with drawdown peaks of up to 40%, as can be observed in Figure 14. Subsequently, there was a strong recovery post-2006, until the collapse associated with the subprime mortgage crisis²⁴, which resulted in the most severe

²³ <https://www.investopedia.com/financial-edge/0911/how-september-11-affected-the-u.s.-stock-market.aspx#:~:text=The%20terrorist%20attack%20on%20Sept,while%20gold%20and%20oil%20rallied>

²⁴ <https://www.federalreservehistory.org/essays/great-recession-and-its-aftermath>

drawdown in the analyzed period of over 60%. The Global Financial Crisis, also known as the Subprime mortgage crisis, was triggered by a combination of factors including high credit default rates and a burst housing bubble. It caused a chain of disasters within the US economy and reverberated throughout the global financial system (He, 2023). The breadth of the downturn persisted for several months, with a complete recovery taking 7 years. With the pandemic crisis, however, a 40% drawdown was reached, characterized by a sudden drop, but ultimately followed by a rather convincing recovery in relatively short time²⁵.

The analyses produced so far, however, reveal a still partial perspective of the success of the value approach to the markets in the last two decades. It has already been observed how, at least from the downside perspective, the performance of the strategy has substantially reflected that of the markets as a whole. To filter out this underlying movement, as well as biases related to geographic origin and high capitalization factor, it is useful at this point to move to a comparative analysis with the S&P 500. In this way, the analysis is more comprehensive and incorporates the concept of opportunity cost, under whose lens it is advisable to investigate investments.

The subsequent graph displays the performance of the SPX Value ETF compared to the overall investment represented by the SXP ETF.

²⁵ <https://www.forbes.com/sites/lizfrazierpeck/2021/02/11/the-coronavirus-crash-of-2020-and-the-investing-lesson-it-taught-us/?sh=3220f2ee46cf>

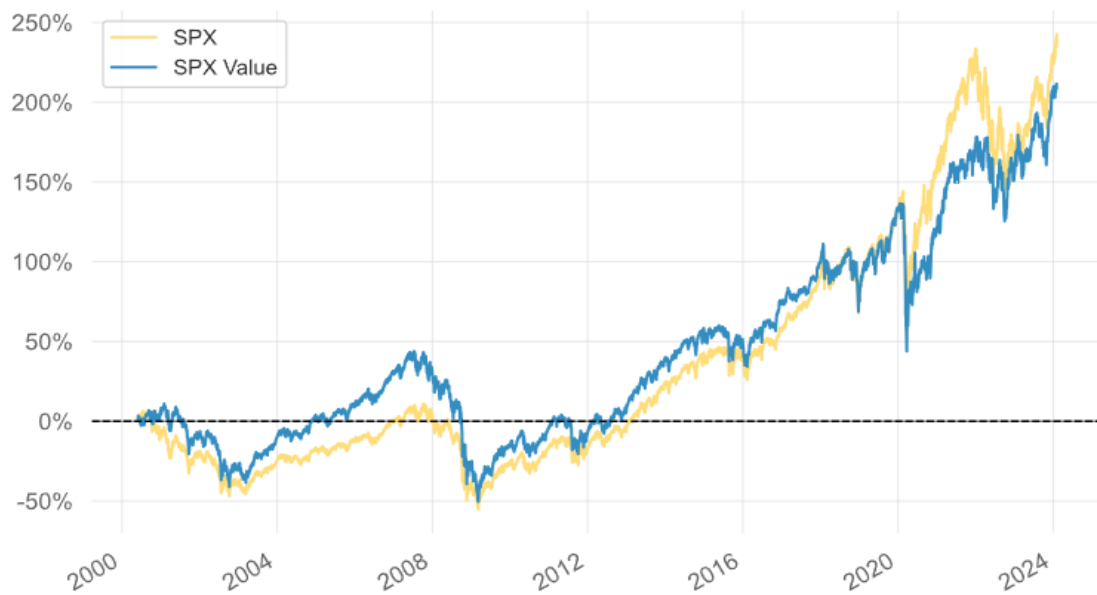


FIGURE 15 - PERFORMANCE COMPARISON. Source: Author's personal elaboration based on YahooFinance Data

The comparison of the performance of the two strategies reveals some interesting points. It can be noted from the graph above that for nearly 18 years, the value component consistently outperformed the S&P 500. This dominance was particularly evident during the period from 2006 to early 2008, where the performance gap between the two widened significantly. The narrowing of the difference occurred after the 2008 crisis, where the collapse of the value strategy was much more pronounced than the overall S&P 500. This result could be attributed to several factors, not easily investigated. However, one potential contributing factor could be the sale of momentum stocks to offset losses. The underlying reasoning is as follows: investors typically maintain diversified portfolios, comprising a variety of stocks, to effectively spread-out risk. In times of crisis, when some positions incur losses, investors frequently respond by selling profitable positions to counterbalance these losses. This selling activity increases the pressure to sell, leading to a more pessimistic outlook – known as bearish sentiment - particularly on stocks that had shown strong performance in the previous months. Part of the explanation for the more violent collapse of the value strategy during the 2008 crisis could be therefore attributed to the substantial appreciation of value stocks in the preceding years.

In the long recovery phase then, after an initial widening of the margin, the distance between the two Profit and Loss curves steadily diminished, until a first reversal of the two ETF occurred around 2018. This shift could be attributed to the efforts made over the years by international and US monetary policies to contain the devastating effects of the

subprime mortgage crisis. The decrease in interest rates, which even reached negative regimes in some specific cases, and the repeated and prolonged quantitative easing policy favored large injections of liquidity into the system (Kapoor and Peia, 2021). Such an interest rate environment typically supports the growth-oriented segment of the stock market. As already explained in the relevant section, growth stocks tend to borrow to favor investments, for example, in research and development, which should lead to future value explosions.

Additionally, as can be observed from the graph, the effect of the pandemic further exacerbated the collapse of the value section of the S&P 500. Subsequently, during the recovery phase, the gap expanded significantly, disadvantaging the market's value component. The coronavirus and the global lockdowns gave the final boost to the affirmation of intangible assets and the technology sector. Tech giants linked to online retail (Amazon), telecommunications and cloud services (Microsoft, Amazon, Google, Apple), social networks (Meta), and the consumption of audiovisual materials (Netflix, Amazon, Apple, Google) benefited enormously from the situation, building a strategic advantage that was further expanded by subsequent structural conditions. The pandemic has not only led to temporary changes; some effects have persisted over time, permanently altering consumers' lifestyles and work (Das et al., 2022). A notable example is the widespread adoption of remote working. These changes further enhanced and strengthened the technology sector, historically oriented towards the growth aspect due to the intrinsic need to invest heavily in research and development. Finally, the final wave was produced by the advent of Artificial Intelligence, never as concrete and manifest as this time (Rajat and Alok, 2023). From the advent of OpenAI, to Google's and Meta's counter-responses, despite encountering some bumps such as the Silicon Valley Bank incident²⁶, the technology sector has seen stratospheric amounts of liquidity entering, to the point that in 2023 there was often talk of a technology bubble. If it is indeed a bubble, however, it does not seem to show signs of slowing down, quite the opposite. These previously mentioned companies, along with Tesla, have been coined “Magnificent 7” by Bank of America analyst Michael Hartnett. According to Yahoo Finance data²⁷, in 2023

²⁶ In March 2023, SVB Bank, one of the largest banks in the US, ceased operations. The closure stemmed primarily from the investment portfolio's decline in value, a consequence of poor decision-making and inadequate risk assessment. Loss of confidence subsequently exacerbated the situation, leading to widespread depositors' withdrawals.

²⁷ <https://finance.yahoo.com/news/chart-day-magnificent-7-stocks-233626055.html>

the total market value of these seven giants was around \$12 trillion, equivalent to the combined value of the stock exchanges of Japan, Canada, and the United Kingdom, surpassing the GDP of every nation except China and the United States. Overall, the current growth trend of these seven stocks shows no signs of reversal, at least for now. As affirmed by Aadil Zaman (2023), partner at the Wall Street Alliance Group, the "Magnificent 7" group of tech stocks are expected to remain magnificent also throughout 2024.

According to Nasdaq, in 2023, the "Magnificent 7" accounted for roughly 28% of S&P 500 index's total market capitalization. The dominance of these few stocks exposes investors to concentration risks, precisely what indices should avoid, especially if those indices invest in broad sectors and geographic areas. Another problem is the use of indices as benchmark reference for asset allocation. In fact, any methodology applied to the 500 stocks of the S&P 500 index becomes problematic because of factors such as meet concentration, specific risk, and liquidity criteria.²⁸. Solutions can be multiple, the simplest is to use together with the market cap versions the equal-weighted versions, which allocates the same weight to each stock within the index, regardless of the company's market capitalization. In this way it is possible to reach much more balanced values, thus limiting the highlighted problems. This helps to reduce the concentration of the largest stocks and prevents a few dominant stocks from having a disproportionate impact on the overall performance of the index.

That said, it is interesting to note how there seems to have been in the markets in recent times a sort of compression of time that has not favored the underlying arguments in favor of a value approach. If time is measured by the number of events that occur, it appears that over the past three years, it has significantly accelerated. In a relatively short period, several significant events have happened, including a pandemic, a war in the heart of Europe, the escalation of hostilities in Israel, the disruptive impact of artificial intelligence, supply chain disruptions, failures of major corporations and the rise in interest rates. Value strategies typically need time to realize their profits, as they base their rationale on the fact that temporary shocks lead to inefficiencies that are likely to correct themselves as markets move towards equilibrium. However, the financial

²⁸ <https://www.alliancebernstein.com/corporate/en/insights/investment-insights/market-concentration-in-magnificent-seven-distorts-index-exposures.html>

landscape may now have entered a spiral in which shocks are so decisive and frequent that their impact is no longer temporary, and there is no longer an equilibrium to return to. Over time, a considerable number of shocks could gradually disrupt the balance, making previously effective value strategies less applicable or even outdated. As a result, investors who utilize these strategies may end up waiting for equilibria that have ceased to exist, making it challenging for them to achieve their desired outcomes.

To verify this perspective in a way that transcends the simple visual suggestion offered by the equity lines, a straightforward analysis was undertaken. This analysis involved regressing the excess returns of the value index against the broader S&P 500 over time, as depicted in the following graph.

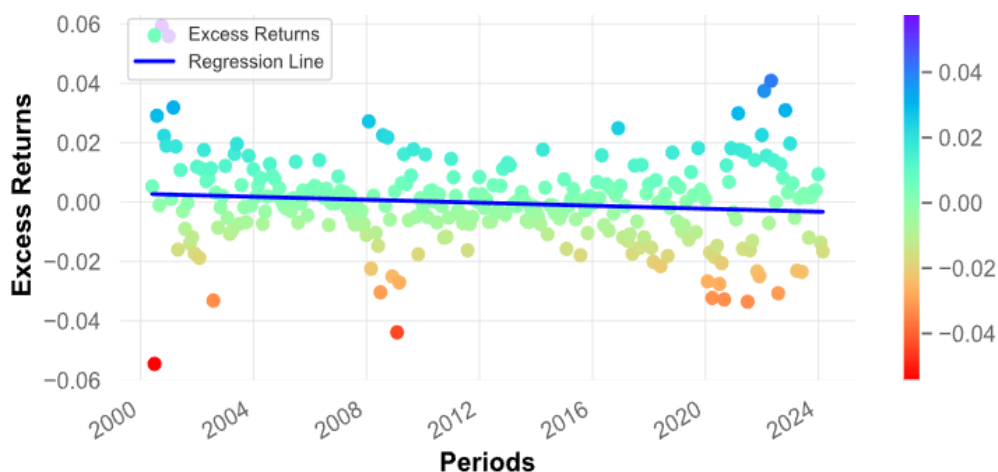


FIGURE 16 - DECLINE IN SPX VALUE PERFORMANCE OVER TIME. Source: Author's personal elaboration based on YahooFinance Data

The slope of the line is negative, as can be observed. In more detail, we can verify the intuition by examining the heatmap that plots the excess returns of the S&P 500 Value against the overall index by year and month. A certain outperformance of the Value ETF is evident in the first years after 2000, probably due to a reaction of the markets of the dotcom bubble.²⁹ The bursting of a bubble usually prompts investors to redirect their

²⁹ <https://www.investopedia.com/terms/d/dotcom-bubble.asp>

attention towards more stable and fundamentally sound companies, often associated with the value sector.³⁰

After relatively stable middle years, except for the period surrounding 2008, the real collapse of the Value ETF began in 2020 and the pandemic crisis, largely attributed to the rise of big tech, as previously explained. A certain recovery occurred in 2022, likely due to a combination of overvaluation of growth companies stemming from the post-pandemic rally and the outbreak of the Russo-Ukrainian war, which once again undermined certainties and led to a significant increase in inflation³¹

³⁰ <https://fundx.com/insights/worried-about-market-lessons-dot-com-bubble>

³¹ <https://www.economicsobservatory.com/ukraine-whats-the-global-economic-impact-of-russias-invasion>

2000	0.00	0.00	0.00	0.00	0.53	-5.37	2.96	-0.10	5.80	2.34	1.88	5.88
2001	0.19	2.96	1.84	-1.64	1.10	-0.30	-0.87	0.02	-1.27	-1.20	-1.81	1.20
2002	-1.86	1.09	1.81	0.67	0.84	1.08	-3.11	0.22	-0.86	-0.29	0.12	1.17
2003	-0.57	-1.09	-0.97	1.75	2.04	-0.75	0.58	-0.19	-0.67	1.66	-0.12	1.16
2004	0.20	0.54	0.79	-0.73	-0.37	0.18	1.26	0.91	0.80	0.25	0.49	0.02
2005	-0.15	-0.21	0.05	-0.30	0.13	1.37	-0.71	-0.03	0.39	0.24	-0.47	0.40
2006	0.45	0.55	0.49	1.43	0.37	0.15	0.44	-0.78	-0.04	0.18	-0.03	0.87
2007	0.38	0.09	0.32	-0.23	0.21	-0.51	-0.74	-0.18	-0.79	-0.31	-0.76	-1.10
2008	2.53	-2.22	0.16	-1.13	-1.52	-2.78	2.06	-0.21	1.80	0.13	-2.34	0.09
2009	-4.01	-2.48	0.33	1.57	0.52	-0.63	0.94	1.83	-0.54	-1.75	0.13	-0.15
2010	1.56	-0.53	0.39	0.38	0.01	-0.64	0.26	-0.14	-1.30	-1.21	-0.52	1.55
2011	0.85	0.21	-0.27	-0.42	-0.70	-0.49	-1.58	-0.80	-0.53	0.22	-0.01	0.82
2012	0.26	-0.22	0.07	-0.67	-0.61	0.58	-0.35	-0.30	0.55	1.10	-0.44	1.33
2013	1.31	-0.12	-0.02	-0.14	0.09	0.33	0.07	-0.60	-0.69	-0.25	-0.15	-0.32
2014	-0.47	-0.77	1.80	0.52	-1.10	-0.11	-0.09	-0.39	-0.33	-0.55	-0.38	0.77
2015	-1.53	-0.15	0.11	0.45	-0.57	0.07	-1.81	0.06	-0.27	-1.14	0.20	-0.08
2016	0.04	0.67	0.14	1.58	-0.78	0.58	-0.99	0.44	-0.39	0.23	2.60	0.56
2017	-1.21	-0.15	-1.29	-1.09	-1.75	1.25	-0.67	-1.52	1.28	-1.21	0.29	0.61
2018	-1.60	-1.89	0.75	0.01	-2.19	0.06	0.29	-1.86	-0.19	1.64	0.72	-0.51
2019	0.55	-1.00	-0.80	0.01	-1.17	1.08	0.24	-1.00	1.86	0.42	0.25	0.10
2020	-2.62	-1.54	-2.97	-2.10	-1.64	-2.89	-2.17	-3.46	1.29	0.70	1.92	-0.37
2021	-0.58	3.12	1.87	-1.63	1.72	-3.40	-1.67	-1.34	1.35	-2.47	-2.46	2.42
2022	3.69	1.61	-0.62	3.91	1.58	0.10	-3.23	1.29	0.80	3.45	0.49	1.91
2023	0.68	-0.52	-2.39	0.13	-2.33	0.29	0.17	-1.16	0.17	0.35	0.43	0.97
2024	-1.36	-1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

FIGURE 17 - SPX VALUE EXCESS RETURN ACROSS MONTHS AND YEARS. Source: Author's personal elaboration based on YahooFinance Data

It is also interesting to observe the year-by-year evolution of returns (Figure 18). Over a span of approximately 23 years, the value ETF maintained its dominance for the first 7 consecutive years, abandoning its lead for the following 5 years, totaling 10 years of outperformance out of 23. Here, again, the figure confirms an almost identical performance for the two ETF, but underscores the preference shift towards growth stocks in recent years, at least in the American market.

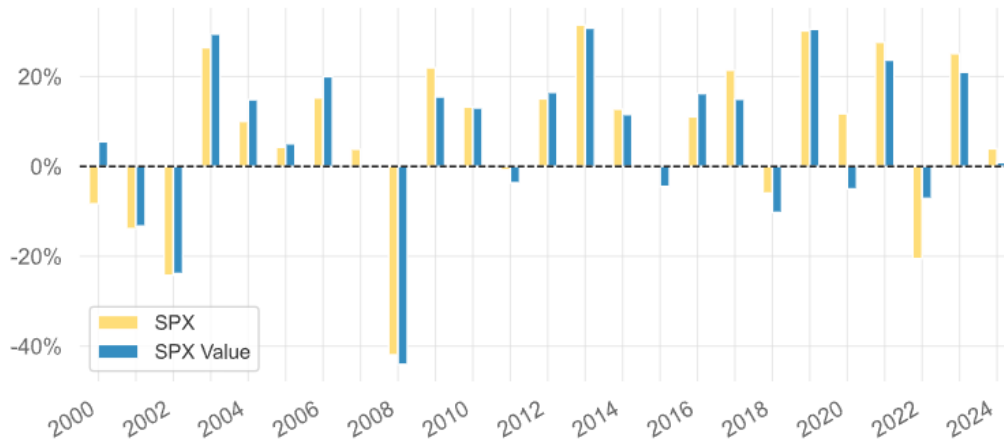


FIGURE 18 - ANNUAL RETURNS COMPARISON. Source: Author's personal elaboration based on YahooFinance Data

To conclude, it's useful to finally look at the performance metrics achieved over the entire period by the Value ETF in comparison to the generic S&P 500 benchmark. Up to this point, one could anticipate that the Value ETF, though by only a slight margin given the similar trend observed over the years, would underperform compared to growth overall. Upon closer inspection of performance measures (Table 1), it becomes evident that the Value ETF indeed underperformed slightly in terms of both risk and return.

TABLE 1 - MEASURES COMPARISON Source: Author's personal elaboration based on YahooFinance Data

Metric	SPX	SPX Value
Risk-Free Rate	0%	0%
Time in Market	100%	100%
Cumulative Return	242,60%	210,69%
CAGR%	3,65%	3,36%
Sharpe	0,37	0,34
Sortino	0,51	0,47
Volatility	19,43%	19,73%
Information Ratio	-	-0,06
Calmar Ratio	0,05	0,05
Skew	-0,27	-0,43
Kurtosis	11,54	9,85
Expected Daily	0,02%	0,02%
Expected Monthly	0,43%	0,40%
Expected Yearly	5,05%	4,64%
Daily Value-at-Risk	-1,99%	-2,02%
Expected Shortfall (cVaR)	-1,99%	-2,02%

Conclusion

Through exploration, this thesis unveils the essence of value investing. In the complex landscape of financial markets, the concept of "valuation" emerges as a crucial guide, illuminating the path toward informed decisions and strategic investments. The investigation into valuation methodologies reveals that valuation extends beyond mere numerical calculation, embracing historical data, future projections, and qualitative insights, as emphasized by Warren Buffet's perspective that valuation is a mix of art and science (Walsh, 2008)

Following a detailed examination of the core principles and mechanisms supporting value investing, the navigation of the topic exposes a dichotomy between absolute and relative approaches, with the contributions of Damodaran's works significantly shaping our understanding. While absolute valuation offers a robust framework rooted in intrinsic value, its reliance on subjective assumptions poses challenges, especially in a world filled with uncertainty. Relative valuation, widely adopted for its simplicity and adaptability, offers a practical, yet vulnerable tool. It effectively captures pricing discrepancies; however, its limitations stem from sensitivity to market sentiment and a lack of transparency. The exploration of relative valuation extends across its entire implementation process. While the thesis offers a structured approach with four clear steps, it is essential to acknowledge the dynamic nature of today's market environment. Therefore, adjusting to the evolving landscape of market conditions and embracing emerging factors such as ESG criteria and technological advancements becomes essential to guarantee the efficacy of valuation methodologies.

In the third chapter, from the empirical analysis of the value investment strategy, interesting insights have surfaced, providing a clear snapshot of its trajectory in the American financial domain. The historical performance of the value strategy highlights both its resilience and sensitivity to macroeconomic events. While it has demonstrated robustness during periods of stability, such as the mid-2000s and post-2012, it has also exhibited vulnerability during crises like the 2008 financial downturn and the COVID-19 pandemic. These occurrences underscore the cyclical nature of the value strategy and its sensitivity to market downturns, highlighting the importance of risk management and the necessity for investors to remain adaptable in their approach.

To provide a more in-depth analysis, a comparison was made between the value strategy and the broader market of the S&P 500. This comparison revealed a nuanced picture: while in the last decades the value strategy has proven its worth by frequently outperforming the S&P 500, recent years have introduced a significant paradigm shift. This changing landscape underscores the perpetual importance of considering opportunity cost in investment decisions.

As revealed throughout the progression of this thesis, the dominance of technology giants and the temporal “compression” of financial events are emerging as dual drivers reshaping the market landscape.

As affirmed by The New York Times³², the so called "Magnificent 7" tech stocks have risen as market titans, redefining investment paradigms and posing a challenge to traditional value-oriented strategies. This raises the question of whether we are experiencing a revival of the tech bubble, like the dotcom crash of the early 2000s. J.P. Morgan has recently expressed concerns about the stock market's increasing concentration in few companies, drawing parallels to the dotcom bubble of the early 2000s. Despite some similarities in terms of concentration and sectors, discerning voices suggest that values of fundamental metrics, such as P/E, and present market conditions differ from that era³³. However, nowadays, especially with the rapid advancement of AI, there is no apparent evidence of a deceleration in the expansion of this type of technology-driven trend.

Moreover, today's financial landscape is characterized by a compression of time, marked by the rapid unfolding of events and a persistent state of volatility. The era of value-based strategies may be at a turning point, facing a landscape where equilibrium is elusive, and shocks always more frequent. This “dynamic equilibrium” represents a problem as the value strategy relies on the concept that, in the long run, the market tends to converge towards the intrinsic value of companies, rather than being swayed by short-term emotional fluctuations. On this perspective, Benjamin Graham, employed a powerful analogy to illustrate how the stock market operates. He depicted the market as a "voting

³² <https://www.nytimes.com/interactive/2024/01/22/business/magnificent-seven-stocks-tech.html>

³³ <https://www.fastcompany.com/91022499/tech-bubble-jpmorgan-stock-market>

machine" for short-term fluctuations, where stock prices reflect investor sentiment and noise. However, his view of the market as a "weighing machine" highlighted its long-term equilibrium-seeking nature, wherein stock prices eventually align with the intrinsic value of companies (Graham and Dodd, 1998). Therefore, this change in equilibrium is critical as it calls into question the validity of the value strategy and suggests the need for a reassessment of investment methodologies to adapt to this new market environment.

In conclusion, while the value strategy continues to represent an important and valid investment approach, it is crucial for investors to carefully assess the associated risks and returns, especially in the face of a rapidly evolving market environment and structural changes in the global economy. Although the future of financial markets remains uncertain, the imperative of adaptability and resilience is clearly evident. Navigating the intricacies of the global economy, the lessons learned from this research emphasize the importance of remaining vigilant, flexible, and open to new paradigms in investment strategy.

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