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Is contrarian investment producing higher returns for value investors?

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Resumo

Esta dissertação aborda a complexa área de tomada de decisão relacionada à avaliação de ações. O foco do estudo prende-se pela estratégia de investimento em valor e na abordagem *contrarian*, investigando se proporciona retornos mais elevados aos investidores. O conceito de margem de segurança, introduzido por Klarman (1991), também é discutido, relacionando-o ao investimento defensivo, como a importância de identificar ações subvalorizadas ou sobrevalorizadas.

Além disso, este estudo aborda o papel das emoções e do comportamento irracional dos investidores na formação dos preços das ações e como esses fatores podem criar oportunidades para investidores que buscam abordagens *contrarian*.

Os resultados sugerem que, ao contrário da literatura anterior que defendia maiores retornos com a estratégia de investimento em valor, os dados observados durante o período analisado podem não confirmar a continuidade dessa tendência, revelando uma correlação decrescente entre estratégias *contrarian* de investimento e retornos.

Diante das limitações deste estudo e da amostra reduzida utilizada, futuras pesquisas devem considerar o aumento do tamanho da amostra para obter conclusões mais robustas. Além disso, é importante observar que, embora o estudo não tenha confirmado a eficácia do investimento em valor durante o período analisado, esses resultados são específicos para esse período. Dadas as mudanças significativas no cenário macroeconómico e de mercado em 2022-2023, as dinâmicas do investimento em valor podem evoluir de novo.

Palavras-chave: Horizonte de investimento de longo prazo, investimento em valor, *Contrarian Investing*, *Overreaction*, *price-to-earnings ratio*, *price-to-book ratio*.

Abstract

This dissertation addresses the complex area of decision-making related to stock valuation.

The study will focus on value investing and the contrarian investment approach, investigating whether this strategy provides investors with higher returns. The concept of margin of safety, introduced by Klarman (1991), is also discussed, relating it to defensive investment, such as the importance of identifying undervalued or overvalued stock.

Furthermore, this research addresses the role of emotions and irrational investor behaviour in stock price formation and how these factors can create opportunities for investors seeking contrarian investment approaches.

The findings suggest that contrary to past literature that advocated for higher returns with a value investment strategy, the observed data during the analysed time period may not be able to confirm the continuity of this trend as previously reported, revealing a diminishing correlation between contrarian investment strategies and investment returns.

With the limitations of this study and the small sample used, the sample should be increased for further study to get more robustness to the conclusions.

While the study did not confirm the effectiveness of value investing during the analysed period, it is essential to note that these findings are specific to that period. Given the significant shifts in the macroeconomic and market landscape in 2022-2023, the dynamics of value investing may evolve again.

Keywords: Long-term horizon, Value Investing, Contrarian Investing, Overreaction, Price-to-Earnings Ratio, Price-to-Book Ratio.

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Introduction

I. Scope of the study

In the dynamic world of finance and investment, compelling stock valuation and investment strategies are paramount for investors, analysts, and other stakeholders. This dissertation explores these complexities, drawing from a thorough literature review.

This dissertation tries to demonstrate how diversification strategies adapt to dynamic market conditions. Also, considering Lakonishok et al. (1994), this study will try to find evidence that investing in value stocks may bring higher returns.

II. The analyst's role and their influence on investors

Garcia and Sangiorgi (2011) argue that analysts may provide accurate information to specific groups of investors while transmitting potentially inaccurate information to larger audiences, driven by the desire for profits through paid information requests.

Within financial decision-making, analyst recommendations serve as a linchpin of influence.

This study aims to shed light on their significant influence. This study emphasises that market analysts, analyse micro and macroeconomic factors to estimate company values and forecast future returns. Furthermore, it underscores the paramount importance of heeding analyst recommendations, as they often hold the key to achieving abnormal returns.

Dreman (1979) thus argues that one should take advantage of the mistakes made by analysts to obtain abnormal returns on the stocks in which one invests. Some stocks that were considered unfavorable may have positive returns.

This journey delves into dissecting the influences that shape analysts' perspectives. We will explore the economic incentives brokers provide, which can sway forecasts, and also shed light on the phenomenon of less experienced analysts presenting overly optimistic forecasts to nurture client relationships, possibly leading to biased recommendations.

III. The focus on contrarian and value investment strategies

This dissertation aims to focus on contrarian and value investing strategies. Contrarians seize upon market sentiment and emotional biases, targeting stocks deemed unfavourable in pursuit of potentially higher returns. Value investors diligently seek undervalued stocks using various indicators, capitalising on pricing discrepancies for profitability.

Considering the value concept and the expectation for higher returns when imposing this philosophy, Lakanishok et al. (1994) stated that value strategies might produce higher returns because they are contrarian to "naive" strategies followed by other investors.

Value investment is a strategy that may be implemented with a long-term horizon. As stated by Klarman, S. (1991), value investing, the strategy of investing in securities trading at an appreciable discount from underlying value, has a long history of delivering excellent investment results with minimal downside risk.

According to Lakanishok et al. (1994), the contrarian model argues that underpriced out-of-favour or value stocks are those that have previously performed poorly and are expected to continue to perform poorly.

Moreover, concerning the relationship between higher returns and these investment strategies, the same study suggests that value strategies that bet against those investors who extrapolate past performance too far into the future produce higher returns.

IV. Unmasking and importance of psychological factors

This section uncovers the significant role of psychological factors in financial markets. Dreman and Lufkin (2000) introduced a statistically testable hypothesis grounded in psychological forces, suggesting that investors exhibit predictable reactions to events. They tend to extrapolate positive or negative outlooks well into the future, resulting in favoured stocks being bid up to excessive premiums and out-of-favour stocks being discounted.

Throughout this study, we attempted to highlight the pervasive influence of psychological factors, encompassing overconfidence, sentiment, and behavioural biases, in shaping investment decisions. These emotional dynamics emerge as critical determinants of stock market returns.

Regarding emotions, Subrahmanyam et al. (1998) found that the overconfident-informed outweighs the private signal relative to the prior, causing the stock price to overreact. When noisy public information signals arrive, the inefficient deviation of the price is partially corrected, on average.

According to Klarman S. (1991), Investors are sometimes their own worst enemies. When prices are generally rising, for example, greed leads investors to speculate, to make substantial, high-risk bets based upon optimistic predictions, and to focus on return while ignoring risk. At the other end of the emotional spectrum, when prices generally fall, fear of loss causes investors to focus solely

on the possibility of continued price declines to exclude investment fundamentals.

This research focuses on the interplay between rational and irrational factors that define market efficiency. It tries to challenge the conventional notion that stock returns are solely driven by rational factors, shedding light on the coexistence of irrational components.

V. Defensive investing, risk, and the margin of safety

In this dissertation, we also explore the realm of defensive investing.

Regarding this topic, Klarman S. (1991) stated that the focus of most investors differs from that of value investors. Most investors are primarily oriented toward return, how much they can make, and pay little attention to risk, how much they can lose.

It will underscore the pivotal concept of a margin of safety. This dissertation advocates for the prudent purchase of assets below their intrinsic values, serving as a protective shield against human errors and the unpredictability of market volatility.

According to Klarman, S. (1991), When a company is significantly undervalued, it is also likely to be less risky because the margin of safety reduces the danger that an investor will suffer a permanent loss of capital.

VI. Objective of the research

This study aims to evaluate whether value stocks can generate higher returns than growth stocks over a 10-year holding period while effectively managing associated risks and maintaining a long-term investment perspective.

As outlined by Lakanishok et al. (1994), value strategies encompass the acquisition of stocks with low prices relative to earnings, dividends, historical prices, book assets, or other value measures.

As highlighted by Siegel, J. (2013), the enduring stability of stock returns has remained consistent over the past two centuries. However, it is essential to acknowledge that long-term stability does not necessarily guarantee short-term stability.

DeBondt and Thaler (1987) explored the impact of overreactions to unexpected news on stock prices. Meanwhile, Klarman S. (1991) underscored how investors are often enticed by the allure of quick gains, leading to overreactions in the market. This research aims to navigate the intricacies of these factors with narrative while preserving the integrity of the cited sources.

VII. Structure of the study

This dissertation is structured into five chapters, each trying to contribute to understanding the research topic.

The breakdown of chapters and their respective content is as follows:

Chapter one: literature review

- Provides an overview of the research topic, exploring the concepts of value stocks and contrarian strategies.
- Distinguish between stock prices and intrinsic value.
- Discusses the importance of the margin of safety, the role of market analysts, and the influence of psychological factors on investment decisions.

Chapter two: methodology and data

- Presents the methodology used in the research, including the rationale behind the sample selection and choice of variables.

Chapter three: data analysis and econometric model

- Outlines the econometric model employed in the research to analyse the data.
- Details the statistical techniques, variables, and methodologies used to investigate the relationship between value and contrarian-based investment strategies and their impact on returns.
- Offers insight into the quantitative aspects of the study and the modelling approach used to derive meaningful conclusions from the data.

Chapter four: research findings and analysis

- Delves into a discussion and analysis of the research findings, offering insights and interpretations.
- Highlights the conclusions and implications drawn from the study's results.

Chapter five: conclusion, limitations, and final thoughts

- Presents the primary conclusions of the dissertation, summarising the essential findings and their significance.
- Includes the limitations faced during the whole project, bearing in mind the data extraction, and tries to present information about potential future research regarding this topic.
- In the end, to sum up, there is a final thoughts reflection section where some points are outlined regarding the conclusions and potential implications of the period in the analysis of the conclusions taken.

This structure ensures a systematic and coherent exploration of the research topic, facilitating a clear and logical progression through the dissertation.

1. Literature review – understanding stock valuation and investment strategies

1.1 Introduction

Investments are the critical foundations for wealth creation. Admittedly, the investment process may be structured and carried out prudently, with knowledge of the action to be taken. To do this, it is fundamental to underline and appropriate a way to make decisions within them to obtain higher results.

In this dissertation, we will focus on value and contrarian investment as strategies focused on the long run: investing in high-quality assets at a discounted price, going against the trends, and the greed to gain easy and quick money. We will try to figure out if investing in stocks that were previously unfavourable produces higher returns.

This literature review explores the essential aspects of stock valuation and its impact on investment decisions. We delve into the significance of expert recommendations from financial analysts and their influence on investment strategies.

1.2 Structure of the literature review

The structure of the literature review and this dissertation is designed to provide a logical narrative. It begins with an introduction and then explores the concepts of value stocks and the contrarian strategy. The subsequent section emphasised the critical distinction between stock prices and a stock's intrinsic value, as this divergence forms the linchpin for both value and contrarian investors.

Moving forward, the discussion examines factors that significantly influence investors' decision-making processes. It also focuses on how human emotions and overreactions can lead investors to make choices that deviate from the core principles of value investing.

The final section of this literature review summarises critical conclusions drawn from prior research. Many of these findings indicate that, over the long term, investments in value stocks tend to yield higher returns.

1.3 Value stocks and contrarian strategy

In the financial landscape, concepts like value stock may denote equities trading below their intrinsic value (Wang et al., 2011). Conversely, a contrarian investment strategy capitalises on market overreactions, seeking opportunities in overlooked stocks (Dreman, 1998). These strategies, underpinned by academic research (Wang et al., 2011; Chan et al., 1991), are fundamental to informed investment choices in the dynamic stock market.

When investing in a stock, it should be recognised that the investor is acquiring a share in a company. Therefore, it is crucial to adopt an owner's mindset and understand the company's dynamics, management practices, operational and financial performance, and the future outlook of its core business.

1.4 Intrinsic value (stock price vs. value)

In this section, we delve into the pivotal role of intrinsic value in investment strategies, examining perspectives from various authors, such as Jensen, Bodie, and Damodaran, and how they influence stock pricing dynamics. Understanding the essence of intrinsic value is crucial for making informed investment decisions and pursuing consistent returns in the stock market.

Ideally, stock prices should reflect all information about stocks, but information costs should be zero. Thus, Jensen (1978) considered that prices should reflect information until the moment when marginal costs are lower than the marginal returns obtained when acting based on said information.

For Bodie et al. (2007), the fact that it is not possible to accurately predict future changes in stocks reduces the efficiency of the market and makes a technical analysis based on the trend less valuable.

According to Damodaran, A. (2019), the potential gap between price and value is at the core of almost all investment philosophies. For instance, value investors believe that markets will see the gap over time and that the price will converge toward value. For Damodaran, A. (2019), the determinants of price are demand and supply, and while fundamentals affect both, mood and momentum can also affect pricing. These “animal spirits,” as behavioural economists may tag them, can cause prices to diverge from value and require different tools to assess the proper pricing for an asset.

The value of stocks is a concept that may be described as the fundamental worth of a security based on a thorough analysis of its underlying financial factors, earnings potential, and risk profile. It signifies the price an informed and rational investor would be willing to pay for a stock, irrespective of its current market price.

As described above, intrinsic value is a critical concept in stock valuation. It reflects the underlying fundamentals and is a foundation for value-based investing strategies.

For value investors, according to Novy-Marx, R. (2015), buying high-quality assets without paying premium prices is just as much value investing as buying average-quality assets at discount prices.

It is crucial to mention that this dissertation, with its intent to show the possible relationship between contrarian investment and higher returns for

investors, will be focusing primarily on the paper from Lakonishok et al. (1994) that considers the appropriate measure of value would be the ratio between the book value of the share and the market value of equity. However, authors such as Chan et al. (1991) considered that the adequate measure of value was the ratio between price and earnings.

Other indicators, such as the income obtained from dividends, were also used, as Fama and French (1996) indicated. In this way, the stocks are considered value stocks when the indicators appear above a specific value. When the shares in question relate to entities with difficulties but are undervalued by investors, the market corrects the errors in terms of price, and therefore, higher returns can be obtained from these shares, considered value shares, as discussed by Haugen (1995). In contrast, when stocks appear below a particular value, they are growth stocks, which are so-called because they have a high growth rate and are therefore very appealing to investors.

According to Novy-Marx, R. (2015), value investors buy high-quality assets without paying premium prices or invest in medium-quality products paying discount prices.

Klarman, S. (1991) defines and emphasises the concept of margin of safety, explaining that it is achieved when securities are acquired at prices below the underlying value to prevent the existence of human errors, volatility and unforeseen events.

De Bondt and Thaler (1985) studied the exaggerated reaction of market participants and whether it influences market prices and returns obtained through shares. They concluded that past “losers” portfolios outperform past “winners.”

1.5 Decision-making in investing

Having established the core tenets of value and contrarian investments, exploring the driving factors that led investors to adopt these strategies is essential.

Investors face several challenges when deciding which type of stocks to invest in or whether to invest in at all. These challenges may include needing more information, the allure of quick and easy profits, a short-term investment perspective, and potential biases arising from analysts' information disclosures.

Market analysts are pivotal in understanding the factors influencing stock valuations, encompassing microeconomic and macroeconomic elements. Based on these analyses, they aim to accurately assess a company's current value, predict future valuations, and forecast investor returns. These predictions draw from historical trends and information relevant to stock price movements. Barber et al. (2001) underscores the importance of considering analyst recommendations to achieve abnormal returns.

1.5.1 Analysts' recommendations and their influences

Brauer and Wiersema (2018) emphasise that investment decisions are greatly influenced by available information, especially recommendations provided by financial analysts, which may be considered credible source. This reliance on analysts can sometimes lead investors to gravitate toward glamour stocks rather than value stocks.

Analysts tend to favour stocks with high trading volumes, strong market dynamics, and satisfactory profits. However, Jegadeesh et al. (2004) argue that analysts may not always promptly recognise sudden changes in stock performance. Additionally, Easterwood and Nutt (1999) contend that analysts may occasionally exhibit a biased reaction to influence investment decisions

intentionally. Driskyl et al. (2020) hold a different perspective, suggesting that analysts' focus may be too narrow. Ho et al. (2022) point out that analysts often overlook value stocks, as they may recommend overvalued stocks while ignoring potential undervalued opportunities.

It is important to note that some less experienced analysts may overly offer optimistic forecasts to maintain a good client relationship, as observed by Arand and Kerl (2015). Economic incentives brokers provide to analysts can also influence the forecasts given to clients, as Gu et al. (2013) researched. In line with this, Lien et al. (2020) conclude that analysts tend to make more buy recommendations than sell recommendations, reinforcing the previously mentioned points.

Analysts' inherent biases can sometimes lead investors to choose investments that may not yield the highest returns in the long run.

1.5.2. Psychological, emotional, and overreaction

As discussed in the previous chapters, unfavourable stocks that did not produce good returns in the past can bring higher returns due, for instance, to the overreaction of the market's interventions.

Thus, as suggested by Welagedara et al. (2017), while the irrational investor overreacts to what the analyst recommended, stock prices become even more unfavourable.

Lakonishok et al. (1994) and Haugen (1995) analyse the exaggerated reaction of investors and consider it an opportunity to take advantage of the fact that the prices of stocks whose behaviour is unfavourable fall. This situation leads to undervaluation. However, when the overreaction is corrected, stock prices tend to approach the fundamental value, and at that time, high returns can be achieved relative to stocks.

Baker and Wurgler (2007) analyse emotion when choosing stocks to make up an investment portfolio and conclude that the stocks most affected by emotion

and sentiment are more challenging to evaluate, having higher risk and, therefore, higher returns.

Pornpikul and Nettayanun (2021) also analysed the emotional issue more recently. They understood that rational feelings significantly affect stock market returns and can be used to explain financial crises in which there was little rationality in decisions.

Asness et al. (2015) concluded that investors who ignored that stocks were losing stocks in the past and continued to invest in them obtained higher returns than those who considered this information. Thus, they believe this situation led to profits obtained through the opposite investment, albeit unconsciously.

The fact that the stock prices become unfavourable due to the overreaction can be an opportunity for the so-called contrarian investor. The stocks that analysts recommended are overpriced until word gets out and allow for abnormal returns, but once the overreaction is corrected, the situation changes.

Jagirdar and Gupta (2023) consider that value investing and contrarian investing are the approaches most used by investors worldwide. In both approaches, there is a focus on market efficiency, and that is why the authors analyse both strategies.

According to Pani and Fabozzi (2021), value investing was one of the bases of stock investment strategies, underlying the fact that it is believed that the acquired shares are undervalued. Accordingly, investors created the measure of value they considered the real one to evaluate the stocks, deciding based on that.

1.6 Exploring contrarian investing strategy

Mayo (2011) confirms the importance of adopting a contrary view at certain times. It considers that the primary basis of this investment strategy is knowledge of the returns obtained in the past. Thus, the author finds that investors using

this strategy should buy stocks that were losing value and sell stocks that were gaining value in the past.

De Bondt and Thaler (1985) analysed the opposite investment strategy. They found that investors' psychological or emotional component is the most determining factor for the price of the shares in question, so it is essential to take advantage of the forecast rates of those who analyse the market and stocks. According to this strategy, investments are made in stocks considered unfavourable, which is how abnormal, but higher returns are obtained.

Dreman (1998) argues that the opposite investment strategy is based on irrational behaviour by investors since, at some point, their reaction to the market is exaggerated.

Even so, Jegadeesh and Titman (1993) consider that buying stocks that made money in the past and selling those that made the investor lose money also generates significant abnormal returns. However, this strategy is the most common; it has less associated risk and, therefore, positive returns, but it is lower than the opposite investment, in which the risk is very high (Chan, 1988).

In the opposite investment strategy, the most crucial step is identifying the losing and winning stocks, as Choi (2021) analysed.

According to Lo and MacKinlay (1990), the fact that there are significant profits when making opposite investments is due to the exaggerated and insufficient reaction of prices to new information that appears in the market, but also to the fact that investors prefer stocks that won in the past instead of lost shares. Furthermore, mistakes made by individual investors with emotions associated with their decisions influence the returns of this strategy, given that emotion tends to push the share price away from its fundamental value.

Daniel et al. (1998) indicated that investor overconfidence should be seen as an essential factor in this strategy, as well as a biased behaviour towards stocks

that previously allowed to obtain returns. Pan (2020) considers that the exaggerated optimism of investors can lead to a speculative bubble.

Jagirdar and Gupta (2023) distinguish the contrarian investment strategy from value investing. Contrarian investors target underperforming stocks, often distressed, to benefit from market corrections and potential rebounds of undervalued assets. In contrast, value investors follow a more traditional approach, avoiding past losers. Both strategies select different stocks simultaneously but operate uniquely within market efficiencies.

1.7 Final considerations

Lakanishok et al. (1994) posit that in the contrarian model, undervalued and disadvantaged value stocks are those that have performed poorly in the past and are expected to continue to underperform. Lakanishok et al. (1994) find that these strategies yield higher returns because they run contrary to the typical investor behaviour followed by other market participants.

According to DeBondt and Thaler (1985), companies with very low P/E (Price/Earnings) ratios are considered temporarily undervalued as investors tend to become excessively pessimistic after a series of poor earnings reports.

Lakanishok et al. (1994) concluded that stocks with low PERs ¹(price-to-earnings) achieve nearly twice the returns compared to stocks with low PBV (price-to-book value). The cheaper stocks, relative to their registered values, significantly outperform the glamorous ones by almost threefold. For a defensive investor, specific criteria are set for each purchase to ensure a minimum level of quality based on a company's historical performance, current financial position, earnings, and assets per dollar of price.

¹A low price-to-earnings ratio (PER) may indicate that a stock is trading at a relatively lower valuation compared to its peers, which is a characteristic often associated with value stocks.

In summary, with the methodology, data extraction, and computations presented in the following chapters, the aim is to perceive whether the previously established results may support the relationship between investing in value stocks and attaining higher returns over a long-term investment horizon. The next chapter will provide an overview of the methods used, the data, the rationale, and the advantages of employing these methods.

2. Methodology and data

In this chapter, we delve into the intricacies of utilising panel data as a fundamental methodology to address and find possible results and conclusions to the intended research question of this dissertation: the exploration of whether value and contrarian-based investments and their associated stocks yield superior returns.

This strategic choice in methodology is rooted in its capacity to enable the comprehensive analysis of variables across distinct temporal phases. We performed a regression analysis, where the dependent variable encapsulates the return after a decade-long holding period.

2.1 The advantages of panel data in value investing

Value investing, with its long-term investment horizon, calls for a methodology that can handle the analysis of variables over time.

Panel data analysis, as suggested by Ramalho (2014), offers an efficient approach. This methodology allows us to scrutinize various variables simultaneously, helping discern cyclical patterns and idiosyncratic behaviors influenced by exogenous factors. The robustness and reliability of panel data, as emphasised by Marques (2000) and Fernandes (2014), provide better information.

Panel data excels in reducing collinearity and efficiently dealing with variables that remain static over time, aiding the accuracy of our estimations. However, it's worth noting that predicting marginal effects in specific models can pose challenges due to complex relationships between regressors and the error term, as Marques (2000) outlined.

Having discussed the advantages of panel data in value investing, we will now delve into the different categories of panel data within the context of value investment strategies.

2.2 Sample selection

The sample selection process was intricately shaped by practical constraints encountered during the research journey. Initially, the ambition was to conduct a comprehensive analysis of all companies listed on the EURO STOXX 600, with the aim of delivering an examination of the market.

However, this study encountered an unexpected challenge due to the researcher's international career relocation, which disrupted our data accessibility. Prominent financial data sources like Reuters and Bloomberg were no longer available to us, necessitating a change in the approach.

To adapt to this new environment, alternative data sources were evaluated and ultimately turned to be used '<https://companiesmarketcap.com>.'

In this context, we crafted a sample focusing on achieving optimal diversification. We emphasised the German market due to its significant role in the European landscape.

Only stocks from European companies listed in the EURO STOXX 600 can be found in this sample. The sample is small. However, it encapsulates European leaders in their markets, such as Adidas, BNP, Mercedes Benz, and Novartis. Further than Germany, stocks from other countries were also chosen, such as EDP from Portugal, Unilever from the Netherlands, and Banco Santander from Spain.

To go further in the analysis and provide a more nuanced perspective, we divided this sample into two sub-portfolios, categorizing companies based on their PERs during the initial 5-year analysis period. This categorisation sought to offer an understanding of performance dynamics within our selected companies.

Our sample data spans 2012 to 2022, encompassing a decade of market activity. This duration was thoughtfully chosen to enable us to conduct a thorough analysis of long-term trends and patterns.

2.3. Selection of Variables and Rationale

Following the previous point, it is essential to highlight the variables selected and the rationale behind them. This study aims to investigate the relationship between value and contrarian-based investments and their associated stocks and determine whether they yield higher returns in the time period in analysis. It will also be explained why we focus on the use of multiples.

2.3.1. Chosen variables and academic research

This study was conducted considering the work performed by Lakonishok et al. (1994). In their paper, the researchers examine a variety of simple classification schemes for glamour and value stocks based on the book-to-market ratio, the cash flow-to-price ratio, the earnings-to-price ratio, and past growth in sales.

Still, regarding this study, there are presented returns on a strategy that has received much attention from (Fama and French (1992)), namely the book-to-market strategy.

The value strategies, according to Lakonishok et al. (1994), call for buying stocks that have low prices relative to earnings, dividends, historical prices, book assets, or other measures of value. If we delve into the paper, it is perceivable that the authors also used the Growth to Sales multiple.

Other authors such as Rosenberg, Reid, and Lanstein (1984) show that stocks with high books relative to market values of equity outperform the market.

Price to earnings ratio is a crucial multiple used to analyse stocks when perceiving whether they are value or growth stocks. Basu, S. (1977) believes that

price-earnings (P/E) ratios are indicators of the future investment performance of a security.

The authors mentioned above studied the relationship between higher returns and investing in value stocks.

In summary, the authors' research mentioned above collectively establishes a foundation for exploring the relationship between investment returns and value-based strategies.

The variables used in our dissertation were the price-to-earnings ratio, the earnings-per-share, the growth to sales, the price-to-sales, and the market capitalisation of the companies.

To perceive whether the companies have their stocks with the value and growth, and concerning the studies mentioned above, it can be seen the below information:

Value Stock:

- Low PER: The stock is inexpensive relative to its earnings.
- Low PBV: The stock trades below its asset value.

Growth Stock:

- High sales growth: The company is growing rapidly.
- High P/S: Investors are willing to pay more for each unit of sales, which is typical for growth stocks.

2.3.2. Rationale for the Use of Multiple Variables

Below will be a description of the main rationales for the use of multiples:

PER: This ratio helps determine whether a stock is relatively inexpensive or overpriced in relation to its earnings. A low PER suggests potential value, while a high PER may indicate growth expectations.

PBV: This ratio measures whether a stock trades above or below its asset value. A low PBV can signal a potential value opportunity.

Earnings-per-Share: EPS indicates a company's profitability. Examining EPS helps understand how a company's earnings translate into earnings for each outstanding share.

Growth to Sales: This metric evaluates the company's growth prospects by assessing the relationship between revenue growth and sales. It provides insights into potential growth stocks.

The price-to-sales (P/S) ratio reveals how much investors are willing to pay for each unit of a company's sales. High P/S ratios are typical for growth stocks, indicating optimism about future sales.

These selected variables provide a framework for assessing the value and growth aspects of the companies in our study, aligning with the insights from prior academic research. By employing these metrics, we aim to shed light on the performance of value and contrarian-based investment strategies and their associated stocks over the specified time period.

3. Econometric model

With panel data, the variability of the $Price_{it}$ variable around its mean can be decomposed as follows:

$$\begin{aligned}
 & \text{Total} = \sum_{i=1}^N \sum_{t=1}^T (Price_{it} - \overline{Price})^2 = \\
 & I = \sum_{i=1}^N \sum_{t=1}^T (Price_{it} - \overline{Price}_i + \overline{Price}_i - \overline{Price})^2 = \\
 & \text{within} + \text{between} = \sum_{i=1}^N \sum_{t=1}^T (Price_{it} - \overline{Price}_i)^2 + \sum_{i=1}^N (\overline{Price}_i - \overline{Price})^2
 \end{aligned}$$

In this case, the first term refers to the variation existing within the groups, which is called within according to the existing literature, and the second term refers to the variation between the groups, which the authors identify as between.

In the case of panel data, the base model to be used corresponds to the individual effects model, which can be written, in general, as follows:

$$Y_{it} = \alpha_i + x'_{it}\beta + u_{it}$$

$i = 1, \dots, N$ e $t = 1, \dots, T$.

Furthermore, α_i concerns individual effects, which do not depend on time, while u_{it} refers to the idiosyncratic error, which differs from company to company and from period to period randomly, as stated by Menezes (2017).

Regarding x'_{it} , this includes all explanatory variables. In other words, this component contains variables that vary from company to company and from period to period, explanatory variables that do not change over time, variables considered dummy due to their qualitative nature, the temporal trend existing in models with data material terms and interaction terms between the variables, which may contribute to the model in a significant way, according to the topic addressed.

In the data under study, the individual effects model can be written as follows:

$$Price_{it} = \alpha_i + \beta P_{e_{it}} + \beta P_{S_{2it}} + \beta P_{B_{2it}} + \beta Growth_{sales_{2it}} + \beta EPS_{2it} + \beta Market_{cap_{2it}} + u_{it}$$

In addition to the model mentioned above, other models can be considered to analyze the most appropriate one for the data under study. The alternative estimators, in general, are based on the base model presented and differ in the type of exogeneity required from the regressors. The exogeneity referred to can be contemporary, weak, or strict.

The Pooled model, also called Population Averaged in some existing literature, states the model similarly, being considered a direct extension of the models used in cross-sectional data. Even so, the model mentioned above has disadvantages in the financial area, given that in this area, the concern with the heterogeneity of each company is constant. In the model discussed above, the parameters are considered standard for all companies, as Menezes (2017) noted. In addition, it is possible to use random and fixed effects models, and the greatest usefulness lies in comparing these. The random effects model is an extension of the stated base model. However, it allows a different coefficient to be considered for each individual in the case of the explanatory variables included, making it more complex in estimation. In other words, according to Menezes (2017), this model introduces heterogeneity between countries. To analyse this, it is essential to rewrite the individual effects model as follows:

$$Price_{it} = \alpha_i + \beta P_{e_{it}} + \beta P_{S_{2it}} + \beta P_{B_{2it}} + \beta Growth_{sales_{2it}} + \beta EPS_{2it} + \beta Market_{cap_{2it}} + (\alpha_i + u_{it})$$

In this case, the error term has two components, given that it is assumed that individual effects may or may not be related to the explanatory variables. In the random effects model, the two error components are not correlated, meaning that the explanatory variables are exogenous, making direct estimation of the model possible. On the other hand, in the fixed effects model, the error

components are correlated, which makes the explanatory variables endogenous concerning the part of the error that does not vary over time. In this case, direct estimation of the model is not possible due to the existing dependency, which leads to bias in the estimators and their loss of efficiency.

In the random effects model, it is possible to use the Pooled least squares estimator and the between estimator or the random effects estimator. However, in the fixed effects model, the fixed effects estimator, the within estimator, the LSDV estimator, or the first differences estimator are used.

The Pooled least squares estimator considers the following assumption: $E[x_{it}(\alpha_i + u_{it})] = 0$, that is, independence between the components present in error and contemporary exogeneity between the original component of the error and the explanatory variables is required. In this case, the estimation must be carried out using the least squares method but considering the existence of clusters or another identical option for the variance.

On the other hand, in the Between estimator, the assumption considered must be: $E(x_{it} u_{is}) = 0, \forall s, t$, meaning independence between the error components is also required. However, exogeneity regarding the original error component and explanatory variables must be strict. In this case, the estimation must be done using the least squares method without considering clusters.

In the random effects estimator, two new assumptions must be considered:

$$\begin{aligned} \text{Var}(\alpha_i) &= \sigma_\alpha^2 \\ \text{Var}(u_{it}) &= \sigma_u^2 \end{aligned}$$

Therefore, in these circumstances, it is possible to obtain efficient estimators. Previous estimators did not consider the panel nature of the data when calculating the estimators but only considered this aspect in the inference. In this case, the estimation must be done using the generalised least squares method, considering the independence between the invariable error component

and the explanatory variables and the strict exogeneity between the error components.

In the fixed effects or within the estimator, the equation to be estimated is obtained through the difference between the individual effects model and the average equation. In this case, the assumption considered must be the same as the between estimator, requiring strict exogeneity between the variable component of the error and the explanatory variables. The estimation uses the least squares method with the cluster option. Even so, this method presents the limitation of making predictions impossible, as Marques (2000) mentioned. On the other hand, after transforming the model according to the stated difference, variables that do not change over time are eliminated, as well as variables that change constantly. Still, the main advantage pointed out to this model, according to Ramalho (2014), concerns the fact that it allows considering endogenous explanatory variables in cases where endogeneity must originate from the omission of variables that do not change over time without using instrumental variables.

The LSDV estimator presents assumptions and estimates for β that are identical to the fixed effects estimators, as analyzed by Marques (2000). However, the estimates for α are given by $\hat{\alpha}_i = \bar{Y}_i - \bar{x}_i' \hat{\beta}$, being consistent only when the panel is extended.

According to Marques (2000), the choice between a fixed effects model and a random effects model has implications that differ from those found in statistical models, given the dynamics of economic variables. This situation occurs at the level of consistency, centrality, and efficiency of the estimators.

To choose the appropriate model based on a pooled model and a fixed effects model, the F test must be used, as mentioned by Menezes (2017), considering the value of the p-value obtained in the estimation carried out. In the null hypothesis, homogeneity is admitted in the constant, while in the alternative

hypothesis, heterogeneity is considered, that is, fixed effects, as referred to by Batista (2017).

On the other hand, the Breush-Pagan test allows for a comparison between the random effects model and the pooled model, with the null hypothesis considering the pooled model, meaning that when the p-value appears lower than the significance level, a random effects model should be chosen, as explained by Batista (2017). The Hausman test is essential for choosing between a fixed effects model and a random effects model. In case of rejection of the null hypothesis, the most appropriate model is the one that considers fixed effects.

4. Discussion of results

This section is intended to present and analyse the results obtained throughout the research. The collected data and conducted analyses aim to shed light on the relationship between stock investment strategies, specifically value and contrarian investment approaches, and the financial returns investors achieve. Based on the prior literature review and the formulated hypotheses, it is anticipated that the results will reveal significant insights into the performance of these strategies.

The discussion of results will follow, wherein it will delve into the nuances of the findings, drawing comparisons with the existing body of literature and addressing any deviations or unexpected outcomes. Ultimately, these results will contribute to some understanding of the dynamics between investment strategies and financial outcomes, with implications for both individual and institutional investors alike.

4.1 Descriptive statistics

It is essential at this moment to present and delineate the variables, independent and dependent, and the urge of the descriptive statistics.

Below are summary descriptions of the main points regarding these statistics and three tables divided into three different types of sample used.

The statistics are presented as a whole, by Geography, and by the conception of value or growth concerning the PER in the first five years of the time period.

The variable relating to the market price of each company's shares has an average value of 73.2 monetary units, varying between 3.0 and 365.0. The variability is high, meaning the standard deviation has a high value.

In terms of the PER, on average, it reaches 23.1, although it varies markedly between negative and positive values. Also, the PER presents a skewness of -1.4,

indicating that the data distribution is skewed, with the lowest values to the left of the mean. It's a leftward or negative skewness.

In the case of the P/S ratio, the average value is 1.6, with less variability, as it only runs between 0.2 and 6.4. The P/B has average values of 3.2, varying between 0.46 and 17.0 units. In the case of EPS, the average value is around 4.16, with high variability, as it varies between negative and positive values.

The PBV exhibits a skewness of 1.9, indicating a positively skewed data distribution with most values concentrated to the right of the mean. A kurtosis of 4.2 suggests the distribution has heavy tails, signifying the presence of extreme or outlier values. In summary, the data distribution is positively skewed and exhibits heavy tails.

Regarding the Market cap, the average value exceeds 65.7 billion EUR, while the standard deviation is 58.8. Values vary between 3.1 and 224.0 billion EUR. Sales growth is 10.5 on average, although it is harmful, reaching -72.3% and 81.2% in other cases, as shown in the table below.

Panel A: Continuous variables										
Variable of interest	Number	Mean	Median	Std. Dev.	Var.	Skew.	Krt.	Min.	Max.	
<i>Firms' characteristics</i>										
Price-to-earnings ratio	160	23.1	18.2	81.7	6,672.7	-1.4	59.9	-698.0	653.0	
Price-to-book ratio	173	3.18	2.19	2.93	8.56	1.86	4.19	0.46	17.00	
Price-to-sales ratio	162	1.63	1.15	1.34	1.81	1.36	1.03	0.15	6.39	
Growth of sales	162	10.5%	3.5%	0.3	0.1	0.7	1.6	-72.3%	81.2%	
Earnings per share ratio	162	4.16	3.15	5.59	31.24	1.19	3.59	-12.14	29.45	
Market capitalisation (billions of euros)	173	65.7	58.2	58.8	2,790.5	1.0	0.6	3.1	224.0	
Price (€)	173	73.2	64.0	60.5	3,658.8	1.8	5.1	3.0	365.0	

Table 1: Descriptive statistics of the variables dependent and independent

Following the statistics of the variables by geography, it is perceived from the table below that more than half of the sample was from Germany; this market plays a pivotal role in Europe.

Two of the companies that reside on the "other" have the biggest market capitalisation from all the sample, that leads to have a bigger market cap in this geography that in any of the other three presented.

It is essential to notice that the stocks in the sample from France show a negative PER in the long run, and the standard deviation of this ratio in France is the highest in all descriptive statistics.

On average, in Germany, there was a higher EPS ratio for these stocks in this period.

Panel A: Continuous variables										
Variable of interest	Number	Mean	Median	Std. Dev.	Var.	Skew.	Krt.	Min.	Max.	
Germany										
<i>Firms' characteristics</i>										
Price-to-earnings ratio	90	35.7	22.0	73.9	5,456.1	6.8	55.8	-25.2	653.0	
Price-to-book ratio	97	3.09	2.51	2.27	5.14	1.29	1.33	0.65	10.70	
Price-to-sales ratio	97	1.47	1.00	1.31	1.72	1.44	1.21	0.15	5.22	
Growth of sales	97	9.4%	4.8%	0.2	0.0	0.5	1.2	-53.1%	54.0%	
Earnings per share ratio	97	5.34	3.59	6.47	41.88	0.93	2.10	-12.14	29.45	
Market capitalisation (billions of euros)	97	52.3	49.2	38.7	1,495.0	0.9	0.3	3.1	166.8	
Price (€)	97	93.8	84.5	68.4	4,684.8	1.6	3.3	7.1	365.0	
Portugal										
<i>Firms' characteristics</i>										
Price-to-earnings ratio	11	16.8	12.5	8.2	66.5	0.6	-1.7	8.7	28.5	
Price-to-book ratio	11	1.06	0.99	0.33	0.11	0.95	-0.46	0.73	1.68	
Price-to-sales ratio	11	0.87	0.71	0.35	0.12	1.76	3.13	0.51	1.73	
Growth of sales	11	1.2%	-0.5%	0.1	0.0	0.5	-0.3	-19.3%	25.2%	
Earnings per share ratio	11	0.28	0.28	0.08	0.01	-0.26	-0.62	0.15	0.40	
Market capitalisation (billions of euros)	11	15.5	13.4	4.7	21.6	1.1	0.2	11.0	25.0	
Price (€)	11	4.1	3.7	1.1	1.2	1.1	0.3	3.0	6.4	
France										
<i>Firms' characteristics</i>										
Price-to-earnings ratio	30	-6.4	14.5	135.4	18,328.4	-4.9	25.6	-698.0	144.0	
Price-to-book ratio	33	3.75	1.86	4.52	20.45	1.74	2.12	0.46	17.00	
Price-to-sales ratio	33	1.72	1.32	1.38	1.91	2.18	4.45	0.44	6.39	
Growth of sales	33	24.5%	9.3%	0.4	0.2	-0.3	-0.6	-72.4%	81.2%	
Earnings per share ratio	33	3.04	3.53	3.88	15.03	-1.02	1.91	-9.48	8.71	
Market capitalisation (billions of euros)	33	52.5	60.1	34.4	1,182.5	-0.1	-1.4	6.6	114.3	
Price (€)	33	64.1	56.8	29.0	841.3	1.3	1.2	24.9	146.2	
Other										
<i>Firms' characteristics</i>										
Price-to-earnings ratio	30	16.7	17.9	6.2	38.1	-0.2	-0.8	4.5	27.9	
Price-to-book ratio	33	3.57	2.70	2.88	8.30	0.73	-0.56	0.48	9.75	
Price-to-sales ratio	22	2.61	2.30	1.28	1.64	0.08	-1.79	0.91	4.41	
Growth of sales	22	-0.9%	-1.9%	0.1	0.0	0.3	-0.3	-15.0%	14.5%	
Earnings per share ratio	22	2.62	1.71	2.81	7.87	1.32	1.90	-0.60	10.72	
Market capitalisation (billions of euros)	33	135.1	127.5	53.4	2,849.1	0.1	-1.2	49.8	224.0	
Price (€)	33	44.5	50.3	31.9	1,014.7	0.0	-1.4	3.0	94.7	

Table 2: Descriptive statistics by geography

In what concerns the division between growth and value stocks, according to table 3, it may be said that both subtypes present a high standard deviation regarding the PER ratio.

The skewness of PER appears to be harmful for the value stocks and positive for the growth stocks.

The growth of sales for this sample in this time period of analysis was more significant for the value stocks than for the growth ones.

The market capitalisation of the value stocks is almost the double, on average, that of the growth ones.

Panel A: Continuous variables										
Variable of interest	Number	Mean	Median	Std. Dev.	Var.	Skew.	Krt.	Min.	Max.	
Value										
<i>Firms' characteristics</i>										
Price-to-earnings ratio	80	3.9	10.6	79.9	6,385.3	-8.8	78.2	-698.0	28.5	
Price-to-book ratio	88	2.10	1.19	2.16	4.67	2.00	3.55	0.46	9.75	
Price-to-sales ratio	77	1.29	0.91	1.12	1.25	1.71	1.77	0.29	4.41	
Growth of sales	77	16.6%	3.5%	0.3	0.1	0.9	-0.6	-19.3%	77.7%	
Earnings per share ratio	77	6.29	5.52	6.59	43.46	0.99	1.47	-6.56	29.45	
Market capitalisation (billions of euros)	88	83.8	70.7	55.6	3,093.6	0.9	0.2	11.0	224.0	
Price (€)	88	66.8	60.2	54.7	2,989.6	1.4	2.9	3.0	268.7	
Growth										
<i>Firms' characteristics</i>										
Price-to-earnings ratio	80	42.2	26.5	79.4	6,300.5	6.0	45.1	-74.3	653.0	
Price-to-book ratio	86	4.28	3.55	3.20	10.22	1.73	3.49	0.69	17.00	
Price-to-sales ratio	86	1.94	1.50	1.46	2.12	1.12	0.48	0.15	6.39	
Growth of sales	86	5.0%	3.2%	0.2	0.1	0.1	4.7	-72.4%	81.2%	
Earnings per share ratio	86	2.26	2.01	3.60	12.93	-0.58	4.14	-12.14	12.71	
Market capitalisation (billions of euros)	86	47.2	30.4	42.8	1,829.7	1.0	0.1	3.1	166.8	
Price (€)	86	79.6	67.5	65.6	4,302.9	2.0	5.8	7.1	365.0	

Table 3: Descriptive statistics by investment strategy (growth / value)

4.2 Pooled estimator

In the Pooled estimator, for a significance level of 5%, only the P/B ratio and the EPS ratio appear as significant variables in explaining the price or value to be paid to invest in a given company. In the case of P/B, an increase of 1% allows the value of the investment or price to increase by 10.34% if everything else remains constant. In the case of EPS, an increase of 1% leads to an increase of 6.42%, keeping everything else constant. Thus, P/B is the variable with the most significant impact on the dependent variable under study.

The remaining variables do not present statistical significance, whatever the acceptable significance level.

The value of the coefficient of determination of 50.4% must also be analysed. This allows us to conclude that 50.4% of the company's investment price variation is explained by this model, namely by the variation in P/B and EPS.

```
. regress price P_e P_S P_B EPS Market_cap Growth_sales,vce(cluster id)
```

Linear regression

Number of obs	=	147
F(6, 14)	=	11.81
Prob > F	=	0.0001
R-squared	=	0.5039
Root MSE	=	44.629

(Std. Err. adjusted for 15 clusters in id)

price	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]
P_e	-.0262428	.0249713	-1.05	0.311	-.079801 .0273154
P_S	6.566656	4.384082	1.50	0.156	-2.836264 15.96958
P_B	10.34244	3.726542	2.78	0.015	2.349801 18.33508
EPS	6.42311	1.38872	4.63	0.000	3.444602 9.401617
Market_cap	.0140194	.1418522	0.10	0.923	-.2902234 .3182622
Growth_sales	.2502637	.3580527	0.70	0.496	-.5176829 1.01821
_cons	5.798755	10.50868	0.55	0.590	-16.74013 28.33764

Table 4: Pooled estimator

4.3 Between estimator

In the Between estimator, for a significance level of 5%, only the P/B ratio and the EPS ratio emerge as significant variables in explaining the investment price. In the case of P/B, an increase of 1% allows the value of the investment or price to increase by 10.3% if everything else remains constant. In the case of EPS, a 1% increase leads to a 6.4% increase, keeping everything else constant. This conclusion is identical to that obtained by the Pooled estimator. If the significance level is increased to 10%, the P/S also appears as a significant variable. The impact is identical to that of EPS, with a 1% increase in P/S leading to a 6.6% increase in the companies' share price.

The remaining variables do not present statistical significance, whatever the significance level used.

The value of the coefficient of determination of 50.4% and the adjusted value of 48.3% must also be analysed. This allows us to conclude that this is the percentage of variation in the company's investment price explained by this model.

```

. xtreg price P_e P_S P_B EPS Market_cap Growth_sales, vce(cluster year)

Random-effects GLS regression                Number of obs   =       147
Group variable: year                        Number of groups =        11

R-sq:                                       Obs per group:
  within = 0.5453                           min =           3
  between = 0.0005                           avg =          13.4
  overall = 0.5039                           max =           15

corr(u_i, X) = 0 (assumed)                  Wald chi2(6)    =      1160.40
                                           Prob > chi2     =         0.0000

                                           (Std. Err. adjusted for 11 clusters in year)

```

price	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
P_e	-.0262428	.0175807	-1.49	0.136	-.0607004	.0082148
P_S	6.566656	2.112229	3.11	0.002	2.426764	10.70655
P_B	10.34244	1.641104	6.30	0.000	7.125933	13.55894
EPS	6.42311	1.493286	4.30	0.000	3.496323	9.349896
Market_cap	.0140194	.0355174	0.39	0.693	-.0555933	.0836322
Growth_sales	.2502637	.1147372	2.18	0.029	.0253829	.4751445
_cons	5.798755	5.623659	1.03	0.302	-5.223414	16.82092
sigma_u	0					
sigma_e	43.334199					
rho	0	(fraction of variance due to u_i)				

Table 5: Between estimator

4.4 Random effects estimator

In the random effects estimator, for a significance level of 5%, all variables are significant except the P/E ratio and the market cap. In the case of P/B, an increase of 1% allows the value of the investment or price to increase by 10.3% if everything else remains constant. In the case of EPS, a 1% increase leads to a 6.4% increase, keeping everything else constant. On the other hand, a 1% increase in P/S leads to a 6.6% increase in the companies' share price. Regarding sales growth, a 1% increase in this percentage increases the dependent variable by 0.25%.

The value of the coefficient of determination of 50.4% must also be analysed, which allows us to conclude that this is the percentage of variation in the company's investment price explained by this model.

```
. regress price P_e P_S P_B EPS Market_cap Growth_sales,be
```

Source	SS	df	MS	Number of obs	=	147
Model	283240.015	6	47206.6692	F(6, 140)	=	23.70
Residual	278849.846	140	1991.78461	Prob > F	=	0.0000
				R-squared	=	0.5039
				Adj R-squared	=	0.4826
Total	562089.861	146	3849.93056	Root MSE	=	44.629

price	Coef.	Std. Err.	t	P> t	Beta
P_e	-.0262428	.0458308	-0.57	0.568	-.0360417
P_S	6.566656	3.425754	1.92	0.057	.1444397
P_B	10.34244	1.422563	7.27	0.000	.453643
EPS	6.42311	.7884671	8.15	0.000	.5515477
Market_cap	.0140194	.0936169	0.15	0.881	.0114497
Growth_sales	.2502637	.1627801	1.54	0.126	.0988886
_cons	5.798755	7.940105	0.73	0.466	.

Table 5: Random effects estimator

The value of the coefficient of determination of 50.4% must also be analysed, which allows us to conclude that this is the percentage of variation in the company's investment price explained by this model.

4.5 Fixed effects estimator

In the fixed effects estimator, for a significance level of 5%, all variables are significant except the P/E ratio, sales growth, and market cap. In the case of P/B, an increase of 1% allows the value of the investment or price to increase by 9.97% if everything else remains constant. In the case of EPS, a 1% increase leads to a 7.5% increase, keeping everything else constant. On the other hand, a 1% increase in P/S leads to a 6.8% increase in the companies' share price.

The value of the coefficient of determination of 49.8% must also be analyzed, which allows us to conclude that this is the percentage of variation in the company's investment price explained by this model.

```

. xtreg price P_e P_S P_B EPS Market_cap Growth_sales,vce(cluster year)

Random-effects GLS regression              Number of obs   =       147
Group variable: year                      Number of groups =        11

R-sq:                                     Obs per group:
    within = 0.5453                        min =           3
    between = 0.0005                       avg =          13.4
    overall = 0.5039                       max =           15

                                         Wald chi2(6)    =    1160.40
corr(u_i, X) = 0 (assumed)                Prob > chi2     =     0.0000

                                         (Std. Err. adjusted for 11 clusters in year)

```

price	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
P_e	-.0262428	.0175807	-1.49	0.136	-.0607004	.0082148
P_S	6.566656	2.112229	3.11	0.002	2.426764	10.70655
P_B	10.34244	1.641104	6.30	0.000	7.125933	13.55894
EPS	6.42311	1.493286	4.30	0.000	3.496323	9.349896
Market_cap	.0140194	.0355174	0.39	0.693	-.0555933	.0836322
Growth_sales	.2502637	.1147372	2.18	0.029	.0253829	.4751445
_cons	5.798755	5.623659	1.03	0.302	-5.223414	16.82092
sigma_u	0					
sigma_e	43.334199					
rho	0	(fraction of variance due to u_i)				

Table 6: Fixed effects estimator

4.6 LSDV estimator

The LSDV estimator presents unsatisfactory results, as P_S and EPS lose statistical significance at a significance level of 5%. In this case, the coefficient of determination was around 88%.

enabling an understanding of how these metrics correlate with returns on a long-term scale.

The choice of a 10-year analysis period is driven by its long-term perspective, which helps mitigate short-term market noise. It provides a view of investment strategies over various market cycles, making it relevant for long-term investors.

As we delve into this analysis, we aim to address the question: Do value stocks with attractive P/B ratios outperform growth stocks with high P/E ratios over various timeframes?

4.7.1. Price to earnings ratio

In the following sections, the results of this comprehensive analysis will be presented, shedding light on the dynamics between these fundamental metrics and long-term stock performance. By the end of this exposition, we aim to provide a nuanced and data-driven perspective on the relationships between stock categories, financial metrics, and returns across ten years.



Figure 1: Evolution of Price ten-year horizon period growth stocks (PER)

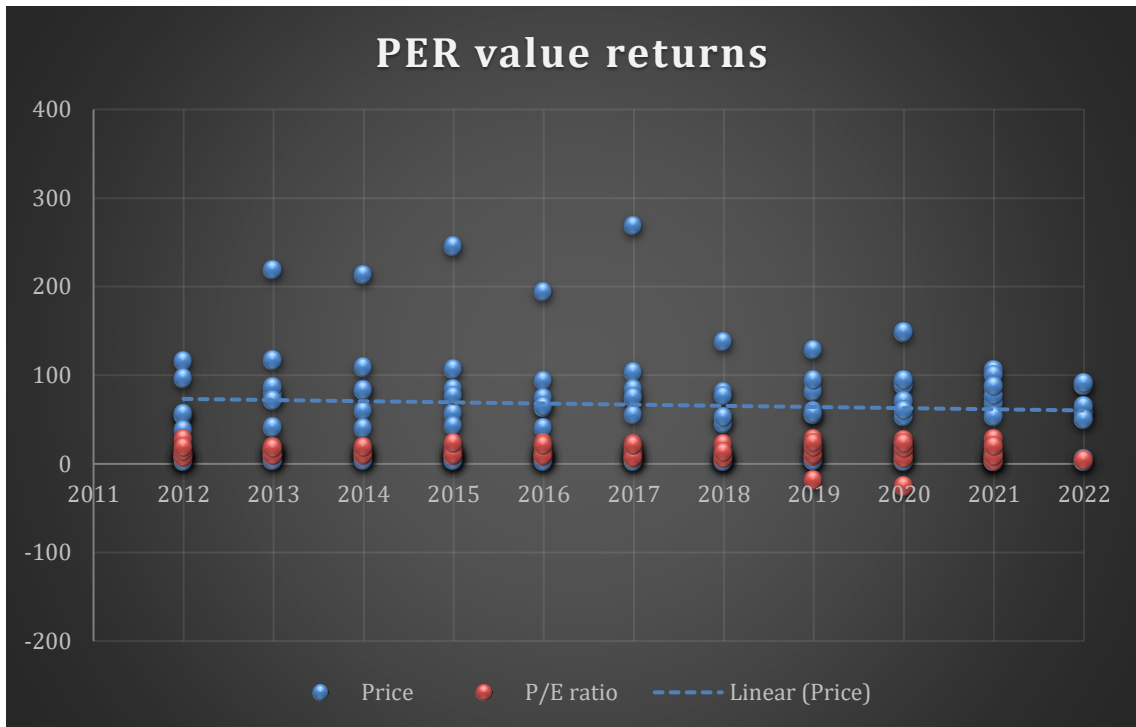


Figure 2: Evolution of Price ten-year horizon period value stocks (PER)

With the above, we analysed the performance of growth and value stocks for eight companies in each category over the past ten years based on their PER. Surprisingly, the data shows that with the small sample and the time period in analysis, the growth stocks have delivered higher returns for long-term investors who invested in them in 2012, contrasting with prior literature that favored value stocks.

This challenges the conventional wisdom and suggests that, over a decade, growth stocks have outperformed value stocks, providing valuable insights for long-term investment strategies.

However, it is essential to notice that this deviation from the literature seems to be diminishing again.

4.7.2 Price-to-book ratio

The Price-to-Book Ratio (P/B) is a pivotal gauge in determining when a stock should be classified as a "value" investment. A P/B ratio below one can be a trigger to perceive that the stock may be undervalued, trading at a price lower

than its book value, suggesting it could be a value opportunity. Conversely, a P/B ratio above 1 indicates the stock trades at a premium to its book value, which may be attributed to high growth expectations.

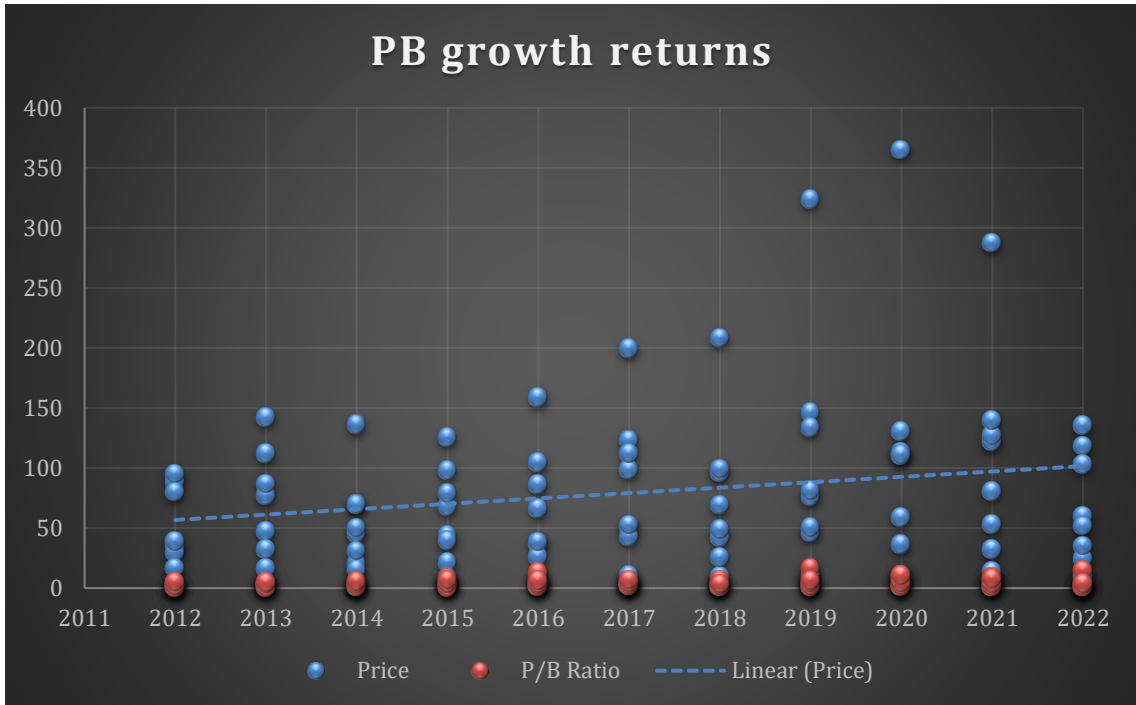


Figure 3: Evolution of Price ten-year horizon period growth stocks (PB)

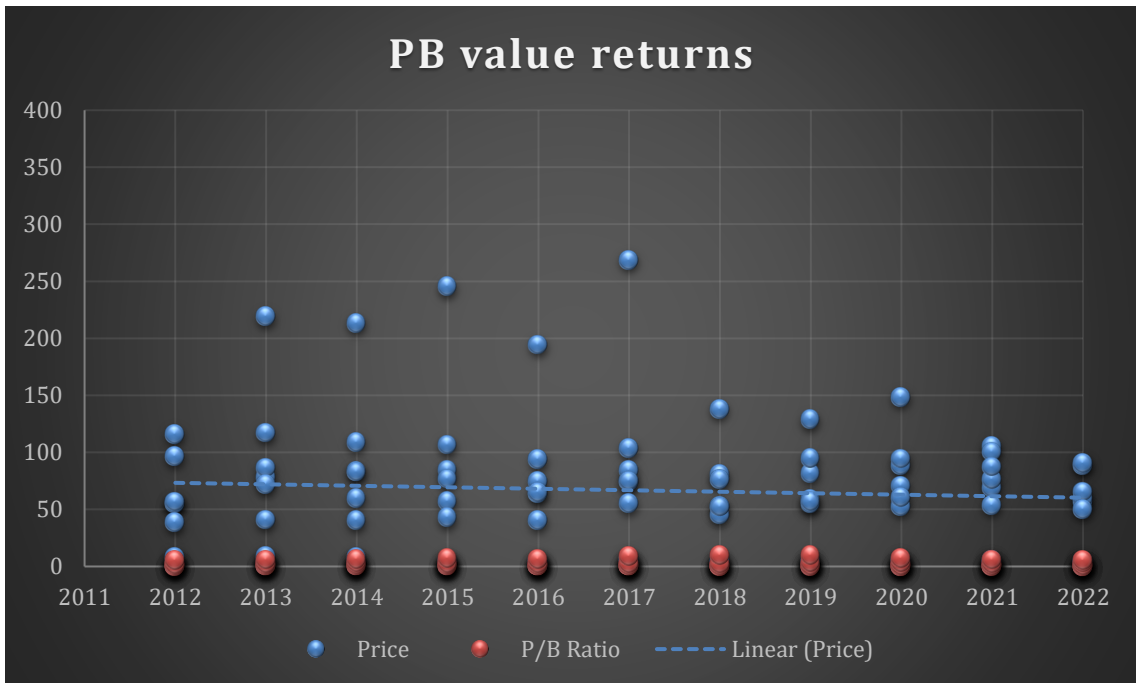


Figure 4: Evolution of Price ten-year horizon period value stocks (PB)

Once again, considering the total portfolio diversified, the value stocks, and the growth stocks divided into two different portfolios, a possible disruption can be seen in the literature review.

With the annual data from the analysis, the returns, in the long run, seem to be higher returns regarding the growth stocks, and the opposite can be verified with the value stocks.

5. Conclusion

5.1 Conclusions

In conclusion, this dissertation has explored the multifaceted realm of stock valuation and investment strategies. This study began by reviewing the literature, considering the nuances of value and contrarian investing, highlighting the significance of intrinsic value, and shedding light on the role of market analysts and the pervasive influence of psychological factors in investment decisions.

This section discusses the main findings of this research, with a particular focus on the results obtained from the different estimators and insights gained from the long-term stock performance analysis.

Various methods were used to understand the relationship between investment strategies and financial outcomes. The pooled estimator highlighted that only the P/B and EPS ratios had significant impacts on investment values with the sample used. In simple terms, changes in P/B and EPS played a substantial role in determining the price to invest in a company.

The between estimator gave similar results. When the criteria were relaxed slightly, the P/S ratio also showed significance. This indicates that these three ratios, P/B, EPS, and P/S, are critical in explaining investment prices.

The Random Effects estimator revealed that several factors significantly affected investment values. P/B, EPS, and P/S had a substantial impact. Sales growth had a more modest influence.

The Fixed Effects estimator mirrored the Random Effects model, emphasising the importance of P/B, EPS, and P/S. These models explained a significant percentage of the variation in investment prices.

The LSDV estimator did not perform well. The random effects model appears to be the most suitable choice.

In the ten-year analysis, the performance of value and growth stocks was examined. The growth stocks outperformed value stocks, with the sample used contrary to conventional thinking. This suggests that, in recent years, investing in growth stocks may have led to higher returns for long-term investors.

However, it is essential to note that this trend seems to be changing.

In conclusion, this study sheds light on the complex connection between investment strategies and financial outcomes. The estimators highlighted the significance of P/B and EPS in determining investment values, providing valuable insights for investors.

Moreover, the long-term analysis challenges traditional beliefs by showing that growth stocks have outperformed. These findings have implications for all types of investors and emphasise the need to examine investment strategies in an ever-changing financial world continuously.

These results open doors for future research into the evolving dynamics of the stock market.

5.2 Limitations and clues for future research

This research encountered several limitations that necessitated an in-depth exploration to ensure a nuanced comprehension of the constraints that influenced the research process. These limitations span a spectrum of aspects, ranging from data accessibility and research scope to logistical challenges engendered by the researcher's international relocation. This section delves into each limitation with high precision and detail.

5.2.1. Data limitations

One of the primary constraints pertains to the unavailability of specific pivotal financial data sources, specifically those widely recognized and esteemed within the academic and financial research community, such as Reuters and Bloomberg.

The unavailability of these sources presented a considerable impediment to the study, as it curtailed the ability to procure a comprehensive dataset replete with the granularity and breadth that would have significantly enriched the analysis. Subsequently, the researcher was compelled to resort to an alternative data source to glean the requisite financial data for the study.

Utilizing this alternative source introduced an inherent level of uncertainty, as the reliability and integrity of the data obtained from this non-standard source cannot be held to the same rigorous standards as those from more established and reputable databases.

5.2.2. International relocation

The researcher's international relocation to Germany was a pivotal and unavoidable constraint that profoundly influenced the research process. This relocation was instigated by professional engagements within the finance realm, necessitating a geographical transition to a different country.

The implications of this international relocation were manifold and significant. Firstly, it resulted in a physical and logistical disconnection from potential data sources, which would have otherwise been accessible had the researcher remained in the location of the original research plan.

5.2.3. Portfolio composition alteration

The initial research design was crafted to closely adhere to the framework delineated in Lakonishok et al.'s (1994) seminal paper. However, a pivotal adjustment was necessitated as a direct consequence of the previously discussed

constraints. Rather than encapsulating the full spectrum of constituent companies within the EURO STOXX 600, the research was compelled to adopt a portfolio strategy predicated on a more limited selection of companies.

This modification had profound implications for the diversification and composition of the portfolio under investigation. The decision to eschew a broader selection of companies in favor of a more confined and targeted group could introduce biases not originally inherent to the research design.

The rationale behind this alteration was primarily motivated by the need to circumvent the international relocation's data access challenges and the limitations associated with the available data sources. Nevertheless, this shift in portfolio composition underscored a fundamental divergence from the initial research intent. It could impact the generalizability of findings and the accuracy of conclusions drawn from the study.

The comprehensive elucidation of these multifaceted limitations underscores the reality of conducting research within the intricate web of real-world constraints. While these constraints undoubtedly influenced the research process and introduced an element of unpredictability, they serve as indispensable contextual variables that must be factored into interpreting the study's results. Future research endeavors in this domain are incumbent upon addressing and mitigating these limitations where feasible to enhance the findings' robustness, validity, and generalizability.

While the study acknowledges these limitations, it is crucial to consider their potential impact on the research outcomes. The unavailability of comprehensive financial data sources may have introduced some uncertainty into the analysis, and the reliance on an alternative data source may have affected data quality.

5.3 Final thoughts

In sum, the decline in long-term returns for value stocks can be attributed to several factors. Low interest rates make growth stocks more attractive, and value companies may not align with current economic trends like technology and innovation.

Market volatility and economic shocks disproportionately affect value stocks.

Investors are changing their asset allocation, and a scarcity of genuine value opportunities contributes to this trend. In summary, economic, financial, and investor preference factors impact the performance of value stocks.

To conclude, the value investing approach may not have showcased its full potential over the analysed decade. However, the substantial macroeconomic and market shifts in 2022-2023 prompted us to consider that the findings may not entirely indicate the future. With evolving economic conditions and market dynamics, the effectiveness of value investing could experience a resurgence.

Therefore, the results of this study carry a degree of dependency on these unique circumstances, offering new perspectives on value-based investment strategies in the ever-evolving world of finance. The story of value investing may yet have unwritten chapters.

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