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Impact of ESG Scores on Stock Returns: evidence from the European stock market

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Declaration of Authorship

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In Prague on May 9, 2024

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Abstract

In the past several years, literature has been comprehensively studying the integration of climate change and other sustainability concerns into investment decisions and portfolio allocation, however, the complete impact of these concerns on investment performance is still not fully known. In this sense, the present study analyses the impact of ESG scores and, specifically, ESG scores divergence, at an individual level (environmental, social and governance), on stock returns of the European stock market. For this purpose, 737 European listed companies are considered for the period between January 2015 and March 2022. The results show no significant relationship between Environmental divergence scores and stock returns, contrary to expectations. Additionally, Social and Governance divergence scores exhibit unexpected negative relationships. Furthermore, investing in portfolios with stocks with lower Environmental or Social divergence tends to outperform standard indices, while Governance-focused portfolios generally outperform indices. The addition of more Environmental, Social and Governance scores given by different rating providers might enhance the understanding of this relationship.

Key words

Asset pricing, European stock market, ESG investing, ESG scores, Stock returns, Sustainable finance

Table of content

Introduction

Over the past few years, the field of sustainable finance has experienced a significant and rising attention within financial markets and among institutional investors. The appearance of different sustainable finance products and services is fuelling the growing interest among financial consumers, which highlights a substantial move towards sustainable finance (OECD, 2023).

Alongside, sustainable investing has also progressed significantly since its beginnings when it was under the umbrella of socially responsible investing (SRI). With trillions of dollars managed under sustainable investment strategies, which integrates environmental, social, and governance (ESG) factors along with financial goals, its pathway points to continued growth, amplifying the importance to understand its impact on asset markets and corporate behavior (Pástor et al., 2021).

At the core of sustainable investing lies ESG integration strategy, a process that involves the constant evaluation of ESG factors in order to increase risk-adjusted returns (GSIA, 2022). Within this context, investors are progressively integrating these non-financial elements into their analytical process, targeting the distinction of significant risks and growth opportunities (CFA Institute, n.d.).

However, the effective integration of these factors into investment decisions is affected by challenges, particularly the absence of a definitive taxonomy for ESG factors and the large number of ESG rating agencies that among them have different methodologies, extent and coverage (Huber & Comstock, 2017 and CFA Institute, n.d.).

This diversity of ESG rating agencies promotes subjectivity and inconsistency in ESG ratings, which, as Berg et al. (2019) claims, creates meaningful consequences. Specifically, the fact that the effect of ESG performance on asset prices can be weakened or diluted because different rating agencies may provide varying assessments of a company's ESG performance, leading to discrepancies in how investors perceive its value.

Consequently, these challenges emphasise the necessity for empirical investigation into the consequences of ESG score and ESG score divergence on stock returns. In this sense, literature has been comprehensively studying the implications for rising ESG issues on investment decision making, however, the effects on stock performance is not yet fully discovered. Latest research suggests no consensus regarding this concern. While Friede et al. (2015) suggests a positive relationship between ESG criteria and corporate financial performance based on the synthesis of approximately 2200 individual studies, Pástor et al. (2021) presume that stocks of greener firms have lower ex ante CAPM alphas and that green stocks have negative alphas, whereas brown stocks have positive alphas. Additionally, Cornell (2021) highlights that although ESG investing may offer social benefits, higher expected returns for investors are not guaranteed. Furthermore, Billio et al. (2021) found that disagreement among rating agencies regarding ESG scores has no significant effect on financial performance. Conversely, several studies suggest a negative relationship between ESG rating disagreement and stock returns (Serafeim & Yoon, 2022; Wang et al., 2023; Xiao et al., 2023; Chen et al., 2023), meanwhile, other authors suggest a positive relationship between ESG rating disagreement and stock returns (Brandon et al., 2021; Avramov et al., 2022).

In this sense and in order to unfold the potential of ESG performance on stock returns, this work aims to study the impact of the ESG score and, specifically, the ESG score divergence, both at an individual level (environmental, social and governance), on the stock returns of the European stock market. It happens that few academic research have been conducted in order to evaluate the relationship between ESG rating divergence and stock returns, especially for each ESG component separately and for the European stock market, in this way, the present study provides its contribute to the existing literature.

For this purpose, in terms of structure, this study begins, in chapter 1, with a theoretical part, which seeks to provide a review and summary of key concepts such as sustainable finance, sustainable investing, ESG factors, the European stock market and asset pricing as well as their theoretical background, pratical implications and recent developments, with the exploration of noteworthy research studies that offer

valuable insights into these themes. In turn, in chapter 2, the methodology and data used are described in order to clarify how this study was conducted. Thus, the data collection and data preparation is disclosed, including the cleaning process, and the descriptive statistics is presented. Additionally, are revealed the variables description, the model setup, hypothesis development and portfolio creation. Subsequently, in chapter 3, a review of previous related studies are presented to support the analysis and a description and assessment of the results obtained with the analysis are disclosed. Moreover, robustness checks were performed in order to test the stability and reliability of the research findings. Lastly, the main conclusions of the study are exposed, alongside a set of limitations of this study and some suggestions for future investigations.

1 Theoretical Part

This chapter provides a review and summary of the theoretical framework of sustainable finance, sustainable investing, Environmental, Social and Governance (ESG) factors, the European stock market and asset pricing. It aims to deliver a comprehensive understanding of the concepts, the practical implications and recent developments, while exploring noteworthy research studies that offer valuable insights into these themes.

1.1 Sustainable Finance

According to OECD (2023), sustainable finance refers to *"efforts to align financial flows and financial products to a sustainable development pathway that takes into consideration the implications of economic development for the society and the environment"*.

In the process of trying to promote and enhance sustainable finance practices, many financial service providers, policy makers, regulators, supervisors, academics, and other organizations have attempted to define "sustainable finance". However, the scope and the characteristics taken into consideration for these definitions vary throughout jurisdictions (OECD, 2023).

Although there is not a single, globally, recognized definition, "sustainable finance" often refers to more than simply "green" or "climate" finance. This is due to the fact that it takes into account elements that are not just strictly connected to the climate or environment, while also comprising aspects and considerations climate related. Moreover, definitions of, and relating to, sustainable finance are usually very broad and focus on the integration of Environmental, Social and Governance (ESG) considerations alongside traditional financial analysis (OECD, 2023).

As it is the case for the European Commission, that refers to sustainable finance as *"the process of taking environmental, social and governance (ESG) considerations into account when making investment decisions in the financial sector, leading to long-term investments in sustainable economic activities and projects"*.

Within the framework of EU policy, sustainable finance aims to support economic growth while mitigating environmental problems in alignment with the climatic and environmental goals of the European Green Deal, whilst also taking social and governance considerations into account. Additionally, sustainable finance implies transparency on the ESG-related risks that might affect the financial system, as is the mitigation of such risks through adequate corporate and financial governance (European Commission, n.d.).

At an international level, alongside many national governments, regulators and supervisors, several organizations and international fora, such as the G20 and the OECD, have made sustainable finance a policy priority, since it is viewed as a means of reducing the effects of climate change on consumers and the economy, as well as a means of fostering a global economy that is resilient, inclusive, and sustainable (OECD, 2023).

As a result, the significance of sustainable finance has grown for financial markets and institutional investors, throughout the years. Individuals are becoming more exposed to possible new risks associated with climate change-related events and financial consumers have shown an increasing interest in sustainable finance, with a variety of sustainable finance products and services being created and marketed (OECD, 2023).

According to KPMG (2023), these sustainable finance products comprise:

1. **Green equities** – shares of equities/stocks invested in companies and/or funds that support positive environmental results.

    a. **Green companies** – investments in shares of companies enhancing positive environmental objectives, including renewable energy or electric vehicle businesses.

    b. **Green funds (mutual and/or exchange traded funds)** – investments in funds that are indexed or designated for companies with positive environment footprints, like funds that exclusively include leading firms in carbon reduction.

2. **Green debt** – debt instruments pointed at projects and/or companies battling climate change and environmental degradation.

    a. **Bonds** – credit issued in public markets to fund initiatives that promote positive environmental change.

        i. **Green and sustainable bonds** – bonds allocated to projects with specific environmental objectives, including bonds directed for energy building retrofits.

        ii. **Sustainability-backed bonds** – bonds invested in projects whose funding is contingent upon meeting certain sustainable associated objectives by a specific date, for instance bonds directed towards renewable energy infrastructure to meet energy consumption reduction targets.

    b. **Loans** – credit pointed at positive environmental change that is issued in private markets.

        i. **Green and sustainable loans** – loans allocated to promote environmentally-friendly services and products development, such as energy-saving home-improvement loans.

        ii. **Sustainability-backed loans** – loans invested in projects whose funding is contingent upon meeting certain sustainable associated objectives by a specific date, for instance energy-saving home improvement loans with covenants to meet energy reduction targets.

Regarding the market for sustainable finance, it has grown significantly, accounting for $1.6 trillion globally in 2021, of which the market for sustainability-backed loans accounted for around $600 billion (Strang, 2022). Additionally, sustainable assets under management increased from $30.7 trillion in 2018 to $35.3 trillion in 2020, while global borrowing through the issuance of green bonds and loans and equity finance through initial public offerings targeting green projects climbed to

$540.6 billion in 2021, showing a 100X growth since 2012 (KPMG, 2023). According to Bloomberg estimates, the value of sustainability-backed debt instruments indicate a significant increase, growing from approximately $155 billion in 2017 to over $1.6 trillion in 2021 (McKinsey, 2022). However, several markets for sustainable finance saw a downturn in 2023. The amount of sustainable finance issued globally fell to $1.3 trillion in 2023, from a record of $1.8 trillion in 2021 and $1.55 trillion in 2022. Sustainability-backed bond issuance dropped by 24% and sustainability-backed loan issuance dropped by 55% in contrast to an 11% growth in green bond issuance (Montagner, 2023).

With this continuous growth and development of markets, guidance is necessary for financial institutions and investors to best position themselves for success (KPMG, 2023). As a result, a rising volume of research is illuminating the multifaceted impacts and implications of sustainable finance.

According to Fu et al. (2023) green financing is believed to be crucial to achieve the Sustainable Development Goals, and investor preferences play a major role in shaping economic decisions, supporting sustainable investments even in situations when they might have an adverse effect on financial performance. Regarding equity indices, Duong (2023) revealed that green equity indices usually exhibit negative returns during market downturns but positive returns during upswings, with fewer negative returns under market stress. In the realm of mutual funds, green mutual funds demonstrate a significant outperformance in comparison to conventional funds, in accordance with Gonçalves et al. (2021). Alonso-Conde & Rojo-Suárez (2020) studied the effect of green bond financing on shareholder returns and project profitability and discovered that green bonds outperform conventional bank loans in terms of returns to shareholders and lead to greater debt payment coverage ratios, which boost project profitability. Additionally, the authors shown that the market for green bonds has experienced significant growth and the sustainable financial products faced a rising demand. Concerning rating scores, in comparison to non-issuers, issuers of green bonds often have better environmental rating scores, according to Schmittmann & Teng (2021). Dursun-de Neef et al. (2023) studied the effectiveness of green and sustainable loans in promoting environmental and social performance and noticed that

green loans can have a negative impact on social performance even while they efficiently reduce environmental emissions. Conversely, sustainable loans encourage businesses to enhance their overall ESG performance, which has a long-term beneficial impact on governance and environmental issues. However, even with the positive progresses in sustainable finance, challenges endure. According to Berrada et al. (2022), a significant percentage of issued sustainability-backed bonds were overpriced at issuance, demonstrating the pervasiveness of mispricing in this products, which emphasizes the importance of evaluating pricing mechanisms in the sustainable finance market more precisely in order to guarantee efficiency and transparency. Lastly, Cortellini & Panetta (2021) revealed that following the 2015 Paris Climate Agreement, the significance of green bonds as sustainable investment vehicles has increased. Investors who care about the environment are becoming more and more interested in green bonds, which is expanding the market and diversifying portfolios. Additionally, geographic diversity of green bond issuances highlights investors' increasing interest in environmental issues and indicates a global trend toward sustainable finance.

1.2 Sustainable Investing

Sustainable investing takes environmental, social, and governance factors into account in addition to financial goals. Although this investment strategy was first made famous under the umbrella of socially responsible investing (SRI), its scope has grown dramatically in the last several years. As a matter of fact, the amount of assets managed with sustainability in mind has reached tens of trillions of dollars, and it appears that the growth will continue (Pástor et al., 2021).

With this worldwide gaining in popularity, sustainable investing importance becomes increasingly evident and this change from conventional financial paradigms to holist investment approaches has resulted in a multitude of sustainable investment strategies. According to GSIA (2022), sustainable investing comprises a range of approaches designed to suit varied investor preferences and risk tolerances, and includes the following recognized strategies:

1. **Screening** – employing rules based on outlined criteria that determine whether an investment is acceptable

    a. **Norms-based Screening** – screening of investments based on international standards, such as those published by the UN, ILO, OECD and NGOs, against minimum requirements of business or issuer practice.

    b. **Negative / Exclusionary Screening** – the exclusion of specific industries, businesses, nations or other issuers from a fund or portfolio based on activities considered not investable. Norms and values-based exclusion criteria may refer, for example, to product categories (e.g., weapons, tobacco), company practices (e.g., animal testing, violation of human rights, corruption) or controversies.

    c. **Positive / Best in Class Screening** – investment in industries, business or projects chosen for positive ESG performance in comparison to industry peers, and that accomplish a rating above a predetermined threshold.

2. **ESG integration** – continuous evaluation of ESG factors within an investment analysis and decision-making process in order to enhance risk-adjusted returns.

3. **Thematic investing** – selecting assets to have access to certain trends.

4. **Stewardship** – the utilization of investor rights and influence on safeguard and improve clients and beneficiaries general long-term value, including the mutual economic, social and environmental assets on which their interests are dependent.

5. **Impact investing** – investing with the purpose of generating positive, quantifiable social and/or environmental effect alongside a financial return.

Given its rapid expansion, evidenced by the growth of sustainable investing assets under management by 20% since 2020 (GSIA, 2022), and by the fact that 73% of asset owners are implementing passive and active sustainable investment strategies, in

accordance with a global survey conducted by FSTE Russell (2023), it is crucial to understand how this sustainable investment strategies affect asset markets and business behavior (Pástor et al., 2021). Consequently, an increasing amount of research has been exploring this topic.

According to Pástor et al. (2021), sustainable investing generates positive social impact, in two ways. First, it leads firms to become greener. Second, it induces more real investment by green firms and less investment by brown firms. Furthermore, a study conducted by Bertelli & Torricelli (2024) prove overperformance of screened portfolios only in the long run and in the presence of negative screening strategies with a low screening threshold. On the other hand, a study conducted by Trinks & Scholtens (2017), reveals that in case an investor employs negative screens, the universe of investment objects can become substantially smaller and it established that there seems to be a price to screening, namely the opportunity cost of refraining from investing in controversial firms. Also, found a screened market portfolio (S&P500) to significantly underperform the unscreened market portfolio when accounting for conventional risk factors. Regarding ESG integration, Kaiser (2019) demonstrated that, since there is a higher adoption rate of ESG in Europe, which leads to such information being more efficiently priced in the market, U.S. value investors can benefit most from integrating ESG information, both in terms of decreasing risk and realizing return potential, than European value investors. According to Morningstar (2022), in the trailing two years to the end of 2021, collective assets under management in thematic funds has grown nearly threefold to $806 billion from $255 billion worldwide, and with $98 billion in assets tied to it, energy transition is by a whisker the second-most-popular theme globally. In accordance with GSIA (2022), corporate engagement and shareholder action (stewardship) is the most common sustainable investment strategy globally, followed by ESG integration then negative or exclusionary screening. Finally, research performed by Bernal et al. (2021) regarding impact investment, point to a risk-adjusted underperformance of impact investments compared to mainstream markets and reveal impact firms' failure to deliver non-negative returns to investors.

1.3 ESG Factors

ESG encompasses three non-financial elements, Environmental, Social, and Governance, that are being used more frequently by investors in their analytical process, beyond financial metrics, to identify significant risks and growth opportunities. Although firms are increasingly disclosing information in their annual report or in a stand-alone sustainability report, ESG measures are not often obligatory in financial reporting requirements (CFA Institute, n.d.).

In order to simplify the incorporation of these factors into the investment process, a number of organizations are working to define materiality and create standards. However, given the frequent interconnection between ESG aspects, it is difficult to categorize an ESG issue as only an environmental, social, or governance concern and so the ESG factors do not have a definitive taxonomy. Additionally, even though these ESG factors are frequently measurable, putting a monetary value on them may be challenging (CFA Institute, n.d.).

1.3.1 Environmental

The environmental factor in ESG refers to the impact that a company's operations has on the natural world (Deutsche Bank, n.d.-b).

According to the European Commission, *"environmental considerations might include climate change mitigation and adaptation, as well as the environment more broadly, for instance the preservation of biodiversity, pollution prevention and the circular economy"*.

Regarding this factor, Chen & Yang (2020) research on investors' asymmetric response to ESG disclosure, reveals that investors tend to overreact more to environmental issues than to social or governance aspects.

1.3.2 Social

The social factor in ESG covers all investing factors that affect people – whether employees, customers or society at large (Deutsche Bank, n.d.-c).

According to the European Commission, *"social considerations could refer to issues of inequality, inclusiveness, labour relations, investment in people and their skills and communities, as well as human rights issues"*.

Regarding this element, in line with current discussions about diversity requirements and with the findings of Hartmann & Carmenate (2020) that suggest that diversity is thought to be one of the most important components of a successful board structure, it was found that "diversity" was the most reported issue within the social dimension by Baier et al. (2020).

1.3.3 Governance

The governance factor in ESG refers to whether a company manages its business in a responsible way (Deutsche Bank, n.d.-a).

According to the European Commission, *"the governance of public and private institutions – including management structures, employee relations and executive remuneration – plays a fundamental role in ensuring the inclusion of social and environmental considerations in the decision-making process"*.

Regarding this component, a study conducted by Baier et al. (2020) shown that 88.9% of ESG terms in financial reports have to do with governance, with "corporate governance" covering subcategories linked to shareholders being the strongest category.

1.3.4 ESG Ratings

ESG ratings offer a judgment on the sustainability profile of an entity, by evaluating its exposure to sustainability risks and its effects on the environment and society, and these ESG ratings are increasingly impacting investor confidence in both sustainable products and the functioning of capital markets (European Council, 2024).

Internationally, most public and many private companies have their environmental, social and governance (ESG) performance evaluated and rated by different providers of reports and ratings. These reports and ratings are becoming more

and more important tools for institutional investors, asset managers, financial institutions, and other stakeholders to evaluate and quantify a company's ESG performance over time and in comparison to its peers. Nowadays, there is a large number of ESG data suppliers, however, the methodology, breadth, and coverage of reports and ratings differ significantly among them (Huber & Comstock, 2017).

Li & Polychronopoulos (2020) tallied at least 70 distinct ESG data sources, in 2019, excluding the surplus of investment banks, governmental bodies, and research institutions that carry out ESG-related investigations. Because of this competitiveness, ESG data providers strive to set themselves apart from the competitors (Gyönyörová et al., 2021).

In contrast to credit ratings, ESG assessment is rather ambiguous because there is not a single definition, set of reporting guidelines, or set of shared characteristics between rating agencies and each ESG component. As a result, there is no single ESG standard, which makes it extremely difficult to evaluate and rate how sustainable a firm is (Billio et al., 2021). According to Windolph (2011), there are six factors that prevent a rating to be transparent and objective. These factors include lack of standardization, lack of credibility of information, bias, trade-offs, lack of transparency, and lack of independence. Furthermore, in order to address emerging global concerns, ESG rating agencies have included new criteria to their assessment models in recent years (Escrig-Olmedo et al., 2019). Overall, the use of a variety of measures by ESG rating agencies leads to considerable subjectivity and, consequently, to significant inconsistencies in ESG ratings (Berg et al., 2019).

According to Berg et al. (2019), this inconsistencies have several significant consequences. In the first place, it makes it challenging to assess the ESG performance of businesses, funds, and portfolios, which is the main objective of ESG ratings. Second, firms are less motivated to enhance their ESG performance when there is a discrepancy in their ESG ratings. Rating agencies provide contradictory messages to companies about what behaviours are anticipated and what the market would appreciate and underinvestment in ex ante ESG improvement initiatives might result from this. Third, ex post pricing of companies' ESG performance is unlikely to occur in markets. ESG performance might be essentially important to value or impact asset

prices through investor preferences. But in both situations, the impact of ESG performance on asset prices is diffused due to the ratings' discrepancy. Fourth, the conflict indicates that it is challenging to establish a connection between CEO compensation and ESG performance. Contracts are probably going to be partial, and CEOs could maximize for a certain rating while doing poorly on other crucial ESG problems; in other words, they might meet the rating's objective but fail to improve the company's overall ESG performance. Ultimately, selecting one rating provider instead of another may change a study's findings and conclusions, which makes the divergence of ratings a barrier for empirical research. Uncertainty in decisions based on ESG ratings is created by the divergence in ESG ratings, which poses a challenge to a broad spectrum of decision-makers.

Nonetheless, all rating providers incorporate fundamental ESG factors into their evaluations, including carbon emissions, the impact of climate change, pollution, waste disposal, renewable energy, diversity, discrimination, community relations, human rights, and independent directors (Cornell & Damodaran, 2020).

1.4 European Stock Market

The European stock market refers to a broad collection of stock exchanges and financial markets located all across the European continent. With a rich history spanning decades, Europe is home to some of the world's most venerable and established stock exchanges, including Euronext, London Stock Exchange (LSE) and Deutsche Börse, which are some of the major stock exchanges in Europe (Statista, 2023).

Many investors believe that Europe's economy entered a slow lane a few years ago, behind the robust economies of the US and Asia. While Europe's stock markets may not be able to claim the many IT giants that dominate the US stock market, they nonetheless deserve to be known as corporate retirement homes for value and old-economy cyclical companies (Barnfather, 2023).

As a matter of fact, the European market has something distinctive to offer. It has a variety of defensive and growth stocks, comprising banks, pharmaceuticals and

luxury retailers. Which means European companies can be an imperative diversifier in portfolios (Financial Times, 2024). Indeed, Europe has greater sector diversification than rival major developed and emerging markets, which helps to lower the risk, and its companies are experiencing significantly higher levels of financial productivity (Barnfather, 2023). Additionally, they tend to be more global. While many US firms are more concentrated on domestic markets, about 60 per cent of European company sales are outside Europe (Financial Times, 2024). Despite this, it still trades at historically low absolute levels and at a discount against other markets, most notably versus US stocks (Barnfather, 2023). Between 2009 and 2023, cumulative S&P500 gains were five times higher than those of the Euro Stoxx 50 (Financial Times, 2024).

Nonetheless, the European market has shifted towards a growth-oriented tilt, as seen by the rise of healthcare, IT, and consumer discretionary sectors, and the decline of financials, materials, energy, and utilities sectors (Barnfather, 2023).

Regarding sustainability, the climate crisis is one of the most significant prospects for the future. In addition to benefiting from substantial domestic climate measures like the Green Deal Industrial Plan and NextGeneration EU (NGEU), Europe's sustainability leaders stand to be major beneficiaries of the more significant and revolutionary US Inflation Reduction Act (Barnfather, 2023).

Within this scope, Europe is a global leader in the areas of automation, testing, electrification, wind power generation, solar technology, and environmental project development. Furthermore, the region benefits from the ESG credentials of its enterprises since many European corporations have the highest ESG ratings in international markets (Barnfather, 2023).

1.5 Asset Pricing

Within the financial industry, estimating stock returns is a timeless and permanent goal. Institutional and individual investors, among others, perform a variety of studies on a daily basis in order to build their portfolios in a way that will optimize their return in the future. The methods extend from basic and standardized models to extremely complicated algorithms, and the results are just as varied (Novak, 2022).

1.5.1 Capital Asset Pricing Model (CAPM)

The first development of modern asset pricing models, referred to as the Capital Asset Pricing Model (CAPM), was accomplished by Harry Markowitz and is built upon the foundation of its Modern Portfolio Theory (Markowitz, 1952). Initially developed by William F. Sharpe in 1964 and subsequently refined by Lintner (1965), Mossin (1966), and Black (1972), the CAPM provides a framework for understanding the relationship between risk and expected return of an asset (Novak, 2022).

The Modern Portfolio Theory emphasizes the construction of portfolios based on individual investors' risk and return preferences, suggesting that through diversification, investors can mitigate but not entirely eliminate risk (Markowitz, 1952). The risk remaining after diversification is referred to as systematic risk, according to Sharpe (1964), which is related to the variance of returns (Lintner, 1965; Markowitz, 1952). According to the CAPM, there is a trade-off between expected return and variance, which underlies that investors can achieve higher expected returns by assuming more risk in form of variance (Sharpe, 1964).

Sharpe (1964) CAPM model posits that the price of an asset consists of the risk-free interest rate (representing the price of time) and the price of risk, which compensates for the risk associated with the investment. The model considers systematic risk, measured by beta (β), which is the asset's covariance with the market return divided by the variance of the market return.

The CAPM formula, derived from various assumptions and findings, relates the expected return of an asset to its beta coefficient, the market return, and the risk-free rate:

$$ER_i = R_f + \beta_i(R_m - R_f)$$

Where,

- ER_i = Expected return of investment
- R_f = Risk-free rate
- R_m = Return of market portfolio
- β_i = Beta coefficient of investment

- $R_m - R_f$ = Market risk premium

1.5.2 Fama and French Three-Factor Model (FF3)

After the emergence of the Capital Asset Pricing Model (CAPM), empirical findings indicated that factors beyond an asset's beta and market risk were better at explaining average returns of US stocks and portfolios (Banz, 1981; Basu, 1977; Lakonishok & Shapiro, 1986; Reinganum, 1981a). Notably, the size of a firm, measured by market capitalization, and the book-to-market (B/M) ratio were found to correlate with average returns. Banz (1981), Lakonishok & Shapiro (1986), Reinganum, (1981b) found that small firms tend to yield higher average returns, while those with higher B/M ratios also show higher returns. Fama & French (1993) confirmed these results and introduced the Three-Factor Model (FF3), which includes size premium, that considers the excess return of small stocks over big stocks (SMB), and value premium, that covers the higher average returns by companies with a high B/M ratio against those with a lower ratio (HML), alongside the market risk premium:

$$R_{it} - R_{ft} = \alpha_{it} + \beta_1(R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_{it}$$

Where,

- R_{it} = Total return of a stock or portfolio *i* at time *t*
- R_{ft} = Risk-free rate of return at time *t*
- $R_{it} - R_{ft}$ = Expected excess return of stock or portfolio *i* at time *t*
- R_{mt} = Total return of market portfolio at time *t*
- $R_{mt} - R_{ft}$ = Excess return on the market portfolio index
- SMB_t = Size premium (small minus big)
- HML_t = Value premium (high minus low)
- $\beta_{1,2,3}$ = Factor coefficients
- α_{it} = intercept
- ε_{it} = error term

1.5.3 Carhart Four-Factor Model

Building upon the Fama and French Three-Factor model and considering the short-term momentum effect, Carhart (1997) proposed the Four-Factor Model, which considers past stock performance. According to Jegadeesh & Titman (1993), the event where stock returns keep on their trend in the short-term period of three to twelve months, is known as the momentum effect. Which means that, in the short term, stocks with good past performance, known as winners, tend to remain winning stocks and stocks with poor past performance, known as losers, tend to remain losing stocks. Additionally, the authors also show that, in the short term, winners tend to outperform losers. Considering this, Carhart (1997) proposed model incorporates momentum factor (MOM), which is calculated by taking the difference in return between stocks with the best performance over the prior year (winning stocks) and stocks with the worst performance over the same period (losing stocks), alongside the size, value, and market risk premium, providing a more comprehensive framework for explaining average returns:

$$R_{it} = \alpha_{it} + \beta_1\left(R_{mt} - R_{ft}\right) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t + \varepsilon_{it}$$

Where,

- R_{it} = Total return of a stock or portfolio *i* at time *t*
- R_{mt} = Total return of market portfolio at time *t*
- R_{ft} = Risk-free rate of return at time *t*
- $R_{mt} - R_{ft}$ = Excess return on the market portfolio index
- SMB_t = Size premium (small minus big)
- HML_t = Value premium (high minus low)
- MOM_t = Momentum factor at month *t*
- $\beta_{1,2,3,4}$ = Factor coefficients
- α_{it} = intercept
- ε_{it} = error term

1.5.4 Fama and French Five-Factor Model (FF5)

Further research revealed two additional factors with explanatory power: investment and profitability. Fama & French (2006) highlighted the negative relationship between past investments and future returns, as well as the positive relationship between profitability and returns. Bearing this in mind, Fama & French (2015) integrated these two factors into their well-established FF3, presenting the Five-Factor Model (FF5). The profitability is presented as RMW (Robust Minus Weak) factor, which symbolizes the expected return difference between stocks with robust and weak profitability. In this sense, those firms with high operating profitability are referred as robust, while those firms with low operating profitability are referred as weak (Fama & French, 2015). The investment is presented as CMA (Conservative Minus Aggressive) factor, which symbolizes the difference in return between stocks with high and low asset growth. In this sense, conservative firms indicate those with low asset growth in former periods, while aggressive firms are those with high asset growth in former periods (Fama & French, 2015):

$$R_{it} - R_{ft} = \alpha_{it} + \beta_1(R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \varepsilon_{it}$$

Where,

- R_{it} = Total return of a stock or portfolio *i* at time *t*
- R_{ft} = Risk-free rate of return at time *t*
- $R_{it} - R_{ft}$ = Expected excess return of stock or portfolio *i* at time *t*
- R_{mt} = Total return of market portfolio at time *t*
- $R_{mt} - R_{ft}$ = Excess return on the market portfolio index
- SMB_t = Size premium (small minus big)
- HML_t = Value premium (high minus low)
- RMW_t = Profitability premium (robust minus weak)
- CMA_t = Investment premium (conservative minus aggressive)
- $\beta_{1,2,3,4,5}$ = Factor coefficients
- α_{it} = intercept
- ε_{it} = error term

2 Methodology and Data

The methodology and data chapter precedes the practical application chapter in order to clarify how this study was conducted. Thus, the following subtopics present the data collection and cleaning process as well as the model setup, hypothesis formulation and portfolio creation.

2.1 Data

2.1.1 Data Collection and Data Preparation

In order to conduct the present study, all the data was retrieved from two major sources, Bloomberg and Refinitiv databases, and was obtained for European publicly traded stocks for the period between January 2015 and May 2022. From each database, the rating of each pillar (environmental, social and governance) was extracted for each stock since the intention is to observe what is the impact of the different components separately. From this universe, stocks with positive prices and with both Bloomberg and Refinitiv ratings for at least one of the three pillars were selected. After the adjustment, the final sample contained 737 stocks from 17 countries, which include Austria, Belgium, Switzerland, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal and Sweden, operating in 9 sectors, which are Basic Materials, Consumer Cyclical, Utilities, Communications, Consumer Non-Cyclical, Industrial, Financial, Energy and Technology.

The scope, methodology, and rating scale of the employed metrics differ between the two rating providers. Bloomberg ESG Score measures a company's management of financially material ESG issues. Bloomberg scores measure best-in-class performance within peer groups. The scores consider disclosure of quantitative data as a dimension of performance. Scores range between 0-10, with higher scores indicating a better management of material issues. As of 2023, Bloomberg calculates its ESG scores for approximately 15,000 companies across over 100 countries (Bloomberg, 2023). Refinitiv ESG Score captures more than 630 ESG metrics across 10 main categories, such as emissions, human rights, corporate social responsibility strategy,

etc. The score adopts percentile rank scoring methodology attributing the best performer the score of 100. As of 2023, Refinitiv calculates its ESG score for more than 15,500 companies globally, of which approximately 3,700 companies are based in Europe (LSEG, 2023).

Given the different assessment and rating methodologies with various scales, data-cleaning processes had to be performed. For example, Refinitiv Score ranges from 0 to 100, with the best performer attributed with highest ranking, while the Bloomberg Score ranges from 0 to 10. For the analysis purposes, the range of Refinitiv Score was divided by the factor of 10. Adjusted this way, each Environmental, Social and Governance metric of the stock is scaled on the range from 0 to 10 granting the highest ranking to the best performer.

2.1.2 Descriptive Statistics

Table 1 presents the average number of observations and average values of mean and standard deviation for each Environmental, Social and Governance scores of each rating provider in any given year from the dataset. As mentioned above in the scope, methodology, and rating scale of each rating provider, these pillar scores are percentiles of performers in the category, which means that the scores are based on how well an entity performs relative to others within the same category.

As can be observed in table 1, Environmental, Social and Governance scores are being assigned from 2015 with an average of 570 rated stocks with Environmental Bloomberg Score and Social Bloomberg Score and 591 rated stocks with Governance Bloomberg Score and Environmental, Social and Governance Refinitiv Scores. As the years progress, more stocks are evaluated, leading to larger sample sizes, which might reflect increased awareness and reporting on ESG matters. Governance Bloomberg Score and Environmental, Social and Governance Refinitiv Scores reached on average 737 rated stocks in 2022, wich means that they achieved 100% coverage in the sample.

Table 1 also demonstrates a gradual increase of each Environmental, Social and Governance score of both rating providers over the years, which suggests an overall improvement in Environmental, Social and Governance performance among the

assessed stocks. Notably, all scores show a consistent upward trend, what can be explained by the fact that the values might be skewed for the best performers, since worst performers do not report data and therefore are not included.

The standard deviation (sd) values provide insights into the variability of scores within each category. For example, in 2015, as it is possible to observe in table 1, the Environmental Bloomberg Score had a mean of 2.4 with a standard deviation of 2.0, which indicates considerable dispersion in environmental performance across stocks. This dispersion has been decreasing for all Refinitiv Scores throughout the years.

Tab. 1 Descriptive statistics of Environmental, Social and Governance Score ratings by year

year	Environmental Bloomberg Score			Social Bloomberg Score			Governance Bloomberg Score			Environmental Refinitiv Score			Social Refinitiv Score			Governance Refinitiv Score		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
2015	570	2.4	2.0	570	2.1	1.4	591	6.0	1.3	591	6.5	2.5	591	6.4	2.2	591	5.6	2.2
2016	585	2.6	2.1	585	2.4	1.5	608	6.1	1.3	608	6.6	2.5	608	6.6	2.2	608	5.7	2.2
2017	606	2.8	2.1	606	2.7	1.6	630	6.3	1.2	630	6.7	2.4	630	6.9	2.1	630	5.8	2.2
2018	623	3.1	2.2	623	2.8	1.6	650	6.3	1.2	650	6.7	2.3	650	7.1	1.9	650	5.9	2.2
2019	647	3.1	2.2	647	2.8	1.7	677	6.3	1.2	677	6.6	2.4	677	7.3	1.8	677	6.3	2.1
2020	661	3.9	2.1	661	3.4	1.8	692	6.6	1.2	692	6.7	2.3	692	7.3	1.7	692	6.5	2.0
2021	718	4.4	2.0	718	3.5	1.9	726	6.6	1.2	726	6.9	2.2	726	7.5	1.7	726	6.8	1.9
2022	729	4.4	2.1	729	3.6	1.8	737	6.6	1.2	737	7.0	2.1	737	7.5	1.6	737	6.8	1.9

Note: This table presents main descriptive statistics of Environmental, Social and Governance scores variable of each rating provider in the dataset. Values are arithmetic means of the corresponding year. For example, variable n stands for average number of stocks with assigned Environmental, Social and Governance score of each rating provider in a given year.

Source: own presentation based on Bloomberg and Refinitiv scores

The following Table 2 shows the correlation matrix of Environmental, Social and Governance scores variables of each rating provider. Unsurprisingly, Environmental Bloomberg Score and Environmental Refinitiv Score, are relatively correlated (0.310), as the Social Bloomberg Score and Social Refinitiv Score (0.321), and the Governance

Bloomberg Score and Governance Refinitiv Score (0.394), which can support the claim that the data are skewed for the best performers. Additionally, this positive correlation between corresponding scores from different frameworks, might suggest convergence or agreement in the rating providers assessment methodologies. Rather unexpected is the high and strong correlation (0.687) between Environmental Refinitiv Score and Social Refinitiv Score, which might suggest that stocks with higher environmental scores tend to also have higher social scores. Equally notable is a very weak correlation between the Governance Bloomberg Score with the Environmental Refinitiv Score (0.062) and with both Social Bloomberg and Social Refinitv Scores (0.039 and 0.066, respectively).

Tab. 2 Correlation matrix of Environmental, Social and Governance score variables

	Environmental Bloomberg Score	**Social Bloomberg Score**	**Governance Bloomberg Score**	**Environmental Refinitiv Score**	**Social Refinitiv Score**	**Governance Refinitiv Score**
Environmental Bloomberg Score	1.000	0.311	0.110	0.310	0.363	0.203
Social Bloomberg Score	0.311	1.000	0.039	0.283	0.321	0.145
Governance Bloomberg Score	0.110	0.039	1.000	0.062	0.066	0.394
Environmental Refinitiv Score	0.310	0.283	0.062	1.000	0.687	0.311
Social Refinitiv Score	0.363	0.321	0.066	0.687	1.000	0.361
Governance Refinitiv Score	0.203	0.145	0.394	0.311	0.361	1.000

Note: This table presents correlation coefficients for Environmental, Social and Governance score variable across all categories.

Source: own presentation based on Bloomberg and Refinitiv scores

2.2 Methodology

The aim of this study is to examine the impact of ESG ratings and, specifically, ESG ratings divergence on stock performance from an investor's perspective with special attention to the impact of the separate components of the ESG (environmental, social and governance). Taking this into account, the following methodology was

developed having in consideration and base the studies of Avramov et al. (2022) and Vyletelka (2024).

2.2.1 Variables Description

As mentioned before, all Environmental, Social and Governance scores have been adjusted by sorting stocks into ranks from 0 to 10, granting the highest possible ranking to the "best" performer in the category. For the assessment of Environmental, Social and Governance scores and scores divergence, six separate variables for each period were created and calculated monthly:

- ***Environmental Composite*:** average of Environmental scores per each stock
- ***Social Composite*:** average of Social scores per each stock
- ***Governance Composite*:** average of Governance scores per each stock
- ***Environmental Divergence*:** standard deviation of adjusted Environmental scores of the stock
- ***Social Divergence*:** standard deviation of adjusted Social scores of the stock
- ***Governance Divergence*:** standard deviation of adjusted Governance scores of the stock

In order to get a proper distribution of values, all variables were sorted in deciles, with the highest ranking attributed to the "best" performers, for the purpose of the analysis. A decile is a quantitative technique for dividing a set of ranked data into ten subsections of the same size. Using a scale of one to ten, where each additional number represents an increase of ten percentage points, a decile rank places the data in order of lowest to highest (Hayes, 2021).

For the purpose of estimating excess returns of the European stocks, Fama and French three-factor model (FF3), Fama and French five-factor model (FF5) and

Carhart four-factor model are applied. Therefore, the relevant risk factors per each stock in any given month were obtained from Eikon and Bloomberg databases and sorted into deciles by the same process:

- Market Capitalization – is used to capture the size effect and refers to the company's market value, which is the number of outstanding shares times stock price.

- Price/Book multiple – is used to capture the value effect and refers to the ratio of a company's market value and its book value.

- Operating profitability on equity – is used to capture the profitability and refers to the ratio between a company's net income and its shareholders' equity.

- Asset growth – is used to capture the investment activity and refers to the rate at which a company's assets are growing.

- Momentum – refers to the event that stock returns keep on their trend in the short term. In this study, will be assessed for one, three and twelve months.

Since STOXX600 is the index more in line with the characteristics of the sample, it was chosen as the main market risk benchmark and was adjusted for the risk-free rate, which is the 12-month EURIBOR rate.

In order to conduct robustness checks, MSCI Europe and STOXX50 indices were later incorporated to factor models.

2.2.2 Regression Models

As previously mentioned, Fama and French three-factor model (FF3), Fama and French five-factor model (FF5) and Carhart four-factor model were applied to estimate excess returns of the European stocks. Therefore, the monthly returns of securities were adjusted for the EURIBOR rate and followingly estimated on a monthly basis:

Fama and French 3-factor:

$$R_{nj} = \alpha_{n,j} + \sum Z_{x,n,j} + E_{composite\ score,n,j} + S_{composite\ score,n,j} + G_{composite\ score,n,j} + E_{divergence,n,j} + S_{divergence,n,j} + G_{divergence,n,j} + \varepsilon_n$$

where R_{nj} is a monthly return for stock n in the time j, Z_x is a relevant beta for the purpose of the factor analysis, including market risk premium, value and size betas.

Fama and French 5-factor:

$$R_{nj} = \alpha_{n,j} + \sum Z_{x,n,j} + E_{composite\ score,n,j} + S_{composite\ score,n,j} + G_{composite\ score,n,j} + E_{divergence,n,j} + S_{divergence,n,j} + G_{divergence,n,j} + \varepsilon_n$$

where R_{nj} is a monthly return for stock n in the time j, Z_x is a relevant beta for the purpose of the factor analysis, including market risk premium, value, size, profitability and investment betas.

Carhart 4-factor:

$$R_{nj} = \alpha_{n,j} + \sum Z_{x,n,j} + E_{composite\ score,n,j} + S_{composite\ score,n,j} + G_{composite\ score,n,j} + E_{divergence,n,j} + S_{divergence,n,j} + G_{divergence,n,j} + \varepsilon_n$$

where R_{nj} is a monthly return for stock n in the time j, Z_x is a relevant beta for the purpose of the factor analysis, including market risk premium, value, size and momentum (one, three and twelve months) betas.

2.2.3 Hypothesis Development

Avramov et al. (2022) reveals that the market premium increases and demand for stocks declines under ESG uncertainty. In addition, the CAPM alpha and effective beta both rise with ESG uncertainty, and the negative ESG-alpha relation weakens. Based

on this study, three relevant hypotheses are formulated, all based on the same assumption, only differing in terms of the ESG component to be assessed:

***Hypothesis 1*:** there is a positive relationship between security's historical returns and its Environmental ratings divergence and a negative relationship with its aggregate Environmental score.

Hypothesis 2: there is a positive relationship between security's historical returns and its Social ratings divergence and a negative relationship with its aggregate Social score.

Hypothesis 3: there is a positive relationship between security's historical returns and its Governance ratings divergence and a negative relationship with its aggregate Governance score.

2.2.4 Portfolio Creation

The portfolio performance analysis aims to measure the cumulative performance of the portfolio, that is, the effectiveness of an investment strategy consisting in investing 1EUR into stocks within the n-th decile of any given variable compared to standard indices. In this case, are stocks within the n-th decile of Environmental divergence, Social divergence and Governance divergence variables, separately.

For this purpose, three portfolio groups are created, one to assess the Environmental divergence variable, other the Social divergence variable and the third to assess the Governance divergence variable. For the first portfolio group, in each month, the stocks in the sample are grouped into deciles of the Environmental scores divergence, defined as a standard deviation of the percentile ranks of all available Environmental ratings for each stock in a given month. The same procedure applies to the Social scores divergence and Governance scores divergence, for the second and third portfolio group, respectively.

For all the three components, portfolios of the 1st decile present the lowest divergence and portfolio of the 10th decile present the highest divergence.

Each month, the investor rebalances its portfolio equally invested in the stocks of the n-th decile of the Environmental, Social and Governance divergence.

Additionally, a portfolio is constructed comprising stocks from the highest decile of the preceding period in a long position and stocks from the lowest decile in a short position (HML strategy), for each component.

For comparison, the indices selected are STOXX 600, MSCI Europe and STOXX 50, each one providing distinct perspectives on the European market.

3 Practical Application

This chapter presents a review of previous related studies, some from which the presented hypotheses in the previous chapter were developed. A description and interpretation of the results of the analysis using the models explained in the previous chapter are also presented, firstly the results of each hypothesis, followed by the results of an aggregated analysis. Additionally, it offers results of the conducted portfolio performance analysis. Lastly, robustness checks are disclosed in order to evaluate the stability and reliability of this research findings.

3.1 Impact of ESG Scores on Stock Returns

No consensus in literature regarding the relation of both ESG activities and ESG rating disagreement with financial performance can be found.

Revelli & Viviani (2015) performed a meta-analysis to test the relationship between socially responsible investing (SRI) and financial performance and the results indicate that the consideration of corporate social responsibility in stock market portfolios is neither a weakness nor a strength compared with conventional investments. While Friede et al. (2015) study that combined the findings of about 2200 individual studies suggests a positive relation between ESG criteria and corporate financial performance (CFP), Pástor et al. (2021) presume that stocks of greener firms have lower ex ante CAPM alphas, especially when risk aversion is low and the average ESG preference is strong, and that green stocks have negative alphas, whereas brown stocks have positive alphas. Additionally, Cornell (2021) reveals that there are two primary factors that can affect expected returns for ESG companies with high ratings, investor preferences and risk, and concludes that while ESG investing may have social benefits, higher expected returns for investors is not among them.

Billio et al. (2021) found that the disagreement in the scores provided by the rating agencies disperses the effect of preferences of ESG investors on asset prices, to the point that even when there is agreement, it has no impact on financial performances.

On one hand, Serafeim & Yoon (2022) found that for firms whose ratings are low in disagreement and thus more likely to create stronger expectations about future news, stock price reaction results are further magnified. Chen et al. (2023) found that ESG rating divergence reduces stock returns. The negative relationship between ESG rating divergence and stock returns is only significant at social, thereby suggesting that lower stock returns can only be achieved when companies show differences in their social issues. Xiao et al. (2023) reveal that stocks with low ESG rating dispersion tend to outperform those with high dispersion, especially for firms that consistently receive more divergent ESG ratings over an extended period in the past and that the negative return predictability of ESG rating dispersion cannot be solely attributed to common risk exposures. Wang et al. (2023) found that the different rating of the three component indicators of ESG all have negative impact on excess stock returns, with the social rating divergence having the greatest impact on excess stock returns, followed by environmental and governance levels.

On the other hand, Brandon et al. (2021) found that stock returns are positively related to ESG rating disagreement, suggesting a risk premium for firms with higher ESG rating disagreement. The relation is primarily driven by disagreement about the environmental dimension. These findings disclose that, since ESG rating divergence introduces uncertainty, investors anticipate higher risk compensation, resulting in companies with greater divergence experiencing higher excess stock returns. Avramov et al. (2022) reveals that the market premium increases and demand for stocks declines under ESG uncertainty. In addition, the CAPM alpha and effective beta both rise with ESG uncertainty, and the negative ESG-alpha relation weakens.

In order to contribute to the existing discussion in the literature, this study examines the impact of ESG ratings and, specifically, ESG ratings divergence on stock performance from an investor's perspective with special attention to the impact of the separate components of the ESG (environmental, social and governance). Few academic research have been conducted in order to evaluate this relationship, especially for the European stock market, and it remains uncertain how strong the relationship between ESG rating divergence and stock returns is, specially the relationship between each ESG component rating divergence and stock returns.

3.2 Results and Discussion

3.2.1 Factor Analysis

In this section, the results from the estimated Fama and French and Carhart regression models specified in the previous chapter are presented by each pillar, corresponding to each hypothesis, as well as the results of an aggregated analysis. As mentioned before, the analysis is based on the past work of authors such as Avramov et al. (2022) and Vyletelka (2024).

H1: there is a positive relationship between security's historical returns and its Environmental ratings divergence and a negative relationship with its aggregate Environmental score

From table 3, where the results for the Environmental pillar are disclosed, it is possible to assess that the Environmental divergence score does not significantly contributes to the expected individual stock returns for neither of the specified models. Although not statistical significant to explain these models, the resulting positive values of the coefficient indicates the expected investors' reward for the uncertainty of the ratings, as highlighted by the studies of Avramov et al. (2022) and Brandon et al. (2021).

Additionally, it is possible to assess the negative and statistically significant effect of the Environmental composite score on the stock returns for all models, which suggest that Environmental performers are able to secure equity financing at lower costs, probably explained by lower sustainability risks, which is in accordance with the theoretical framework of Pástor et al. (2021).

Tab. 3 Summary of Fama-French factor models for Environmental pillar

	3-factor	**5-factor**	**4-factor (12M)**	**4-factor (3M)**	**4-factor (1M)**
(Intercept)	-0.011***	-0.040***	-0.040***	-0.028***	-0.018***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Market premium	104.0***	103.9***	103.6***	103.8***	103.7***
	(0.759)	(0.737)	(0.741)	(0.753)	(0.758)
Value effect	0.206***	0.132***	0.164***	0.161***	0.158***
	(0.011)	(0.014)	(0.011)	(0.011)	(0.012)

Size effect	0.069*** (0.012)	0.075*** (0.011)	0.059*** (0.011)	0.062*** (0.012)	0.059*** (0.012)
Environmental composite	-0.059*** (0.012)	-0.026* (0.011)	-0.046*** (0.011)	-0.047*** (0.012)	-0.046*** (0.012)
Environmental divergence	0.002 (0.011)	0.011 (0.011)	0.005 (0.011)	0.007 (0.011)	0.007 (0.011)
Growth effect		0.649*** (0.011)			
Profitability		-0.084*** (0.014)			
12MOM		0.559*** (0.011)			
3MOM		0.339*** (0.011)			
1MOM		0.172*** (0.012)			
Num.Obs.	55024	54804	55016	54993	54754
R2	0.259	0.304	0.293	0.271	0.262

Note: The response variable is gross stock return on a monthly basis, expressed in percentage points. The explanatory variables consist of standard Fama-French factors, constructed divergence of Environmental scores (Environmental divergence), constructed Environmental composite score (Environmental composite), 1-year momentum (12MOM), 3-months momentum (3MOM) and 1-month momentum (1MOM). The first value in the cell corresponds to the value of beta coefficient for a given variable, the value in brackets below represents the standard error of the coefficient. Star symbols *,**,*** highlight statistical significance on a 5%,1% and 0.1% level.

Source: own presentation based on RStudio

H2: there is a positive relationship between security's historical returns and its Social ratings divergence and a negative relationship with its aggregate Social score

From table 4, where the results for the Social pillar are disclosed, it is possible to perceive that the Social divergence score significantly contributes to the expected individual stock returns when controlling for variables in Fama-French 3-factor and Carhart 4-factor model with one-, three- and twelve-month momentum. However, the coefficients of the Social divergence score have negative values, which indicates that investors are not rewarded for the uncertainty of the ratings, being contrary to what was expected and consistent with the findings of Chen et al. (2023) and Wang et al. (2023). This might be due to the fact that when companies do not fulfil their social responsibility properly, it might lead to public dissatisfaction and investor concerns, which can affect its market reputation and financial performance. Additionally, since

social responsibility metrics include multiple sensitive subjects such as ethics, morality, and culture, it might be complicated to reach a consensus on assessing social responsibility (Chen et al., 2023). Nevertheless, the effect dissolves when control variables include operating profitability and asset growth from Fama and French 5-factor model.

Additionally, as for the Environmental composite score, it is possible to assess the negative and statistically significant effect of the Social composite score on the stock returns for the Fama-French 3-factor and Carhart 4-factor model with one-, three- and twelve-month momentum, which suggest that Social performers are able to secure equity financing at lower costs, probably explained by lower sustainability risks, which is in accordance with the theoretical framework of Pástor et al. (2021). However, even though it remains negative, the effect dissolves when control variables include operating profitability and asset growth from Fama and French 5-factor model.

Tab. 4 Summary of Fama-French factor models for Social pillar

	3-factor	**5-factor**	**4-factor (12M)**	**4-factor (3M)**	**4-factor (1M)**
(Intercept)	-0.010*** (0.001)	-0.039*** (0.001)	-0.039*** (0.001)	-0.027*** (0.001)	-0.017*** (0.001)
Market premium	104.0*** (0.759)	103.9*** (0.737)	103.6*** (0.741)	103.9*** (0.752)	103.8*** (0.758)
Value effect	0.206*** (0.011)	0.130*** (0.014)	0.163*** (0.011)	0.160*** (0.011)	0.157*** (0.012)
Size effect	0.076*** (0.012)	0.078*** (0.011)	0.064*** (0.012)	0.067*** (0.012)	0.064*** (0.012)
Social composite	-0.033** (0.012)	-0.020 (0.011)	-0.028* (0.011)	-0.027* (0.012)	-0.029* (0.012)
Social divergence	-0.054*** (0.011)	-0.018 (0.011)	-0.039*** (0.011)	-0.039*** (0.011)	-0.039*** (0.011)
Growth effect		0.649*** (0.011)			
Profitability		-0.085*** (0.014)			
12MOM		0.559*** (0.011)			
3MOM		0.338*** (0.011)			
1MOM					0.171*** (0.012)

Num.Obs.	55036	54816	55028	55005	54766
R2	0.259	0.304	0.294	0.271	0.262

Note: The response variable is gross stock return on a monthly basis, expressed in percentage points. The explanatory variables consist of standard Fama-French factors, constructed divergence of Social scores (Social divergence), constructed Social composite score (Social composite), 1-year momentum (12MOM), 3-months momentum (3MOM) and 1-month momentum (1MOM). The first value in the cell corresponds to the value of beta coefficient for a given variable, the value in brackets below represents the standard error of the coefficient. Star symbols *,**,*** highlight statistical significance on a 5%,1% and 0.1% level.

Source: own presentation based on RStudio

H3: there is a positive relationship between security's historical returns and its Governance ratings divergence and a negative relationship with its aggregate Governance score

Lastly, from table 5, where the results for the Governance pillar are disclosed, it is possible to observe negative values for the Governance divergence coefficients, as it was for the Social divergence scores, which indicates, once again, that investors are not rewarded for the uncertainty of the ratings, being contrary to what was expected and consistent with the findings of Chen et al. (2023) and Wang et al. (2023). This might be due to the fact that companies with significant divergence in governance ratings may attract more regulatory attention, possibly resulting in fines or sanctions, negatively impacting the stock returns (Chen et al., 2023). However, in this case, the Governance divergence score does not significantly contributes to the expected individual stock returns for neither of the specified models.

Additionally, as for the Environmental and Social composite scores, it is possible to assess the negative and statistically significant effect of the Governance composite score on the stock returns for all models, which suggests that Governance performers are able to secure equity financing at lower costs, once again probably explained by lower sustainability risks, which is in accordance with the theoretical framework of Pástor et al. (2021).

Tab. 5 Summary of Fama-French factor models for Governance pillar

	3-factor	**5-factor**	**4-factor (12M)**	**4-factor (3M)**	**4-factor (1M)**
(Intercept)	-0.010*** (0.001)	-0.038*** (0.001)	-0.038*** (0.001)	-0.026*** (0.001)	-0.017*** (0.001)

Market premium	103.5*** (0.744)	103.4*** (0.722)	103.0*** (0.726)	103.3*** (0.738)	103.2*** (0.743)
Value effect	0.210*** (0.011)	0.130*** (0.014)	0.166*** (0.011)	0.163*** (0.011)	0.160*** (0.011)
Size effect	0.058*** (0.011)	0.070*** (0.011)	0.049*** (0.011)	0.053*** (0.011)	0.049*** (0.011)
Governance composite	-0.065*** (0.011)	-0.043*** (0.011)	-0.051*** (0.011)	-0.051*** (0.011)	-0.050*** (0.011)
Governance divergence	-0.005 (0.011)	-0.005 (0.011)	-0.008 (0.011)	-0.006 (0.011)	-0.007 (0.011)
Growth effect		0.650*** (0.011)			
Profitability		-0.083*** (0.014)			
12MOM		0.564*** (0.011)			
3MOM				0.342*** (0.011)	
1MOM					0.174*** (0.011)
Num.Obs.	56999	56779	56991	56966	56712
R2	0.258	0.303	0.293	0.271	0.261

Note: The response variable is gross stock return on a monthly basis, expressed in percentage points. The explanatory variables consist of standard Fama-French factors, constructed divergence of Governance scores (Governance divergence), constructed Governance composite score (Governance composite), 1-year momentum (12MOM), 3-months momentum (3MOM) and 1-month momentum (1MOM). The first value in the cell corresponds to the value of beta coefficient for a given variable, the value in brackets below represents the standard error of the coefficient. Star symbols *,**,*** highlight statistical significance on a 5%,1% and 0.1% level.

Source: own presentation based on RStudio

After performing the Fama and French and Carhart regression models for each pillar, an aggregated analysis was also performed in order to conclude what would be the effects of the addition of different variables.

As it is possible to assess in table 6, with the introduction of new variables, the Environmental composite still has a negative effect, however this effect vanishes for most models, except for the Fama and French Three-Factor and Carhart 3-months models, as it presents a level of statistical significance of 5%. In the case of the Social composite, although it still presents a negative effect, it loses all the explanatory power in all the models specified. For the Governance composite, the effect remains negative for all models, and the explanatory power remains the same for Fama and French

Three-Factor, Carhart 12-months and Carhart 1-month. In the other two models, the level of significance of this variable changes from 0,1% to 1%.

Regarding the Environmental divergence and the Governance divergence, no changes result from the introduction of new variables, as the Environmental divergence still presents a positive effect and the Governance divergence a negative effect, and both are still not statistically significant for all the models specified. Lastly, the Social divergence still presents a negative effect for all models, with the same statistical significance of 0,1% for Fama and French Three-Factor and with no statistical significance for Fama and French Five-Factor model. However, for the three Carhart models, its statistical significance changes from 0,1% to 1%.

Tab. 6 Summary of Fama-French factor models for all ESG pillars

	3-factor	**5-factor**	**4-factor (12M)**	**4-factor (3M)**	**4-factor (1M)**
(Intercept)	-0.008*** (0.002)	-0.038*** (0.002)	-0.037*** (0.002)	-0.025*** (0.002)	-0.015*** (0.002)
Market premium	104.1*** (0.759)	104.0*** (0.737)	103.6*** (0.741)	103.9*** (0.753)	103.8*** (0.758)
Value effect	0.206*** (0.011)	0.132*** (0.014)	0.164*** (0.011)	0.162*** (0.011)	0.159*** (0.012)
Size effect	0.078*** (0.012)	0.078*** (0.012)	0.065*** (0.012)	0.069*** (0.012)	0.066*** (0.012)
Environmental composite	-0.037* (0.015)	-0.011 (0.014)	-0.027 (0.014)	-0.029* (0.014)	-0.027 (0.015)
Social composite	-0.005 (0.014)	-0.009 (0.014)	-0.007 (0.014)	-0.006 (0.014)	-0.010 (0.014)
Governance composite	-0.049*** (0.012)	-0.035** (0.011)	-0.038*** (0.011)	-0.039** (0.012)	-0.038*** (0.012)
Environmental divergence	0.015 (0.012)	0.016 (0.012)	0.015 (0.012)	0.017 (0.012)	0.017 (0.012)
Social divergence	-0.046*** (0.012)	-0.016 (0.012)	-0.033** (0.012)	-0.033** (0.012)	-0.034** (0.012)
Governance divergence	-0.007 (0.011)	-0.006 (0.011)	-0.010 (0.011)	-0.008 (0.011)	-0.009 (0.011)
Growth effect		0.647*** (0.011)			
Profitability		-0.086*** (0.014)			

12MOM			0.557*** (0.011)		
3MOM				0.336*** (0.011)	
1MOM					0.166*** (0.012)
Num.Obs.	54992	54772	54984	54961	54722
R2	0.260	0.304	0.294	0.272	0.262

Note: The response variable is gross stock return on a monthly basis, expressed in percentage points. The explanatory variables consist of standard Fama-French factors, constructed divergence of, Environmental, Social and Governance scores (Environmental, Social and Governance divergence), constructed Environmental, Social and Governance composite score (Environmental, Social and Governance composite), 1-year momentum (12MOM), 3-months momentum (3MOM) and 1-month momentum (1MOM). The first value in the cell corresponds to the value of beta coefficient for a given variable, the value in brackets below represents the standard error of the coefficient. Star symbols *,**,*** highlight statistical significance on a 5%,1% and 0.1% level.

Source: own presentation based on RStudio

3.2.2 Portfolio Performance Analysis

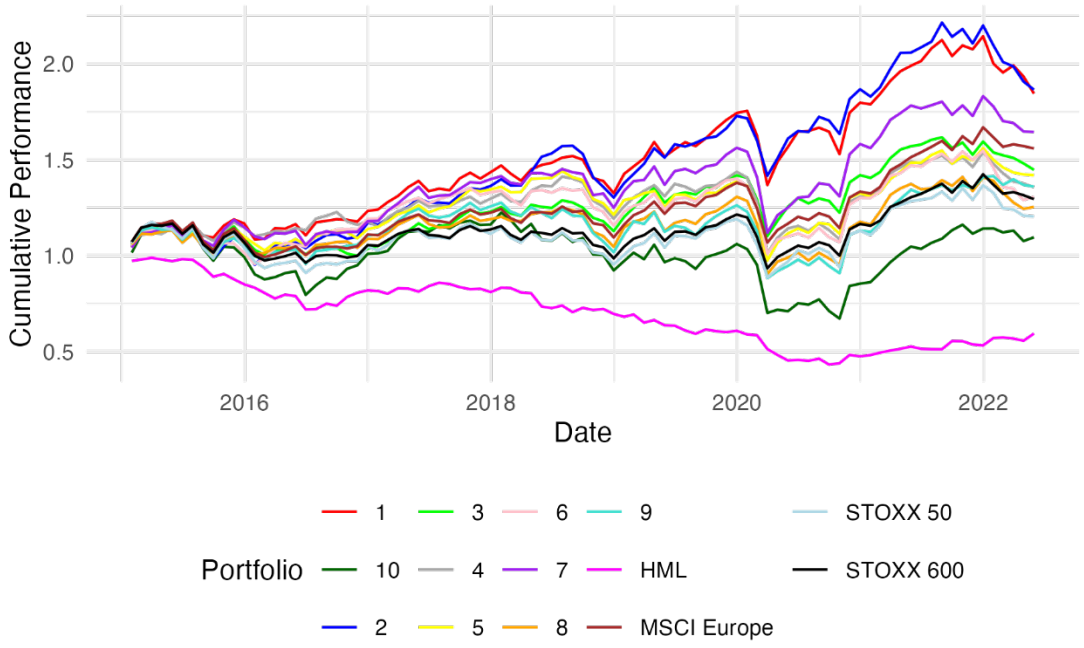
In this section, the results from the constructed portfolios are presented by each pillar. The figures 1, 2 and 3 present the cumulative performance of the constructed investment portfolios over time. They allow the comparison between the performance of investment strategies that focus on environmental, social and governance divergence, respectively, against major European indices.

From figure 1, regarding the cumulative performance of Environmental Portfolio Strategies, it is possible to observe that the lowest divergence portfolio outperforms the STOXX 600, MSCI Europe and STOXX 50 benchmarks, contrarily to the highest divergence portfolio. The outperformance of the 7th decile right below the outperformance of the 1st and 2nd decile evidences that there is no clear relationship between Environmental ratings divergence and stock returns. From the portfolio analysis it can be seen that lowest divergence bears excessive returns, however this effect dissolves by incorporating other factors.

Additionally, in Annex A, it is presented a table with the performance characteristics of portfolios consisting of stocks in n-th decile of individual pillar divergence, including annualized returns, annualized Sharpe ratio and annualized standard deviation. Regarding the environmental pillar, it is possible to assess that the annualized returns of a 1st decile portfolio outperform the STOXX600 benchmark,

while of a 10th decile portfolio underperform it, in absolute terms. The investor alpha against the STOXX600 benchmark amounts to 5.08 percentage points for the lowest divergence portfolio, indicating an excess return over the benchmark's performance. Conversely, for portfolios with the highest divergence, the investor alpha is 2.3 percentage points lower than the STOXX600 benchmark, indicating relative underperformance. When adjusted for risk, the outperformance of the 1st decile persists as its Sharpe ratio is higher (0.6028) than the Sharpe ratio of the STOX600 index (0.2600). However, its outperformance is beaten by the 2nd decile (0.6314). Also, the underperformance of the 10th decile persists as its Sharpe ratio is 0.0683.

Figure 1 Cumulative Performance of Environmental Portfolio Strategies



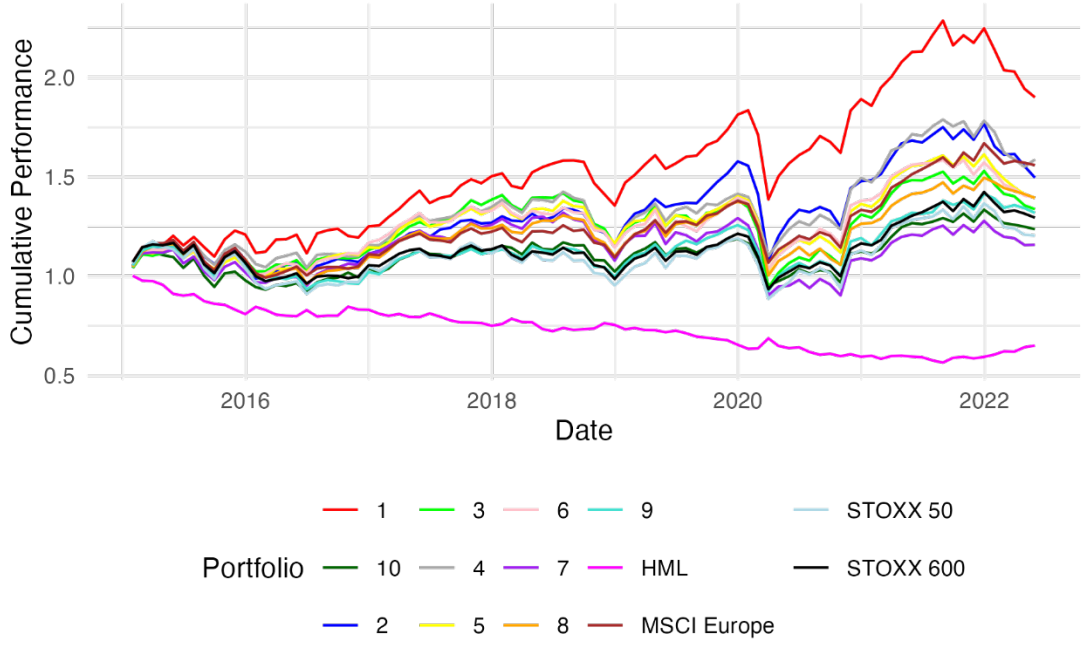
Source: own presentation based on RStudio

From figure 2, regarding the cumulative performance of Social Portfolio Strategies, it is possible to observe that, similarly to the Environmental portfolio strategies, the lowest divergence portfolio outperforms the STOXX 600, MSCI Europe and STOXX 50 benchmarks, contrarily to the highest divergence portfolio. Additionally, it is possible to assess that the portfolios that present the lowest divergence also present higher cumulative performance, on the contrary, portfolios with higher divergence present lower cumulative performace, which is in accordance

with the previous results that show a negative relationship between Social divergence and stock returns.

Additionally, from Annex A, it is possible to assess, regarding the social pillar, that the annualized returns of a 1st decile portfolio outperform the STOXX600 benchmark, while of a 10th decile portfolio underperform it, in absolute terms. The investor alpha against the STOXX600 benchmark amounts to 5.51 percentage points for the lowest divergence portfolio, indicating an excess return over the benchmark's performance. Conversely, for portfolios with the highest divergence, the investor alpha is 0.63 percentage points lower than the STOXX600 benchmark, indicating relative underperformance. When adjusted for risk, the outperformance of the 1st decile persists as its Sharpe ratio is higher (0.5932) than the Sharpe ratio of the STOX600 index (0.2600). Also, the underperformance of the 10th decile persists as its Sharpe ratio is 0.2344.

Figure 2 Cumulative Performance of Social Portfolio Strategies



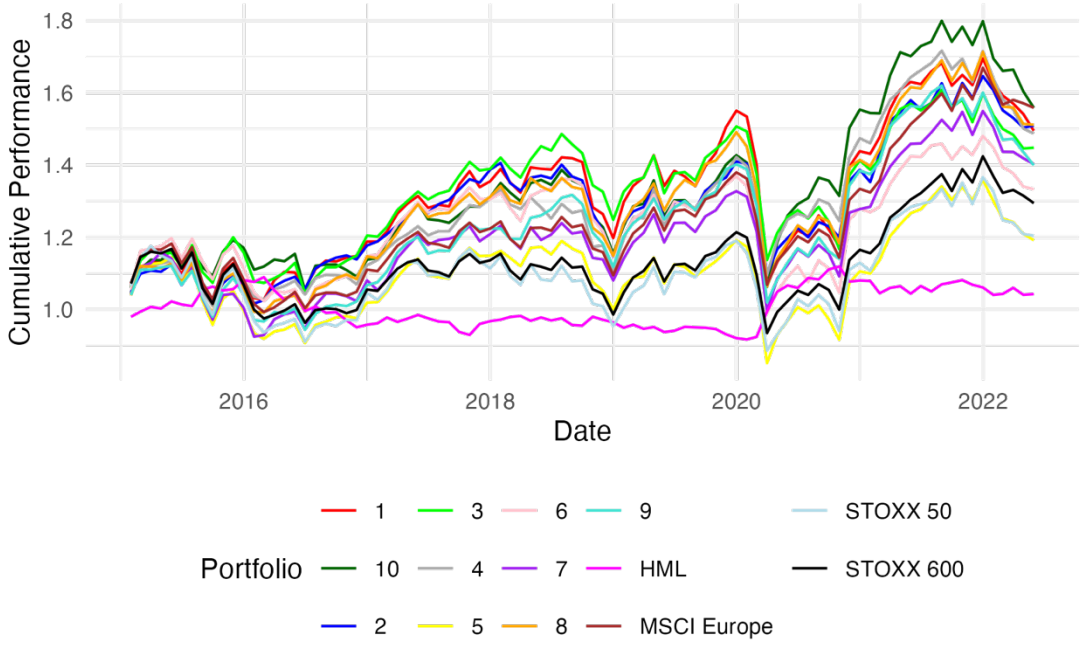
Source: own presentation based on RStudio

Lastly, from figure 3, regarding the cumulative performance of Governance Portfolio Strategies, it is possible to observe that the results are somewhat mixed. Until 2020, the 1st, 2nd and 3rd decile portfolios presented the highest cumulative performance, then the highest divergence portfolio surpassed this portfolios, granting

the highest cumulative performance. However, all these portfolios outperform the STOXX 600, MSCI Europe and STOXX 50 benchmarks during the all period.

Additionally, from Annex A, it is possible to assess, regarding the governance pillar, that the annualized returns of a 1st decile portfolio and 10th decile portfolio outperform STOXX600 benchmark, in absolute terms. The investor alpha against the STOXX600 benchmark amounts to 2.04 percentage points for the lowest divergence portfolio and 2.63 percentage points for the highest divergence portfolio. When adjusted for risk, the outperformance of the 1st and 10th decile persists as its Sharpe ratio is higher (0.3447 and 0.4163, respectively) than the Sharpe ratio of the STOX600 index (0.2600). However, the 2nd decile (0.4361) beats the outperformance of both 1st and 10th decile portfolios, while the 4th decile (0.3918) and 8th decile (0.3659) also beat the outperformance of the 1st decile portfolio, indicating no clear relationship between Governance ratings divergence and stock returns, which can also be confirmed by the insignificance of alpha and risk-adjusted returns of the HML strategy.

Figure 3 Cumulative Performance of Governance Portfolio Strategies



Source: own presentation based on RStudio

3.2.3 Robustness Checks

Researchers can investigate the stability of their estimations to alternative plausible model specifications by performing robustness checks (Neumayer & Plümper, 2017). In this way, the researchers investigate the behavior of specific "core" regression coefficient estimates when the regression specification is altered in any manner, usually by including or excluding regressors (Lu & White, 2014). Additionally, in order to evaluate the stability of empirical conclusions, sample splits are also frequently employed (Catherine et al., 2022).

In this way, to investigate the stability and reliability of the research findings of this study, robustness checks were conducted having in consideration and base the study of Vyletelka (2024).

In order to perform the robustness checks, the sample was split into two time periods: 2015-2018 and 2019-2022. Moreover, slight adjustments were made to Environmental, Social and Governance divergence decile variables. In order to make visible the effects of extreme divergence values, if significant, the metric scale was modified to a range of −5 to 5 and subsequently squared to account for the impact of the variance of the divergence from the average. Besides, additional regressions using both the MSCI and STOXX50 indices as alternative market risk premium were conducted. For the purpose of simplifying the comprehension of results, only the Fama and French 5-factor model was used with the separated Environmental, Social and Governance composite betas and Environmental, Social and Governance divergence betas for each period and each market benchmark.

In tables 7, 8 and 9 are summarized the conducted tests for environmental, social and governance pillar, respectively. From the three tables it is possible to observe that the Environmental divergence effect and the Governance divergence effect are not relevant for any period from the sample, even when different benchmarks are used for market risk beta estimation. On the other hand, the Social divergence effect is only relevant for the period 2015-2018, even when different benchmarks are used for market risk beta estimation.

Even though the adjusted parameter of the Environmental, Social and Governance divergence deciles have the positive effect expected, contrarily to the non-adjusted Social and Governance divergence deciles, they do not bear significance in the conducted models, even when different benchmarks are used for market risk beta estimation.

Regarding the effect of the scores, the Environmental composite loses its effect when the data is split, for each of the three different market benchmarks. The Social composite does not bear any significant effect for neither of the periods and market benchmarks. For the Governance composite, the models from the data period between 2019 and 2022 have the highest explanatory power, but not for all market benchmarks, with the significance of the Governance score effect not detectable in the first data period.

Still with regards to the Governance pillar, a decreasing power of the profitability effect can be observed in the models from the period 2019-2022.

Overall, even with the model split up, the addition of the adjusted divergence variable for each pillar and the usage of different benchmarks, the effect of the constructed divergence scores and constructed composite scores barely changes, as well as its statistical significance, which might indicate that the models are robust.

Tab. 7 Panel summary of robustness check of factor analyses for Environmental pillar

	STOXX 600		**STOXX 50**		**MSCI Europe**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Panel A: 2015-2018						
Market	90.76***	90.74***	74.13***	74.12***	90.03***	90.02***
Value effect	0.160***	0.162***	0.160***	0.162***	0.160***	0.162***
Size effect	0.043**	0.041**	0.044**	0.043**	0.044**	0.042**
Growth effect	0.572***	0.573***	0.570***	0.571***	0.572***	0.573***
Profitability	-0.109***	-0.108***	-0.108***	-0.108***	-0.109***	-0.109***
Environmental composite	0.006	0.004	0.001	0.000	0.004	0.003

Environmental divergence	-0.021		-0.019		-0.021	
Environmental divergence adjusted		-0.004		-0.005		-0.004
Num.Obs.	27619	27619	27619	27619	27619	27619
R2	0.249	0.249	0.238	0.238	0.247	0.247
Panel B: 2019-2022						
Market	112.7***	112.7***	93.8***	93.8***	114.5***	114.5***
Value effect	0.115***	0.111***	0.116***	0.113***	0.114***	0.110***
Size effect	0.082***	0.082***	0.078***	0.078***	0.083***	0.083***
Growth effect	0.724***	0.724***	0.724***	0.724***	0.723***	0.723***
Profitability	-0.070***	-0.070***	-0.070***	-0.070***	-0.069***	-0.069***
Environmental composite	-0.018	-0.014	-0.014	-0.010	-0.021	-0.018
Environmental divergence	0.015		0.011		0.016	
Environmental divergence adjusted		0.010		0.010		0.010
Num.Obs.	27185	27185	27185	27185	27185	27185
R2	0.343	0.343	0.334	0.334	0.342	0.342
Panel C: 2015-2022						
Market	103.9***	103.9***	86.06***	86.06***	104.5***	104.5***
Value effect	0.132***	0.130***	0.133***	0.132***	0.131***	0.130***
Size effect	0.075***	0.075***	0.071***	0.071***	0.075***	0.076***
Growth effect	0.649***	0.649***	0.649***	0.648***	0.649***	0.649***
Profitability	-0.084***	-0.083***	-0.084***	-0.083***	-0.083***	-0.083***
Environmental composite	-0.026*	-0.026*	-0.020	-0.019	-0.028*	-0.028*
Environmental divergence	0.011		0.005		0.011	
Environmental divergence adjusted		0.003		0.003		0.003
Num.Obs.	54804	54804	54804	54804	54804	54804
R2	0.304	0.304	0.294	0.294	0.302	0.302

Note: For each period, monthly stock returns and factor variables have been selected as dependent and independent variables respectively. The general data period was from January 2015 to May 2022, the cut−off date for models' estimation was December 2018. The value of a cell corresponds to the value of beta coefficient for a given variable. Star symbols *, **, *** highlight statistical significance on a 5%,1% and 0.1% level.

Source: own presentation based on RStudio

Tab. 8 Panel summary of robustness check of factor analyses for Social pillar

	STOXX 600		**STOXX 50**		**MSCI Europe**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Panel A: 2015-2018						
Market	90.75***	90.74***	74.12***	74.11***	90.02***	90.02***
Value effect	0.169***	0.163***	0.167***	0.162***	0.168***	0.162***
Size effect	0.052**	0.041**	0.055**	0.043**	0.054***	0.042**
Growth effect	0.570***	0.573***	0.568***	0.571***	0.570***	0.572***
Profitability	-0.113***	-0.107***	-0.112***	-0.106***	-0.113***	-0.107***
Social composite	0.010	0.003	0.002	-0.004	0.007	0.000
Social divergence	-0.040**		-0.039**		-0.040**	
Social divergence adjusted		0.001		0.001		0.001
Num.Obs.	27619	27619	27619	27619	27619	27619
R2	0.249	0.249	0.238	0.238	0.247	0.247
Panel B: 2019-2022						
Market	112.8***	112.8***	93.8***	93.8***	114.6***	114.5***
Value effect	0.115***	0.115***	0.117***	0.117***	0.114***	0.114***
Size effect	0.079***	0.078***	0.076***	0.074***	0.080***	0.078***
Growth effect	0.724***	0.724***	0.724***	0.725***	0.723***	0.724***
Profitability	-0.071***	-0.071***	-0.071***	-0.071***	-0.071***	-0.071***
Social composite	0.003	0.004	0.005	0.006	0.021	0.002
Social divergence	-0.007		-0.008		-0.008	
Social divergence adjusted		0.002		0.002		0.002
Num.Obs.	27197	27197	27197	27197	27197	27197

R2	0.343	0.343	0.334	0.334	0.342	0.342
Panel C: 2015-2022						
Market	103.9***	103.9***	86.07***	86.06***	104.5***	104.5***
Value effect	0.130***	0.129***	0.133***	0.131***	0.130***	0.128***
Size effect	0.078***	0.073***	0.074***	0.069***	0.078***	0.073***
Growth effect	0.649***	0.650***	0.648***	0.649***	0.648***	0.649***
Profitability	-0.085***	-0.083***	-0.086***	-0.084***	-0.085***	-0.083***
Social composite	-0.020	-0.021	-0.015	-0.015	-0.021	-0.022
Social divergence	-0.018		-0.020		-0.018	
Social divergence adjusted		0.003		0.003		0.003
Num.Obs.	54816	54816	54816	54816	54816	54816
R2	0.304	0.304	0.294	0.294	0.302	0.302

Note: For each period, monthly stock returns and factor variables have been selected as dependent and independent variables respectively. The general data period was from January 2015 to May 2022, the cut−off date for models' estimation was December 2018. The value of a cell corresponds to the value of beta coefficient for a given variable. Star symbols *, **, *** highlight statistical significance on a 5%,1% and 0.1% level.

Source: own presentation based on RStudio

Tab. 9 Panel summary of robustness check of factor analyses for Governance pillar

	STOXX 600		**STOXX 50**		**MSCI Europe**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Panel A: 2015-2018						
Market	89.84***	89.84***	73.17***	73.17***	89.14***	89.14***
Value effect	0.160***	0.161***	0.160***	0.161***	0.160***	0.161***
Size effect	0.045***	0.046***	0.046***	0.047***	0.046***	0.047***
Growth effect	0.572***	0.572***	0.571***	0.571***	0.572***	0.572***
Profitability	-0.103***	-0.104***	-0.103***	-0.104***	-0.103***	-0.105***
Governance composite	-0.019	-0.016	-0.021	-0.018	-0.020	-0.017
Governance divergence	-0.012		-0.011		-0.011	
Governance divergence adjusted		-0.001		0.000		-0.001

Num.Obs.	28750	28750	28750	28750	28750	28750
R2	0.245	0.245	0.233	0.233	0.243	0.243
Panel B: 2019-2022						
Market	112.5***	112.5***	93.5***	93.5***	114.2***	114.2***
Value effect	0.109***	0.108***	0.111***	0.110***	0.108***	0.108***
Size effect	0.079***	0.079***	0.075***	0.076***	0.078***	0.079***
Growth effect	0.727***	0.727***	0.727***	0.727***	0.727***	0.727***
Profitability	-0.066**	-0.066**	-0.066**	-0.066**	-0.066**	-0.065**
Governance composite	-0.040*	-0.039*	-0.034*	-0.033	-0.041	-0.040*
Governance divergence	-0.003		-0.005		-0.001	
Governance divergence adjusted		0.005		0.005		0.005
Num.Obs.	28029	28029	28029	28029	28029	28029
R2	0.344	0.344	0.334	0.334	0.343	0.343
Panel C: 2015-2022						
Market	103.4***	103.4***	85.55***	85.55***	104.0***	104.0***
Value effect	0.130***	0.130***	0.132***	0.132***	0.130***	0.130***
Size effect	0.070***	0.071***	0.067***	0.068***	0.070***	0.071***
Growth effect	0.650***	0.650***	0.649***	0.649***	0.650***	0.650***
Profitability	-0.083***	-0.083***	-0.082***	-0.083***	-0.083***	-0.083***
Governance composite	-0.043***	-0.041***	-0.036**	-0.034**	-0.043***	-0.041***
Governance divergence	-0.005		-0.006		-0.004	
Governance divergence adjusted		0.002		0.002		0.003
Num.Obs.	56779	56779	56779	56779	56779	56779
R2	0.303	0.303	0.292	0.292	0.301	0.301

Note: For each period, monthly stock returns and factor variables have been selected as dependent and independent variables respectively. The general data period was from January 2015 to May 2022, the cut−off date for models' estimation was December 2018. The value of a cell corresponds to the value of beta coefficient for a given variable. Star symbols *, **, *** highlight statistical significance on a 5%,1% and 0.1% level.

Source: own presentation based on RStudio

Conclusions

In the past several years, the integration of climate change and other sustainability concerns into investment decisions and portfolio allocation has been a growing trend among investors. Therefore, literature has been comprehensively studying the implications for rising sustainability concerns on investment decisions, however, the complete impact on investment performance is still not fully known. In this sense and in order to unfold the potential of ESG performance on stock returns, this work studies the impact of the ESG score and, specifically, the ESG score divergence, both at an individual level (environmental, social and governance), on the stock returns of the European stock market.

In order to conduct this research, 737 European listed companies are considered for the period between January 2015 and March 2022, for 17 countries, across 9 industries, with Environmental, Social and Governance scores established by two different rating providers, Bloomberg and Refinitiv. On one hand, to assess the impact of each component score in the stock returns, the variables Environmental composite, Social composite and Governance composite were created. On the other hand, to assess the impact of each component score divergence in the stock returns, the variables Environmental divergence, Social divergence and Governance divergence were created. For the purpose of evaluating these relationships, Fama and French and Carhart regression models were employed as well as a portfolio performance analysis.

Regarding the factor analysis based on the Fama and French and Carhart regression models, results show no significant relationship between Environmental divergence score and stock returns, despite excess returns, and when additional variables are included into the model, the effects remain negligible. Considering Social divergence and Governance divergence, findings contradict expectations, as they present a negative relationship with stock returns, not supporting the presupposed general hypothesis of a significant risk premium of stocks attributed to a higher degree of scores divergence. Moreover, when additional variables are included into the model, the social divergence effect remains visible while the governance divergence effect remains negligible. These results are further supported by robustness checks using

several different market benchmarks as a market risk beta and several other time windows.

Furthermore, the results of the analysis based on the Fama and French and Carhart regression models present a negative and significant relationship between the aggregate score and stock returns for the three separate ESG components, implying lower equity costs for better Environmental, Social and Governance performers. However, the inclusion of additional variables into the models reveals diminishing effect of the Environmental composite on stock returns and loss of all explanatory power for Social composite scores, remaining only the relationship between Governance composite and stock returns significant.

Concerning the portfolio performance analysis, it is possible to conclude that for environmental divergence focused portfolios, an investment strategy of investing 1EUR into stocks with lower environmental divergence would most likely outperform an investment strategy of investing in standard indices, since the annualized returns of the lowest divergence portfolio outperform the annualized returns of the STOXX600 benchmark. On the other hand, an investment strategy of investing 1EUR into stocks with higher environmental divergence would most likely underperform an investment strategy of investing in standard indices, since the annualized returns of the highest divergence portfolio underperform the annualized returns of the STOXX600 benchmark. Additionally, when adjusted for risk, these performances persist.

Moreover, the same conclusions can be drawn for social divergence focused portfolios since the behavior is the same as the previous pillar for both lowest and highest divergence portfolios.

Regarding governance divergence focused portfolios, most of them outperform the indices in the observed period, what can indicate that an investment strategy of investing 1EUR into the stock of the n-th decile of Governance Divergence would most likely outperform an investment strategy of investing in standard indices, since the annualized returns of both lowest and highest divergence portfolio outperform the annualized returns of the STOXX600 benchmark and when adjusted for risk, these performances persist.

This study's conclusions provide important new perspectives for institutional investors, asset managers, financial institutions, and other stakeholders on how sustainability concerns can affect investment decisions and portfolio allocation. It is noticed that the impact of Environmental, Social and Governance scores divergence is not linear among the three components, which proves the challenge of taking sustainability into account when making investment decisions.

While this study contributes to the existing comprehension of how Environmental, Social and Governance (ESG) scores divergence impact stock returns, it is important to acknowledge several limitations. Given the relatively recent emergence of ESG considerations, the availability of ESG score data extents only since 2015, thereby restricting the analysis period. Moreover, the study exclusively focuses on the European stock market, which may be considered a relatively modest sample size compared to larger markets such as the US. Additionally, the analysis incorporates Environmental, Social and Governance scores from only two rating providers, Bloomberg and Refinitiv, which represents a limited selection considering the multitude of available rating providers in the market. Therefore, future research undertakings might address these limitations by incorporating a broader array of rating providers or by expanding the scope to include other major stock markets, thereby enriching the sample size.

Literature

Alonso-Conde, A.-B., & Rojo-Suárez, J. (2020). On the Effect of Green Bonds on the Profitability and Credit Quality of Project Financing. *Sustainability*, *12*(16), Article 16. https://doi.org/10.3390/su12166695

Avramov, D., Cheng, S., Lioui, A., & Tarelli, A. (2022). Sustainable investing with ESG rating uncertainty. *Journal of Financial Economics*, *145*(2, Part B), 642–664. https://doi.org/10.1016/j.jfineco.2021.09.009

Baier, P., Berninger, M., & Kiesel, F. (2020). Environmental, social and governance reporting in annual reports: A textual analysis. *Financial Markets, Institutions & Instruments*, *29*(3), 93–118. https://doi.org/10.1111/fmii.12132

Banz, R. W. (1981). The relationship between return and market value of common stocks. *Journal of Financial Economics*, *9*(1), 3–18. https://doi.org/10.1016/0304-405X(81)90018-0

Barnfather, A. (2023). *Europe's Stock Markets: Challenging Misperceptions | Lazard Asset Management*. Lazard Asset Management. https://www.lazardassetmanagement.com/gl/research-insights/lazard-insights/europes-stock-markets-challenging-misperceptions

Basu, S. (1977). Investment Performance of Common Stocks in Relation to Their Price-Earnings Ratios: A Test of the Efficient Market Hypothesis. *The Journal of Finance*, *32*(3), 663–682. https://doi.org/10.2307/2326304

Berg, F., Kölbel, J. F., & Rigobon, R. (2019). *Aggregate Confusion: The Divergence of ESG Ratings* (SSRN Scholarly Paper 3438533). https://doi.org/10.2139/ssrn.3438533

Bernal, O., Hudon, M., & Ledru, F.-X. (2021). Are impact and financial returns mutually exclusive? Evidence from publicly-listed impact investments. *The Quarterly Review of Economics and Finance*, *81*, 93–112. https://doi.org/10.1016/j.qref.2021.04.010

Berrada, T., Engelhardt, L., Gibson, R., & Krueger, P. (2022). *The Economics of Sustainability Linked Bonds* (SSRN Scholarly Paper 4059299). https://doi.org/10.2139/ssrn.4059299

Bertelli, B., & Torricelli, C. (2024). The trade-off between ESG screening and portfolio diversification in the short and in the long run. *Journal of Economics and Finance*. https://doi.org/10.1007/s12197-023-09652-9

Billio, M., Costola, M., Hristova, I., Latino, C., & Pelizzon, L. (2021). Inside the ESG ratings: (Dis)agreement and performance. *Corporate Social Responsibility and Environmental Management*, *28*(5), 1426–1445. https://doi.org/10.1002/csr.2177

Bloomberg. (2023). *Bloomberg ESG Scores*. https://hr.bloombergadria.com/data/files/Pitanja%20i%20odgovori%20o%20Bloomberg%20ESG%20Scoreu.pdf

Brandon, R. G., Krueger, P., & Schmidt, P. S. (2021). ESG Rating Disagreement and Stock Returns. *Financial Analysts Journal*, *77*(4), 104–127. https://doi.org/10.1080/0015198X.2021.1963186

Carhart, M. M. (1997). On Persistence in Mutual Fund Performance. *The Journal of Finance*, *52*(1), 57–82. https://doi.org/10.1111/j.1540-6261.1997.tb03808.x

Catherine, S., Ebrahimian, M., Sraer, D., & Thesmar, D. (2022). *Robustness Checks in Structural Analysis* (Working Paper 30443). National Bureau of Economic Research. https://doi.org/10.3386/w30443

CFA Institute. (n.d.). *What is ESG Investing?* CFA Institute. Retrieved 16 April 2024, from https://www.cfainstitute.org/en/rpc-overview/esg-investing

Chen, H., He, R., & Huang, Y. (2023). *ESG Rating Divergence, Investor Expectations, and Stock Returns* (SSRN Scholarly Paper 4578803). https://doi.org/10.2139/ssrn.4578803

Chen, H.-Y., & Yang, S. S. (2020). Do Investors exaggerate corporate ESG information? Evidence of the ESG momentum effect in the Taiwanese market. *Pacific-*

Basin Finance Journal, *63*, 101407. https://doi.org/10.1016/j.pacfin.2020.101407

Cornell, B. (2021). ESG preferences, risk and return. *European Financial Management*, *27*(1), 12–19. https://doi.org/10.1111/eufm.12295

Cornell, B., & Damodaran, A. (2020). *Valuing ESG: Doing Good or Sounding Good?* (SSRN Scholarly Paper 3557432). https://doi.org/10.2139/ssrn.3557432

Cortellini, G., & Panetta, I. C. (2021). Green Bond: A Systematic Literature Review for Future Research Agendas. *Journal of Risk and Financial Management*, *14*(12), Article 12. https://doi.org/10.3390/jrfm14120589

Deutsche Bank. (n.d.-a). *Corporate Governance: The "G" in ESG*. Deutsche Bank Wealth Management. Retrieved 16 April 2024, from https://www.deutschewealth.com/en/our-capabilities/esg/what-is-esg-investing-wealth-management/corporate-governance-g-in-esg-governance.html

Deutsche Bank. (n.d.-b). *Environmentally responsible investing: The "E" in ESG*. Deutsche Bank Wealth Management. Retrieved 16 April 2024, from https://www.deutschewealth.com/en/our-capabilities/esg/what-is-esg-investing-wealth-management/environmentally-responsible-investing-e-in-esg-environmental.html

Deutsche Bank. (n.d.-c). *Socially responsible investing: The "S" in ESG*. Deutsche Bank Wealth Management. Retrieved 16 April 2024, from https://www.deutschewealth.com/en/our-capabilities/esg/what-is-esg-investing-wealth-management/socially-responsible-investing-s-in-esg.html

Duong, A. (2023). *Resilience or Returns: Assessing Green Equity Index Performance Across Market Regimes* (SSRN Scholarly Paper 4650107). https://doi.org/10.2139/ssrn.4650107

Dursun-de Neef, Ö., Ongena, S., & Tsonkova, G. (2023). *Green Versus Sustainable Loans: The Impact on Firms' ESG Performance* (SSRN Scholarly Paper 4115692). https://doi.org/10.2139/ssrn.4115692

Escrig-Olmedo, E., Fernández-Izquierdo, M. Á., Ferrero-Ferrero, I., Rivera-Lirio, J. M., & Muñoz-Torres, M. J. (2019). Rating the Raters: Evaluating how ESG Rating Agencies Integrate Sustainability Principles. *Sustainability*, *11*(3), Article 3. https://doi.org/10.3390/su11030915

European Commission. (n.d.). *Overview of sustainable finance*. European Commision. https://finance.ec.europa.eu/sustainable-finance/overview-sustainable-finance_en

European Council. (2024). *Environmental, social and governance (ESG) ratings: Council and Parliament reach agreement*. European Council. https://www.consilium.europa.eu/en/press/press-releases/2024/02/05/environmental-social-and-governance-esg-ratings-council-and-parliament-reach-agreement/

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, *33*(1), 3–56. https://doi.org/10.1016/0304-405X(93)90023-5

Fama, E. F., & French, K. R. (2006). Profitability, investment and average returns. *Journal of Financial Economics*, *82*(3), 491–518. https://doi.org/10.1016/j.jfineco.2005.09.009

Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model. *Journal of Financial Economics*, *116*(1), 1–22. https://doi.org/10.1016/j.jfineco.2014.10.010

Financial Times. (2024, February 27). *The unfulfilled potential of Europe's stock markets*. https://www.ft.com/content/4f94ab66-25c6-45a1-96df-1fd6cd2ad509

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, *5*(4), 210–233. https://doi.org/10.1080/20430795.2015.1118917

FSTE Russell. (2023). *Sustainable investment asset owner survey*. https://www.lseg.com/en/ftse-russell/sustainable-investing-solutions/global-asset-owner-survey

Fu, C., Lu, L., & Pirabi, M. (2023). Advancing green finance: A review of sustainable development. *Digital Economy and Sustainable Development*, *1*(1), 20. https://doi.org/10.1007/s44265-023-00020-3

Gonçalves, T., Pimentel, D., & Gaio, C. (2021). Risk and Performance of European Green and Conventional Funds. *Sustainability*, *13*(8), Article 8. https://doi.org/10.3390/su13084226

GSIA. (2022). *Global Sustainable Investment Review*. https://www.gsi-alliance.org/members-resources/gsir2022/

Gyönyörová, L., Stachoň, M., & Stašek, D. (2021). ESG ratings: Relevant information or misleading clue? Evidence from the S&P Global 1200. *Journal of Sustainable Finance & Investment*, *13*(2), 1075–1109. https://doi.org/10.1080/20430795.2021.1922062

Hayes, A. (2021). *What Is a Decile? Definition, Formula to Calculate, and Example*. Investopedia. https://www.investopedia.com/terms/d/decile.asp

Huber, B. M., & Comstock, M. (2017, July 27). ESG Reports and Ratings: What They Are, Why They Matter. *The Harvard Law School Forum on Corporate Governance*. https://corpgov.law.harvard.edu/2017/07/27/esg-reports-and-ratings-what-they-are-why-they-matter/

Jegadeesh, N., & Titman, S. (1993). Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. *The Journal of Finance*, *48*(1), 65–91. https://doi.org/10.2307/2328882

Kaiser, L. (2019). *ESG Integration: Value, Growth and Momentum* (SSRN Scholarly Paper 2993843). https://doi.org/10.2139/ssrn.2993843

KPMG. (2023). *Defining sustainable finance*. KPMG. https://kpmg.com/us/en/articles/2023/defining-sustainable-finance.html

Lakonishok, J., & Shapiro, A. C. (1986). Systematic risk, total risk and size as determinants of stock market returns. *Journal of Banking & Finance*, *10*(1), 115–132.

https://doi.org/10.1016/0378-4266(86)90023-3

Li, F., & Polychronopoulos, A. (2020). *What a Difference an ESG Ratings Provider Makes! | Research Affiliates*. Research Affliates. https://www.researchaffiliates.com/publications/articles/what-a-difference-an-esg-ratings-provider-makes

Lintner, J. (1965). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics*, *47*(1), 13–37. https://doi.org/10.2307/1924119

LSEG. (2023). *Environmental, social and governance scores from LSEG*.

Lu, X., & White, H. (2014). Robustness checks and robustness tests in applied economics. *Journal of Econometrics*, *178*, 194–206. https://doi.org/10.1016/j.jeconom.2013.08.016

Markowitz, H. (1952). Portfolio Selection. *The Journal of Finance*, *7*(1), 77–91. https://doi.org/10.2307/2975974

McKinsey. (2022). *Sustainable financial products in global transaction banking: A market imperative*. https://www.mckinsey.com/industries/financial-services/our-insights/sustainability-in-global-transaction-banking-a-market-imperative

Montagner, D. (2023). *What to expect for sustainable finance in 2024*. The Banker. https://www.thebanker.com/What-to-expect-for-sustainable-finance-in-2024-1707473740

Morningstar. (2022). *Thematic Fund Trends: Global Launches, Leaders, and Flops*. https://www.morningstar.com/lp/global-thematic-fund-landscape

Neumayer, E., & Plümper, T. (Eds.). (2017). The Logic of Robustness Testing. In *Robustness Tests for Quantitative Research* (pp. 11–22). Cambridge University Press. https://doi.org/10.1017/9781108233590.003

Novak, D. G. (2022). *The fama and french six-factor model: Evidence for the*

german market [masterThesis]. https://repositorio.ucp.pt/handle/10400.14/36816

OECD. (2023). *Financial consumers and sustainable finance: Policy implications and approaches*. OECD. https://doi.org/10.1787/318d0494-en

Pástor, Ľ., Stambaugh, R. F., & Taylor, L. A. (2021). Sustainable investing in equilibrium. *Journal of Financial Economics*, *142*(2), 550–571. https://doi.org/10.1016/j.jfineco.2020.12.011

Reinganum, M. R. (1981a). A New Empirical Perspective on the CAPM. *Journal of Financial and Quantitative Analysis*, *16*(4), 439–462. https://doi.org/10.2307/2330365

Reinganum, M. R. (1981b). Misspecification of capital asset pricing: Empirical anomalies based on earnings' yields and market values. *Journal of Financial Economics*, *9*(1), 19–46. https://doi.org/10.1016/0304-405X(81)90019-2

Revelli, C., & Viviani, J.-L. (2015). Financial performance of socially responsible investing (SRI): What have we learned? A meta-analysis. *Business Ethics: A European Review*, *24*, 158–185. https://doi.org/10.1111/beer.12076

Schmittmann, J., & Teng, C. H. (2021). How Green are Green Debt Issuers? *IMF*, 30.

Serafeim, G., & Yoon, A. (2022). Stock price reactions to ESG news: The role of ESG ratings and disagreement. *Review of Accounting Studies*, *28*. https://doi.org/10.1007/s11142-022-09675-3

Sharpe, W. F. (1964). Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk*. *The Journal of Finance*, *19*(3), 425–442. https://doi.org/10.1111/j.1540-6261.1964.tb02865.x

Statista. (2023). *Stock exchanges in Europe by market capitalization 2023*. Statista. https://www.statista.com/statistics/693587/stock-exchanges-market-capitalization-europe/

Strang, S. (2022). *Financing sustainable growth: An emerging opportunity*. PwC. https://www.pwc.co.uk/services/business-restructuring/insights/financing-sustainable-growth-emerging-opportunity.html

Trinks, P. J., & Scholtens, B. (2017). The Opportunity Cost of Negative Screening in Socially Responsible Investing. *Journal of Business Ethics*, *140*(2), 193–208. https://doi.org/10.1007/s10551-015-2684-3

Vyletelka, M. (2024). ESG Score Uncertainty and Excess Stock Returns: European Stock Market Case. *Prague Economic Papers*, *33*(2), 137–163. https://doi.org/10.18267/j.pep.854

Wang, H., Jiao, S., Ge, C., & Sun, G. (2023). Corporate ESG rating divergence and excess stock returns. *Energy Economics*, *129*, 107276. https://doi.org/10.1016/j.eneco.2023.107276

Windolph, S. (2011). Assessing Corporate Sustainability Through Ratings: Challenges and Their Causes. *Journal of Environmental Sustainability*, *1*(1). https://doi.org/10.14448/jes.01.0005

Xiao, X., Liu, X., & Liu, J. (2023). ESG Rating Dispersion and Expected Stock Return in China. *Emerging Markets Finance and Trade*, *59*(11), 3422–3437. https://doi.org/10.1080/1540496X.2023.2223933

List of Figures, Tables, and Abbreviations

List of Figures

List of Tables

List of Abbreviations

12M: Twelve Months

1M: One Month

3M: Three Months

B/M: Book To Market

CAPM: Capital Asset Pricing Model

CEO: Chief Executive Officer

CFA: Chartered Financial Analyst

CMA: Conservative Minus Aggressive

ESG: Environmental, Social and Governance

EU: European Union

EUR: Euro

FF3: Fama and French Three-Factor Model

FF5: Fama and French Five-Factor Model

G20: Group of Twenty

GSIA: Global Sustainable Investment Alliance

HML: High Minus Low

ILO: International Labour Organization

IT: Information Technology

LSE: London Stock Exchange

MOM: Momentum

NGEU: NextGeneration European Union

NGO: Non-Governmental Organization

OECD: Organisation for Economic Co-operation and Development

RMW: Robust Minus Weak

SD: Standard Deviation

S&P500: Standard & Poor's 500

SMB: Small Minus Big

SRI: Socially Responsible Investment

UN: United Nations

US: United States

List of Annexes

Annex A – Performance characteristics of portfolios consisting of stocks in n-th decile of individual pillar divergence

Pillar	Strategy	Annualized Return	Annualized Sharpe Ratio	Annualized SD
Environmental	1	0.0879	0.6028	0.1458
	2	0.0895	0.6314	0.1417
	3	0.0528	0.3874	0.1364
	4	0.0437	0.2902	0.1507
	5	0.0501	0.3151	0.1590
	6	0.0384	0.2450	0.1568
	7	0.0712	0.4490	0.1585
	8	0.0327	0.1950	0.1678
	9	0.0441	0.2500	0.1763
	10	0.0141	0.0683	0.2063
	HML	-0.0662	-0.5339	0.1241
Pillar	**Strategy**	**Annualized Return**	**Annualized Sharpe Ratio**	**Annualized SD**
Social	1	0.0922	0.5932	0.1555
	2	0.0575	0.3513	0.1638
	3	0.0417	0.2445	0.1705
	4	0.0661	0.4394	0.1503
	5	0.0475	0.3043	0.1561
	6	0.0476	0.3089	0.1542
	7	0.0217	0.1323	0.1640
	8	0.0476	0.3114	0.1527
	9	0.0397	0.2602	0.1527
	10	0.0308	0.2344	0.1314
	HML	-0.0547	-0.6688	0.0817
Pillar	**Strategy**	**Annualized Return**	**Annualized Sharpe Ratio**	**Annualized SD**
Governance	1	0.0575	0.3447	0.1667
	2	0.0588	0.4361	0.1348
	3	0.0529	0.3477	0.1522
	4	0.0567	0.3918	0.1448
	5	0.0256	0.1574	0.1629
	6	0.0413	0.2599	0.1588
	7	0.0484	0.3125	0.1549
	8	0.0590	0.3659	0.1614
	9	0.0481	0.3071	0.1566
	10	0.0634	0.4163	0.1523
	HML	0.0073	0.1118	0.0657
Benchmarks	Risk-Free Rate	0.0000		0.0000
	STOXX 600	0.0371	0.2600	0.1429
	MSCI Europe	0.0634	0.4468	0.1420
	STOXX 50	0.0271	0.1595	0.1700

Source: own presentation based on RStudio