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The effect of ESG rating on ETF performance: Evidence from different market conditions

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ABSTRACT:
In recent decades, the financial world has undergone a change, with the rise of exchange-traded funds (ETFs) as cost-effective and diversified investment vehicles and the integration of environmental, social and governance (ESG) factors into investment decision-making. The rise of these reflects investors' growing demand for both efficiency and responsibility, making the interplay between ESG considerations and ETF performance an important area in modern financial research.

This thesis investigates the effect of ESG ratings on the financial performance of equity ETFs across three different market conditions: a stable period (February 2016 – February 2018), the high-volatility COVID-19 pandemic (February 2020 – February 2022), and the period following the Russian invasion of Ukraine (February 2022 – February 2024). Utilizing portfolio performance analysis with Jensen's alpha and Sharpe ratio, and a multivariate regression model controlling for fund-specific characteristics, the research provides detailed insights into the effects of ESG integration.

The findings reveal that during the stable period there is a negative correlation between ESG ratings and ETF performance, although, when controlling for fund-specific characteristics, ESG ratings show a non-linear inverted U-shaped effect on ETF performance. During the COVID-19 pandemic, the ESG rating of an ETF did not show a statistically significant linear effect on performance; however, a non-linear inverted U-shaped relationship emerges in the multivariate analysis, suggesting that moderate ESG scores might have been beneficial. During the Russian invasion of Ukraine, a statistically significant positive correlation between ESG ratings and ETF performance is observed, although this relationship also exhibits an inverted U-shape. This indicates that while ESG generally contributed positively to performance during this geopolitical and energy crisis, benefits might peak at certain ESG levels. Overall, the study concludes that the impact of ESG ratings on ETF performance can depend on the prevailing market conditions and the specific nature of the crisis.

KEY WORDS: ETF, Exchange-Traded Fund, ESG, COVID-19 pandemic, Russian invasion of Ukraine, investing, portfolio performance, risk-adjusted return, excess return, volatility

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TIIVISTELMÄ:
Viime vuosikymmeninä rahoitusmaailma on muuttunut, kun pörssinoteeratut rahastot (ETF) ovat nousseet kustannustehokkaina ja monipuolisina sijoitusvälineinä, ja samaan aikaan ympäristöön, yhteiskuntavastuuseen ja hallintotapaan (ESG) liittyvät tekijät on otettu huomioon sijoituksiin liittyvässä päätöksenteossa. Näiden yleistyminen heijastaa sijoittajien kasvavaa vaatimusta sekä tehokkuudesta että vastuullisuudesta, minkä vuoksi ESG:n ja ETF:ien suorituskyvyn välinen vuorovaikutus on nykyaikaisen rahoitustutkimuksen tärkeä osa-alue.

Tässä tutkielmassa tutkitaan ESG-luokitusten vaikutusta osake-ETF:ien suorituskykyyn kolmessa eri markkinaolosuhteessa: vakaa ajanjakso (helmikuu 2016 - helmikuu 2018), korkean volatiliteetin COVID-19-pandemia (helmikuu 2020 - helmikuu 2022) ja Venäjän hyökkäystä Ukrainaan seuraava ajanjakso (helmikuu 2022 - helmikuu 2024). Tutkimus tarjoaa tietoa ESG-integraation vaikutuksista analysoimalla salkun suorituskykyä Jensenin alfan ja Sharpen luvun sekä monimuuttujaisen regressiomallin avulla, jolla kontrolloidaan rahastokohtaisia ominaisuuksia.

Tuloksista käy ilmi, että vakaana ajanjaksona ESG-luokitusten ja ETF:ien tuoton välillä on negatiivinen korrelaatio, vaikka rahastokohtaisten ominaisuuksien kontrolloinnin yhteydessä ESG-luokituksilla on epälineaarinen käänteisen U:n muotoinen vaikutus ETF:ien tuottoon. COVID-19-pandemian aikana ETF:n ESG-luokituksella ei ole tilastollisesti merkittävää lineaarista vaikutusta tuottoon, mutta monimuuttuja-analyysissä ilmenee epälineaarinen käänteisen U:n muotoinen suhde, mikä viittaa siihen, että maltilliset ESG-luokitukset ovat saattaneet olla hyödyllisiä. Venäjän hyökkäyksen aikana Ukrainaan havaitaan tilastollisesti merkitsevä positiivinen korrelaatio ESG-luokitusten ja ETF:ien tuoton välillä, vaikka tämäkin suhde on käänteisen U:n muotoinen. Tämä viittaa siihen, että vaikka ESG vaikutti yleisesti ottaen myönteisesti suorituskykyyn tässä geopoliittisessa ja energiakriisissä, hyödyt saattoivat saavuttaa huippunsa tietyillä ESG-luokituksilla. Kaiken kaikkiaan tutkimuksessa todetaan, että ESG-luokitusten vaikutus ETF:n tuottoon voi riippua vallitsevista markkinaolosuhteista ja kriisin luonteesta.

AVAINSANAT: ETF, pörssinoteerattu rahasto, ESG, COVID-19 pandemia, Venäjän hyökkäys Ukrainaan, sijoittaminen, salkun suorituskyky, riskikorjattu tuotto, ylituotto, volatiliteetti

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1 Introduction

Over the past three decades, exchange-traded funds (ETFs) have transformed the investment landscape by offering a versatile and cost-effective way for investors to gain market exposure (Investment Company Institute, 2024). Since the launch of the first ETF in 1993, the global ETF market has grown rapidly, with global ETF assets under management going from $0,2 trillion in 2003 to over $11,5 trillion in 2023 (Statista, 2024b). This growth highlights the increasing reliance on ETFs by both retail and institutional investors who seek diversification, liquidity, and access to a broad array of assets (Investment Company Institute, 2024). As the ETF market continues to evolve, new themes reflecting changing investor preferences and global priorities have emerged, most notably the integration of sustainability considerations into investment decisions.

In particular, the integration of Environmental, Social, and Governance (ESG) criteria into investments, including ETFs, has become one of the defining shifts in how investors assess value and risk. ESG ratings have gained traction as investors increasingly prioritize sustainability alongside financial performance (Morgan Stanley, 2024). This trend highlights the growing importance of understanding how non-financial factors, such as a company's environmental impact or governance practices, influence investment returns. In this sense, ESG investing and ETFs have become intertwined: ETFs offer an accessible and diversified investment vehicle, while ESG ratings reflect growing societal and regulatory pressures.

This shift reflects not only investor demand for products that align with social and environmental values, but also a growing awareness that ESG considerations may influence risk and return outcomes. This has increased both academic and industry interest in whether ESG factors improve financial outcomes, provide downside protection in times of stress, or impose trade-offs on performance. Understanding how ESG ratings affect ETF performance is the core research question of this thesis and an important issue for researchers, policymakers, and finance professionals seeking to evaluate whether the

integration of sustainability into mainstream investment vehicles generates financial benefits and whether different market conditions affect this relationship.

1.1 Purpose of the study

The purpose of this study is to evaluate the effect of ESG ratings on the performance of equity ETFs during different market conditions. Specifically, this thesis examines how ESG ratings have influenced ETF performance during three periods: a stable period between February 2016 and February 2018, the COVID-19 pandemic between February 2020 and February 2022, and the Russian invasion of Ukraine, which is ongoing, but the timeline for this study is between February 2022 and February 2024. By comparing these periods, this study aims to understand whether ESG factors have gained significance as determinants of investment performance under different levels of market stress and volatility. This is particularly relevant as ESG investing has become increasingly prominent, reflecting investors' growing interest in sustainable and socially responsible investment strategies.

This research seeks to contribute to the ongoing debate about the financial implications of ESG investing by focusing on ETFs. This study explores whether market conditions alter the relationship between ESG ratings and ETF performance, providing insights into the potential trade-offs between financial returns and ESG integration. The novelty of this study lies in its focused examination of ESG-rated ETFs across distinct market conditions. While ETFs have seen significant growth and are valued for their cost-effectiveness, comprehensive research specifically analyzing the relationship between their ESG rating and performance during varying periods of market stability and crisis remains a novel area. This paper analyzes ETFs' historical data with Jensen's alpha, Sharpe ratio and a multivariate regression model. The results can be used to better understand how ESG ratings impact the performance of ETFs and how investors may manage future market uncertainties.

1.2 Hypotheses of the study

The hypotheses of this study are formulated based on existing literature concerning ESG investing and investment performance, particularly during periods of market stress. Also, the nature of the crises is considered. These hypotheses aim to investigate how the relationship between ESG ratings and ETF performance may vary across different market conditions to find if they reflect shifts in investor priorities and market dynamics.

The COVID-19 pandemic triggered unprecedented volatility in global financial markets, and, for example, the S&P 500 index fell by 33% in a month between February and March 2020 (Yahoo Finance, 2025). Research suggests that ESG investments did not consistently provide a performance advantage during this market crash and the following recovery period. For instance, Pavlova and de Boyrie (2022) find that ESG ETFs with higher sustainability ratings did not outperform lower-rated funds during the COVID-19 market crash, with some experiencing comparable or worse losses. Similarly, Folger-Laronde et al. (2022) observe a negative correlation between sustainability of a fund and its performance. Bae et al. (2021) further report no significant impact of Corporate Social Responsibility (CSR) on US stock returns during the crash or recovery phases. These findings could indicate that during such acute crises, investor behavior can shift towards prioritizing immediate financial returns over long-term sustainability goals. The health and economic nature of the crisis, characterized by lockdowns, supply chain disruptions, and widespread uncertainty, likely drove investors to focus on short-term opportunities. Therefore, the first hypothesis is the following:

Hypothesis 1: The ESG rating of an ETF did not have a statistically significant effect on ETF performance during the COVID-19 pandemic.

The Russian invasion of Ukraine, which started on the 24th of February 2022, increased geopolitical tensions and created an energy crisis (Kolaczkowski, 2022; Yu et al., 2024; Zhang et al., 2024). Following the invasion energy prices increased, and investor uncer-

tainty was high which is indicated by a sustained increase in the VIX index following the invasion (Zangari et al., 2022; Cboe, 2025). The second hypothesis is more novel due to a relative lack of papers studying the relationship between financial performance and ESG ratings during the invasion. However, Curto et al. (2022) highlight that the invasion has made ESG and sustainability considerations more central to investment decisions and this attention is particularly focused on governance and social factors due to geopolitical uncertainties. They argue that investors will increasingly scrutinize investments based on their alignment with democratic principles and ethical standards, which are integral to high ESG ratings. Furthermore, Curto et al. (2022) state that there is an opportunity for accelerated investments in renewable energy and energy efficiency as a strategic response to the energy crisis, which could benefit investments with high ESG ratings. Similarly, Kuzemko et al. (2022), Jaller-Makarewicz and Williams-Derry (2022) and IAE (2024) report that the energy crisis brings potential to drive more sustainable changes as the world seeks more diverse energy sources which could lead to an increase in sustainable choices. Also, Nofsinger and Varma (2014) find evidence in previous market crises which show that socially responsible mutual funds outperform conventional funds, and Lins et al. (2017) further support this by demonstrating that firms with high CSR experienced significantly higher stock returns during the 2008-2009 financial crisis. Thus, it is reasonable to hypothesize that during the Russian invasion of Ukraine, ESG ratings are positively correlated with ETF performance which reflects investor preferences for funds that demonstrate resilience and alignment with sustainability goals in a geopolitically uncertain environment. Therefore, the second hypothesis is the following:

Hypothesis 2: The ESG rating of an ETF has a positive correlation with ETF performance during the Russian invasion of Ukraine.

1.3 Structure of the study

The introductory chapter has presented the motivation for the study, a discussion on the subject, hypotheses and the purpose. The second chapter will describe ETFs in

more detail. In the third chapter the background and details of socially responsible investing (SRI) and ESG are explained. The fourth chapter will discuss the relevant theoretical background. After that, the fifth chapter will conduct a literature review on previous studies which have covered the relationship between financial performance and ESG ratings. The sixth chapter will cover the data and methodology used in this study. The seventh chapter discusses the results discovered in this study. Finally, the eighth and final chapter will conclude the findings of this study.

2 Exchange traded fund (ETF)

ETF is an investment instrument. ETFs have several similarities with mutual funds but also meaningful differences (McMahon, 2005). An ETF tracks the performance of an underlying portfolio consisting of different securities. There are different types of ETFs which track different asset classes, such as equity, fixed income, bonds, real estate, or commodities (Blackrock, 2024; State Street Global Advisors, 2024). Often an ETF focuses on one asset class, but there are also multi asset ETFs. In other words, ETFs can be pre-diversified fund products for investors. Accordingly, an investor can gain extensive exposure to the market and different sectors. This chapter will discuss some of the differences between ETFs and mutual funds, and important mechanics, and types of ETFs. Understanding these topics will allow for an understanding of how ETFs are connected to the underlying securities across financial markets.

2.1 Development of ETFs

The first ETF, in the US, was listed in January 1993 (Investment Company Institute, 2024). It is SPDR S&P 500 ETF Trust and namely it tracks the performance of the S&P 500 index. Since 1993, the number of ETFs and the assets invested in ETFs have grown, especially during the 21st century. The total net assets invested in worldwide ETFs grew by 5500 percent between 2003 and 2023, from 200 billion to 11,5 trillion US dollars. During the same time the number of ETFs grew from 276 to over 10000. The development of assets under management of worldwide ETFs and the total number of ETFs is shown in **Figure 1** below.

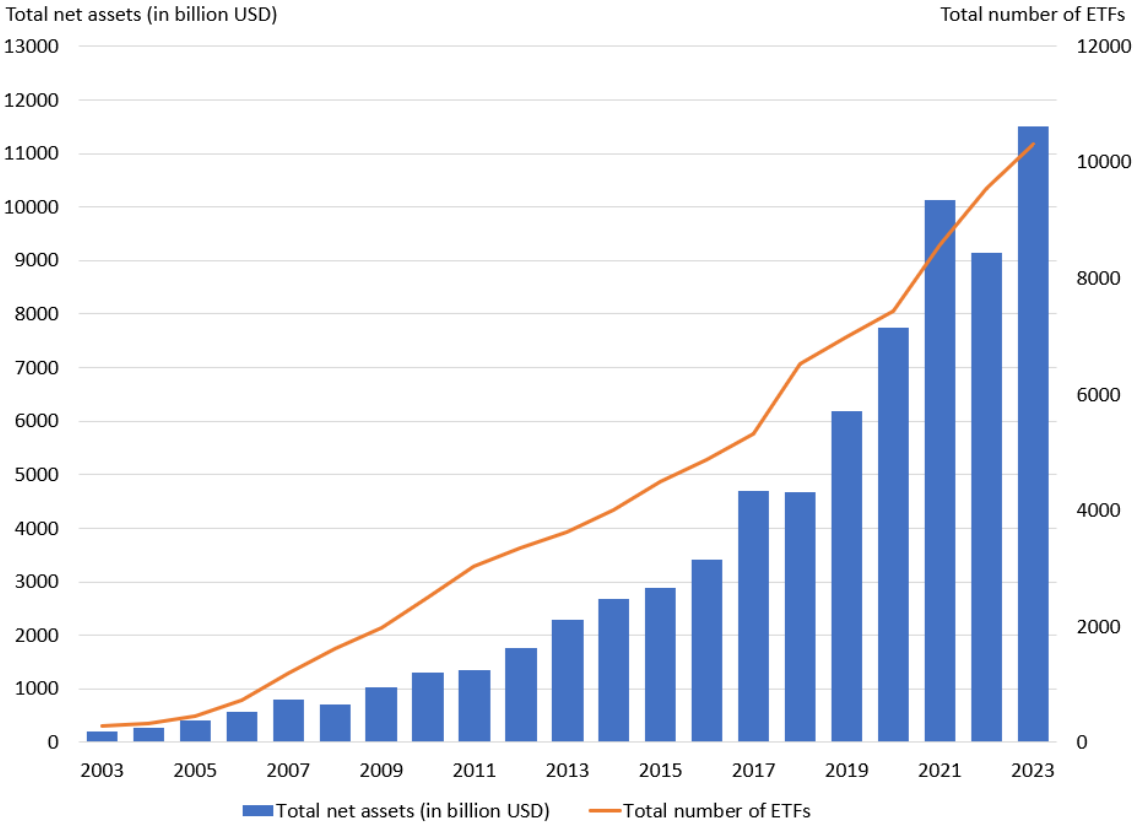

Figure 1. Total net assets invested worldwide in ETFs and total number of ETFs worldwide (Statista, 2024b; Statista, 2024c)

2.2 Mechanics of ETFs

The structure of ETF creation and their transaction flows in the financial markets is depicted in **Figure 2** below. Like a mutual fund, an ETF has a portfolio of assets (Lettau & Madhavan, 2018). But ETFs are not interacting directly with capital markets. Instead, ETFs have a primary and a secondary market for trading. In the primary market, ETFs are created between an ETF Asset Manager (AM) and an Authorized Participant (AP), most often several APs. Together they make a legal contract to create ETF shares. An example of an ETF AM, also known as sponsor, is BlackRock. APs are usually large financial institutions or market makers, who directly interact with the financial markets.

ETF is created when an ETF AM issue shares with APs in large blocks, which are called ETF creation units (Lettau & Madhavan, 2018). The ETF AM receives the underlying

securities in exchange from the APs. Consequently, an AP can redeem ETF shares by giving them to the ETF AM and receiving the underlying securities in exchange. This process allows for the shares of ETFs to adjust to demand and supply. It is known as the creation and redemption mechanism. Creation means that the supply of ETF shares is increased i.e., an AP gives an ETF AM the appropriate underlying securities in exchange for ETF shares and sells them on the secondary market to investors. Decreasing the shares outstanding of the ETF is known as redemption i.e., an AP buys ETF shares on the secondary market and gives them to the ETF AM in exchange for the underlying securities.

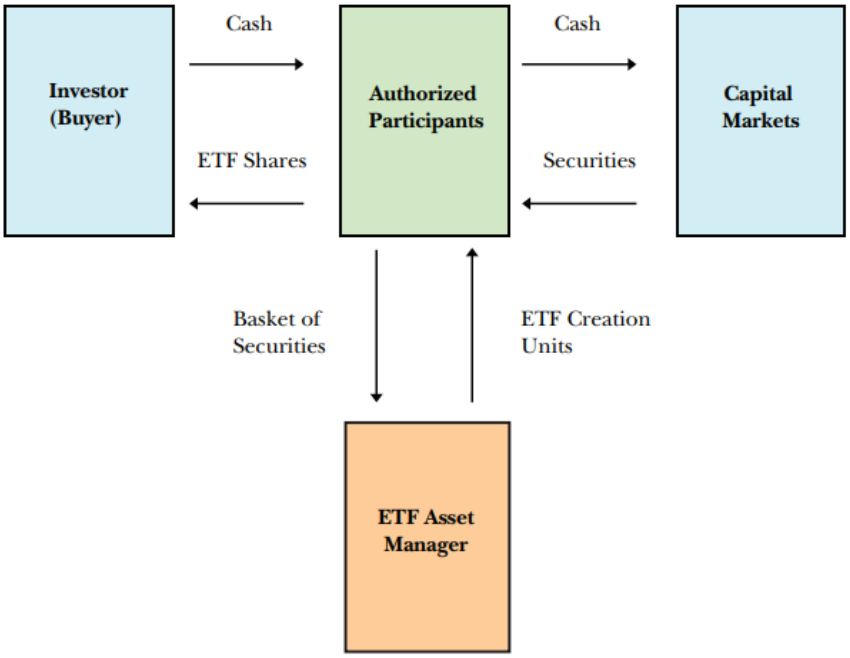

Figure 2. The structure of ETF creation and their transaction flows in the financial markets (Lettau & Madhavan, 2018)

After the ETF creation process, ETFs are traded in the secondary market. In the secondary market, investors buy ETF shares on an exchange, or from APs (Lettau & Madhavan, 2018). Investors do not interact with the ETFs directly or make transactions with the underlying securities. They trade with ETF shares. Most of the ETF trading activity takes place in the secondary market (Investment Company Institute, 2024). In 2023, 84 per-

cent of the total activity in ETFs took place in the secondary market. Therefore, only 16 percent of the ETF trading included trading of the underlying securities.

The net asset value (NAV) of an ETF is closely related to this creation and redemption mechanism. The NAV of an ETF is calculated based on the total value of the underlying assets held by the ETF. The equation for calculating the NAV is the following: (Sum of all assets of the ETF [shares, cash, bonds, and other securities] – Liabilities) / The number of shares outstanding (Madhavan & Sobczyk, 2016). When APs create or redeem ETF shares, it directly impacts the number of ETF shares in circulation, and therefore, the ETF share price. If more ETF shares are created, the ETF share price may decrease. Conversely, if ETF shares are redeemed, the ETF share price may increase. The creation and redemption process works to move the ETF share price closer to reflect its NAV, enhancing the relative market efficiency.

2.3 Growth and significance of passive investing and ETFs

The growth of passive investing vehicles, in particular ETFs, is a crucial context to the study of ESG's impact on their performance. Over the past decade, there has been a notable shift in capital flows from actively managed equity mutual funds towards passively managed equity funds and indexed equity ETFs. This trend is illustrated below in **Figure 3**, which shows the cumulative flows to actively managed equity mutual funds is negative. This diverges from the net share issuance of indexed equity ETFs and equity mutual funds which is a positive change of the same magnitude. This shift reflects a broader investor preference for low-cost and diversified investment solutions.

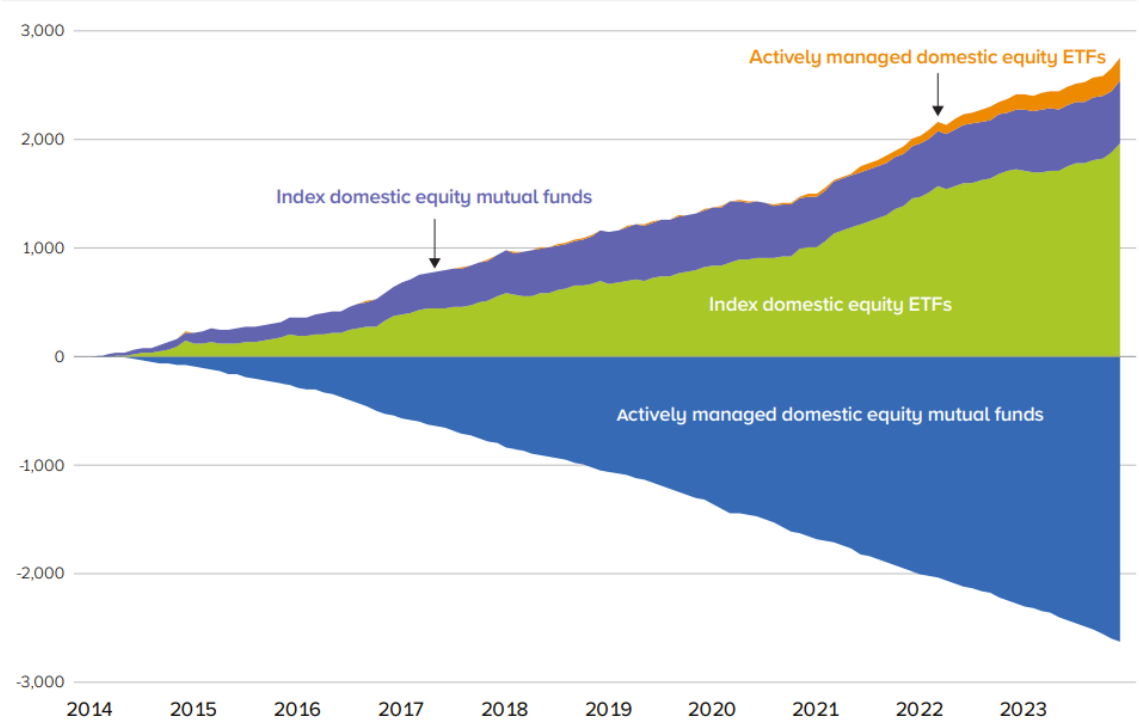

Figure 3. Cumulative flows to domestic equity mutual funds and net share issuance of domestic equity ETFs, billions of dollars, monthly (Investment Company Institute, 2024).

In this environment, the emergence and rapid growth of ESG-focused passive investment products is particularly significant. As investors increasingly seek to align their portfolios with sustainable development values without sacrificing diversification or paying high active management fees, ESG ETFs have become a popular choice (Morgan Stanley, 2024; Investment Company Institute, 2024). Comparing the S&P 500 ESG to a traditional S&P 500 provides a preliminary indication of this trend. **Figure 4** below, which shows the outperformance of the S&P 500 ESG over the S&P 500 from February 2021 to February 2024, provides an interesting illustration. While this is only a single time period and considering factors such as the sector bias of the ESG index (e.g. higher weighting of technology companies), it shows that incorporating ESG into passive strategies can sometimes yield favorable results. This broader context of the rise of passive investing and the simultaneous rise of ESG indices is essential to understand the environment in which ETFs operate and how market preferences may affect their performance.

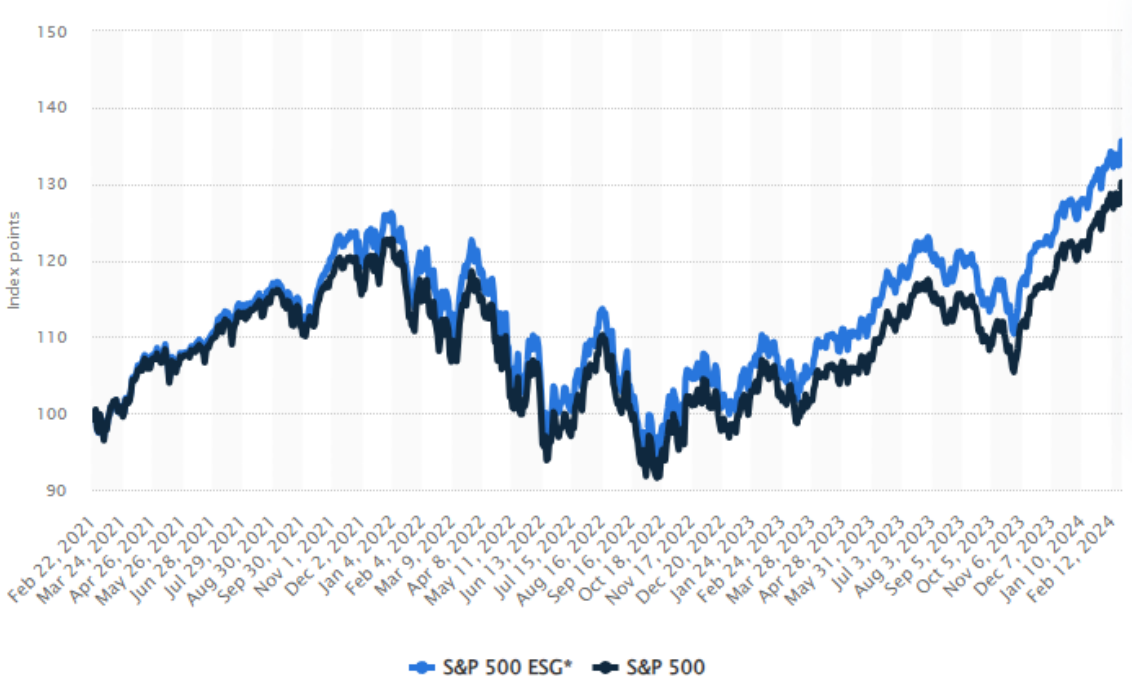

Figure 4. S&P 500 ESG and S&P 500 indices between February 2021 and February 2024 (Statista, 2024a).

3 SRI and ESG

This chapter introduces the concepts of SRI and ESG. Also, the ESG rating agencies, their rating methods, the issues with ESG ratings and ratings for ETFs are discussed.

3.1 Socially Responsible Investing (SRI)

SRI refers to the practice of allocating investment funds in ways that align with both financial goals and a commitment to social values, such as social justice, economic growth, peace, and environmental health. This approach considers non-financial aspects of a company's performance and policies. By evaluating factors like corporate governance and environmental, social, and economic criteria, investors can manage their funds in line with their personal mission and values (Haigh & Hazelton, 2004; Scholtens, 2006).

The difference between SRI and CSR should be acknowledged. CSR is a conceptual framework which focuses on a company's own ethical, environmental, social, and governance practices, whereas SRI reflects investors' efforts to support CSR initiatives through their investment choices. Effectively, SRI represents a form of activism where individuals choose investment strategies that promote social change. Sometimes SRI is a form of politicizing personal and daily financial decisions to protest corporate actions that contribute to social injustice or environmental harm, or to encourage positive corporate impact. While investing is often personal, it can take on a collective dimension when funds are pooled to drive ideas behind SRI by creating mutual funds or ETFs (Scholtens & Sievänen, 2013).

Investors have partnered together with the United Nations Environment Programme and United Nations Global Impact to create Principles for Responsible Investment (PRI). PRI includes six values, or principles, by which a socially responsible investor can act on (PRI Association, 2024). Investors have also created multiple investment strategies under the umbrella term of SRI. These strategies include ESG integration, negative screen-

ing, divestment, shareholder activism, positive investing and impact investing (GSIA, 2023).

3.2 Environmental, social and governance (ESG)

Environmental, social, and governance are metrics used to evaluate a company's operations and their impact on the environment, society, and governance structures. The environmental component assesses factors like carbon emissions, energy usage and waste management. The social aspect considers factors such as human rights, labor standards and data protection. Governance evaluates corporate leadership, board composition, transparency and shareholder rights. ESG factors are increasingly important to investors seeking socially responsible investments. They offer insights into a company's long-term risks and opportunities beyond traditional financial metrics. ESG metrics promote global sustainability goals and responsible corporate behavior (CFA Institute, 2024; Krantz & Jonker, 2024; Wagstaff & Belsom, 2024). Below in **Figure 5** is a breakdown and visualization of the ESG constituents.

Figure 5. Breakdown of environmental, social and governance concerns (Wagstaff & Belsom, 2024).

3.2.1 ESG ratings

ESG ratings are provided by several firms. These firms include MSCI, Sustainalytics, LSEG, ISS, S&P Global and FTSE Russell. These institutions started developing their ESG ratings in the early 2000s, around the same time that the UN started developing their ESG framework (IFC, 2004; Factset, 2021; MSCI, 2025; Sustainalytics; 2025). Each firm has a different methodology to determine an ESG rating for a company and there are variations in their assessments. The rating companies use multiple metrics to calculate a company's ESG rating. For example, S&P Global uses 1000 indicators, LSEG employs 630 metrics, and FTSE Russell utilizes 300 indicators (Larcker et al., 2022).

The rating firms turn information from company filings for SEC, sustainability reports, press releases, media reports, news, and government, regulatory and NGO datasets into data which reflect the environmental, social and governance aspects of companies' operations. In practice, ESG scores for companies are presented on scales that vary between the rating firms. For instance, MSCI uses a 7-point scale system from AAA to CCC and LSEG has a numerical scale from 0 to 100 with 100 indicating the best ESG performance. Whereas Sustainalytics assigns a score from 0 to 100 with lower scores indicating better ESG performance thus lower ESG risk. ISS uses a 12-point scale system with ratings ranging from A+ to D- (Larcker et al., 2022).

3.2.2 Issues with ESG ratings

As discussed in the previous chapter, the ESG rating firms use different amounts of metrics and methodologies to determine an ESG rating for a company and they also use different scales to present a company's ESG performance. Due to these circumstances, comparing ESG scores across different rating firms is challenging, as the scores assigned to companies can vary significantly. Even when the scores are adjusted to a common scale, deviations persist due to differences in methodologies, metrics and evaluation criteria used by the agencies.

ESG ratings face criticism due to their lack of consistency and standardization across rating agencies. Berg et al. (2022) highlight that different rating providers utilize distinct methodologies, indicators, and weighting systems. This divergence can result in contradictory ESG ratings for the same entity, leaving investors confused about the true sustainability profile of a company or ETF. For instance, while one agency might heavily weigh environmental metrics, another might focus more on governance factors, leading to different scores. These inconsistencies hinder the comparability and reliability of ESG ratings as a decision-making tool for investors.

Larcker et al. (2022) note that a more fundamental issue with ESG ratings is the accuracy of the scores the rating agencies have for companies. This issue stems from the completeness and quality of available data. This creates an inherent issue in understanding the true ESG rating of a company. Larcker et al. (2022) also raise other issues such as what the agencies are trying to measure and reasons for ESG rating upgrades. They highlight that different agencies have different approaches to what they are measuring with ESG scores. Some agencies say that they are measuring risk, and some say their ESG rating approach is for measuring future risk-adjusted performance. In addition, the reasons for ESG rating upgrades seem to differ. Out of 155 upgrades, MSCI mentioned governance improvements for 42 percent of the upgrades which is much higher than the 32 percent of social or 26 percent of environmental improvements. Upgrades were rarely motivated by substantive practices, such a real decrease in carbon emissions, but rather by “check-the-box” measures, such as performing a staff survey that may lower turnover. Methodological adjustments resulted in half of the enterprises being upgraded by accomplishing nothing.

These issues create challenges for investors seeking consistent ESG information to guide investment decisions. They also complicate efforts to align portfolios with sustainability goals. Despite these limitations, ESG ratings remain vital as they offer insights into corporate sustainability practices and provide a basis for developing respon-

sible investment strategies. However, greater transparency and standardization across methodologies are necessary to improve their reliability and comparability.

3.2.3 ESG ratings for ETFs

There is demand for ESG rating agencies to release ESG ratings for funds, including ETFs, since the use of ESG integration strategies, passive investments, and ETF investments has increased. The method to rate funds is rather easy for the organizations as they already have ESG scores for companies. Since each fund owns a variety of equities, each of which has a certain weight within the fund, the ESG rating of the fund is determined using a value-weighted score (MSCI, 2023). These ratings give investors a comprehensive picture of a fund's exposure to governance, social, and environmental risks.

Similar to how companies are rated, funds and ETFs are rated on different numerical or point scales. ESG fund rating providers include MSCI (2024), Bloomberg (2024), ISS (2024) and Sustainalytics (2024). The ratings of MSCI for funds range from AAA (highest) to CCC (lowest), whereas Sustainalytics rates the funds from 5 to 1 with 5 being the best score.

4 Theoretical background

This chapter introduces the theoretical foundations that are relevant for understanding the relationship between ESG ratings and ETF performance. While the empirical analysis of this thesis focuses on risk-adjusted returns, interpreting the results requires a broader conceptual framework. The first part of this chapter presents the Efficient Market Theory and the Capital Asset Pricing Model (CAPM) which provide basic assumptions about how markets process information and price risks. While the second part of this chapter outlines complementary perspectives, including CSR, shareholder and stakeholder theory, signaling theory, and behavioral finance, which highlight additional mechanisms through which ESG factors can influence both corporate behavior and investor decision-making. Together, these theories form the foundation for analyzing how ESG integration can affect ETF performance in different market conditions.

4.1 Efficient Market Theory

In this chapter, efficient market theory is discussed. For the purpose of this thesis, the efficient market theory explains how resources should be allocated efficiently. This chapter also addresses the issues with the theory. This theory describes why the allocation of resources might have been shifting towards SRI and ESG integration and what difficulties are related in SRI and ESG from the perspective of efficiency.

4.1.1 Informational efficiency

Fama (1970) states that for a market to work efficiently, the market prices must always fully reflect all available fundamental information. Thus, resources should be allocated efficiently. If prices reflect all available fundamental information, the prices should only change when new fundamental information is revealed. Hence only then is the allocation of resources reconsidered. This indicates that market prices follow a random walk (Fama, 1965). Therefore, previous changes in the asset price should not predict future changes. Accordingly, technical analysis of an asset should not create information

which could create abnormal returns. Furthermore, fundamental analysis should only be executed when new information is revealed because security prices should reflect all relevant available fundamental information. Thus, security prices should reflect a fair price based on the obviously available fundamental information because all the fundamental information regarding the securities should be enough to set security prices.

Fama (1970) introduces three levels for examining the prevalence of efficiency in the financial markets: weak, semi-strong and strong form. Firstly, the weak form tests investigate if the market prices fully reflect the implicit information of past prices. Fama concludes that "the results are strongly in support" of the weak form. Secondly, the semi-strong form tests review the speed of price adjustment to new public information. In other words, the semi-strong studies the hypothesis that market prices should reflect all publicly available fundamental information. Fama also concludes that semi-strong form tests support the efficient market theory. Lastly, the strong form tests measure if the market prices reflect information that only a proportion of investors have monopolistic access to. Fama says that corporate specialists and insiders hold monopolistic information that could be used to create profits. However, this deviation should not spread throughout the financial markets.

4.1.2 Operational efficiency

Fama's (1970) definition of efficient markets relates mostly to informational efficiency. Dimson and Mussavian (1998) point out that market efficiency is also used to describe the operational efficiency of a market. This term highlights the allocation of resources in a way which supports the functioning of capital markets. If capital markets are perfectly competitive then investors should not be able to earn excess risk-adjusted average returns or average returns greater than are justified for the risk from their investment strategies. This indicates that there is a positive correlation between risk and return. Risk refers to two types of risk: systematic and idiosyncratic or non-systematic risk

(Bodie et al., 2023). Systematic risk refers to market risk that cannot be mitigated by portfolio diversification. Whereas idiosyncratic risk refers to company or industry-specific risk, and it can be mitigated by portfolio diversification.

The efficient market theory is based on the foundation of three arguments (Villalta, 2012). Firstly, individuals make rational investment decisions, which stem from their own interests. Secondly, if individuals act irrationally, their erroneous resource allocation is corrected by opposite positions. In other words, the law of demand and supply constructs the security prices. For example, if irrational investors become overly optimistic about an asset, they will start to buy it excessively. This increase in demand will increase the price. However, the rational actors in the market will start to sell this security. The opposing activity will increase the supply of the security to the markets which in turn decreases the security price back to the equilibrium, or its fundamental value. That is to say that only new fundamental information which affects the fundamental values of securities should affect the market prices. Namely, new positive fundamental information will lead to an increase in demand for a security which increases the number of buyers and increases the price. Similarly, new negative fundamental information will lead to an increase in the supply of a security which increases the volume of selling and decreases the price. Thirdly, arbitrage activity corrects mispricing in the capital markets.

4.1.3 Criticism of the efficient market theory

Although efficient market theory has received support, it has been challenged by several counterarguments. Arguments against the efficient market theory include stock market seasonality, bubbles, insider trading, and stock price volatility (Burton & Shah, 2013; Malkiel, 2012). Most importantly, behavioral finance challenges the efficient market theory. These arguments challenge the conventional thoughts of rational investors and unpredictable patterns i.e., the random walk, in stock returns which would be in line with efficient market theory.

For example, Jegadeesh and Titman (1993) show that with a momentum strategy an investor can gain excess returns by studying the past performance of stocks. This creates an argument against the random walk of the efficient market because it states that previous changes in the asset price should not predict future changes. Lakonishok et al. (1994) provide evidence on the excess returns one can gain by investing in value stocks. They also argue that retail and institutional investors are somewhat irrational when investing in glamour stocks, such as Microsoft or Walmart. Moreover, Fama and French (1992) show that book-to-market ratio could be used to predict stock returns. This argues against the unpredictability of stock returns.

Keown and Pinkerton (1981) show that there is trading based on information about upcoming mergers before they have been publicly announced. Thus, this indicates market inefficiency regarding the strong form which states that insider information is not used in the capital markets. Moreover, Shiller (2003) points out several inefficiencies in the financial markets, including excess price volatility, anomalies, and market seasonality. He also argues that the faulty resource allocation of irrational investors is not always corrected by rational investors but rather amplified. Hence, market bubbles are often caused by irrational human behavior which causes inefficiencies in the way resources are allocated in a market. Thus, it can be argued that the market is never efficient in all three forms.

4.1.4 CAPM and Jensen's alpha

CAPM, introduced by Sharpe (1964) and Lintner (1965), is among the most recognized models for evaluating capital market efficiency. It provides a method to calculate the fair value of financial assets based on their associated risk. The model assumes that only systematic risk, or market risk that cannot be mitigated through diversification, affects asset pricing as firm-specific risk can be eliminated by diversifying the portfolio. The expected return of an asset is calculated as the sum of the risk-free rate and the product of the market risk premium and the asset's beta. Beta measures the sensitivity of an asset's price to market movements; a beta of 1 implies the asset moves propor-

tionally with the market, while a beta of 1.5 indicates 1.5 times the market's fluctuation in either direction.

Building upon the CAPM, Jensen's alpha is a measure to evaluate the performance of an investment manager or a portfolio (Jensen, 1968). It quantifies the abnormal return of a security or portfolio, meaning the return achieved above or below what the CAPM predicts given its systematic risk. Conceptually, Jensen's alpha represents the excess return of a portfolio over its theoretically expected return, assuming the CAPM holds true. A positive alpha indicates outperformance, while a negative alpha suggests underperformance relative to the CAPM benchmark. This metric is particularly useful for identifying whether a fund manager has added value through active management or if a particular investment strategy consistently generates returns beyond what can be explained by market risk alone.

4.1.5 Implications for ESG integration

Efficient market theory assumes all available fundamental information, including non-financial information like ESG factors, should already be reflected in security prices. Manescu (2011) notes that ESG attributes are important for the fair value of a financial asset. However, ESG scores of companies are not efficiently incorporated into their prices as the fair value of ESG attributes is difficult to determine, i.e., integrating ESG data into market prices is a challenge. ESG data is often inconsistent between ESG rating agencies and lacks standardization and quantification (Berg et al., 2022; Amel-Zadeh & Serafeim, 2018). Furthermore, investors value ESG data differently because of subjectivity and thus value ESG information differently in the security prices. This can result in varied pricing of assets with ESG ratings. This complicates the notion that markets would always efficiently reflect all available fundamental information.

4.2 Theoretical Perspectives Beyond Market Efficiency

While the efficient market theory provides a foundational view on how information is incorporated into asset prices, it does not fully cover all the mechanisms that may influence the relationship between ESG considerations and financial performance. SRI and ESG integration are shaped not only by informational efficiency but also by broader corporate, investor, institutional, and behavioral dynamics. To provide a more comprehensive theoretical foundation for this thesis, four complementary perspectives are presented: CSR, shareholder and stakeholder theory, signaling theory, and behavioral finance. Together, these frameworks help explain both the corporate motivation behind ESG integration and the investor behavior that may affect ETF performance.

4.2.1 Corporate Social Responsibility (CSR)

CSR refers to the voluntary practices and policies through which companies integrate social and environmental concerns into their business operations and interactions with stakeholders. The concept has been a central part of the debate on the role of businesses in society for decades. Carroll (1979) proposes a three-dimensional model of corporate social performance, which emphasized three core aspects: what constitutes social responsibility, what social issues are relevant, and how an organization should respond to them. This framework broadens the understanding of CSR beyond legal or economic duties to include ethical and discretionary expectations, while also highlighting the importance of how firms respond to social demands. Building on this work, Carroll (1991) introduces the “pyramid of CSR” which categorizes corporate responsibilities into four levels: economic, legal, ethical, and philanthropic. Together, these models provide a comprehensive foundation for analyzing how corporations balance profit-making with broader societal obligations. These models and the CSR perspective demonstrate a framework which states that firms bear responsibilities that extend beyond shareholder interests.

While often used interchangeably, CSR and ESG have distinct scopes and focuses. CSR primarily highlights a company's voluntary social and environmental efforts, whereas ESG serves as a more comprehensive framework for investors to evaluate a company's environmental, social, and governance impacts (Amel-Zadeh & Serafeim, 2018). Unlike CSR, ESG incorporates quantifiable metrics and reporting standards, which allows investors to better assess long-term risks and opportunities associated with sustainability. Essentially, CSR can be viewed as a company's self-regulatory model for pursuing social benefits, while ESG functions as a decision-making tool for investors to ensure that companies are addressing sustainability risks in a way that aligns with financial performance.

Since the introduction of CSR, the relationship between CSR and financial performance has been a subject of academic research. The studies focus on the question of whether CSR-oriented practices can contribute to positive financial outcomes. This debate remains relevant for investors and fund managers, and CSR's and ESG integration's financial implications are discussed in more detail in Chapter 5's literature review. At the ETF level, CSR considerations are operationalized through ESG ratings of the underlying firms. Funds which lean toward companies with higher ESG ratings effectively insert CSR principles into their investment strategy, potentially shaping both risk and return.

4.2.2 Shareholder theory and stakeholder theory

The discussion of CSR connects to the broader debate on the purpose of the corporation and for whom value should be created. CSR emphasizes that firms have responsibilities that extend beyond profit maximization, but this view is directly challenged by shareholder theory, which argues that a company's primary obligation is to maximize shareholder wealth, provided that the company operates within the legal framework of society. Friedman (1970) famously expresses this view, arguing that corporate resources should not be used for social or environmental causes unless such actions promote profitability. From this perspective, CSR and ESG activities are unnecessary costs that reduce shareholder value unless they are financially justified.

In contrast, Freeman (1984) introduces stakeholder theory, which argues that companies should create value for a broader set of stakeholders, including employees, customers, suppliers, regulators, and communities, in addition to shareholders. This framework emphasizes the interdependence between firms and their stakeholders and suggests that long-term financial success is more likely when companies actively manage their stakeholder relationships. This theory suggests that addressing stakeholder concerns can improve long-term performance by strengthening relationships, mitigating risks, and meeting societal expectations.

These competing perspectives directly influence the debate on integrating ESG factors into financial markets. If ESG practices incur costs without corresponding benefits, as shareholder theory suggests, assets with high ESG ratings might underperform traditional assets. Conversely, if stakeholder management improves risk-adjusted returns, assets with high ESG ratings may outperform by influencing long-term value drivers that are overlooked in short-term financial metrics.

4.2.3 Signaling theory

Whereas the debate between shareholder and stakeholder theories focuses on the fundamental purpose of a company, signaling theory provides a framework for understanding how companies credibly communicate to external parties, such as investors, their underlying quality and intentions, which are not directly observable. This theory emerged to address the economic problem of information asymmetry, where one party (a company) has information that is not available to the other party (an investor). Akerlof (1970) was the first to highlight this issue by showing how uncertainty about quality in markets, such as the used cars market, can lead to adverse selection and cause the market to collapse entirely. Based on this fundamental problem, Spence (1973) formulates the concept of signaling as a solution. He introduces a model in the context of the labor market, where a job applicant (the sender) uses a costly and observable characteristic, such as education, to signal their unobservable productivity to

a potential employer (the receiver). The core principle of this framework is that, in order for a signal to be credible, it must be more costly for a low-quality party to imitate than it is for a high-quality party to acquire. This ensures that the signal truly distinguishes superior quality and helps reduce the uncertainty described by Akerlof (1970), thereby maintaining market efficiency.

In the ESG field, signaling theory provides a framework for understanding how firms communicate their unobservable qualities to investors. Connelly et al. (2011) argue that credible signals are essential for reducing the information asymmetry that exists between a company (the sender) and the capital market (the receiver). A key takeaway from their study is that for a signal to be effective, it must be costly to imitate so that only high-quality companies can send it credibly. In the context of ESG, a company's commitment to sustainability is not immediately visible. Therefore, a high ESG rating, earned through costly investments in environmental technology, social programs, or improved governance structures, serves as a credible signal. It communicates to investors that the firm is well-managed, forward-thinking, and better positioned to mitigate long-term risks, which are qualities that less committed or lower-quality companies find difficult to fake. From this perspective, ESG ratings not only reflect ethical considerations, but also convey information about the underlying quality and resilience of a company. However, Connelly et al. (2011) also point to the possibility of false or misleading signals. Sending false signals is a concept that is particularly relevant to the ongoing debate on "greenwashing," in which companies can make superficial ESG claims without genuine commitment.

As mentioned, the signaling theory is also relevant for understanding greenwashing, which refers to a company's practice of focusing on observable CSR activities and neglecting less visible or unobservable activities (Wu et al., 2020). Greenwashing is essentially a signaling strategy used by profit-maximizing companies to mimic genuinely socially responsible companies and gain consumer rewards without making a genuine and comprehensive commitment to social good. The existence of greenwashing stems

from limited transparency of information between companies and external parties. When consumers cannot fully observe all company's activities, the company can selectively invest in ways that create misleading signals and prevent consumers from making informed purchase decisions. The concept of greenwashing highlights how limited transparency of information allows companies to engage in false signaling.

At the ETF level, ESG ratings can be interpreted as signals of portfolio quality. By allocating capital to companies with higher ESG ratings, ETFs signal that such companies are better positioned for long-term success or lower downside risk. However, greenwashing raises the critical question of whether the signals sent through ESG ratings consistently translate into genuine financial advantages.

4.2.4 Behavioral finance

While signaling theory highlights how firms convey information to reduce asymmetries, behavioral finance shifts the focus to the decision-making of investors themselves. Traditional finance assumes that investors act rationally, and markets are efficient, yet behavioral research demonstrates that cognitive biases and psychological factors systematically affect investment choices. Kahneman and Tversky (1979) develop prospect theory which challenges the traditional expected utility theory by demonstrating how individuals evaluate potential gains and losses asymmetrically. They introduce concepts such as loss aversion, which indicates that investors experience the psychological pain of a loss more intensely than the pleasure of an equivalent gain, and probability weighting, where investors tend to overweight low-probability events and underweight high-probability events. This means that investors' decisions are not always based on objective probabilities and outcomes. Shiller (2003) questions the efficient market hypothesis by finding that the volatility of the overall stock market index is much greater than can be explained by variations in subsequent dividends. This suggests that price changes are not solely driven by rational fundamental information, but also by irrational psychological factors. This means that market prices can be driven by investor sentiment and not just rational expectations. Barberis et al. (1998) formulate models of in-

vestor sentiment that illustrate how biases such as overreactions and underreactions can lead to persistent mispricing in the market. This means that prices do not immediately and accurately reflect all available fundamental information, but may react to news, such as earnings announcements, by overreacting or underreacting, creating opportunities for deviations from fundamental value over time.

In addition to broader behavioral patterns, two specific behavioral biases are relevant for understanding investor behavior in the ESG context: confirmation bias and herd behavior. Confirmation bias is the tendency of investors to seek out, interpret, and favor information that supports their existing beliefs, while rejecting contradictory evidence. Cheng (2018) demonstrates this effect by showing that investors are significantly more likely to read articles that support their existing investment decisions. This selective information gathering can reinforce the perception that ESG investments are inherently superior and lead to investment errors. Another bias affecting behavior is herding, in which investors follow the actions of others, which can be caused by two different reasons. First, as Banerjee (1992) has modeled, herd behavior can result from a rational sequential decision-making process. An investor may rationally decide to ignore their own private information and follow the crowd, assuming that previous decision-makers have obtained important information that they themselves do not have. However, this can lead to a socially inefficient outcome where valuable private information remains unused. Second, Scharfstein and Stein (1990) show that herding among professional managers can be a rational strategy based on reputational concerns. Managers may imitate their colleagues' investment decisions to protect their position in the labor market, as "it is better for reputation to fail conventionally than to succeed unconventionally". By following the herd, managers can share the blame for poor performance, which would appear to be an individual failure if they had acted differently. In the ESG context, herd behavior can drive significant capital flows to certain ESG funds and reinforce this effect as the popularity of these funds grows, regardless of their underlying economic fundamentals or rational risk-return analysis.

In the context of ESG investing, behavioral finance offers valuable insights into why the demand for sustainable investment products has grown, even if performance differences relative to conventional funds have been small. As Riedl and Smeets (2017) show, many investors are guided by social preferences and social signaling and are willing to accept lower returns and higher fees when they receive non-financial utility by holding socially responsible investments. This indicates that value-based preferences can be significantly more important than traditional motives for maximizing returns. Furthermore, research by Hartzmark and Sussman (2019) provides evidence that the mere visibility of sustainability ratings can directly influence capital allocation. They show that Morningstar's new, simple sustainability rating caused billions in capital to flow into highly rated funds and away from low-rated ones, even though there was no evidence that high sustainability funds outperformed the low-rated funds. This highlights the powerful role of investor sentiment and signaling in capital allocation, as investors can respond to a simple and affective signal, the sustainability rating, rather than to detailed financial data. These findings suggest that demand for assets with ESG ratings can be driven by psychological and social motivations rather than purely rational explanations based on available fundamental information.

At the ETF level, these behavioral dynamics can directly impact capital flows and performance. During times of heightened attention to sustainability, such as periods of regulatory change, investor preferences may shift capital disproportionately toward ETFs with high ESG ratings, creating return patterns that are not fully explained by fundamentals. These demand-driven effects can create short-term mispricing, resulting in ETFs temporarily outperforming or underperforming what would be explainable based on their fundamental information. Behavioral finance therefore provides a complementary theory to traditional asset pricing theories and helps explain how investor psychology can affect the performance of ETFs with higher ESG ratings.

5 Literature review – ESG rating and financial performance

This chapter reviews academic literature related to the topic of the thesis, examining the evolving landscape of ESG integration in finance and its documented impact on financial performance. The mechanisms through which ESG factors are believed to influence financial performance, findings on the impact of ESG ratings on financial performance under different market conditions, and the impact of ESG ratings on ETF performance are discussed. While research on ESG integration has expanded significantly, particular attention is given to studies that examine different market conditions and how these dynamics may affect the relationship between ESG and investment returns.

5.1 How can ESG improve financial performance?

The growing interest in ESG investing is based on the convincing theoretical premise that strong ESG practices can lead to tangible economic benefits. This relationship has received a lot of attention, with many studies suggesting a positive correlation. Accordingly, Friede et al. (2015) conduct a comprehensive meta-analysis combining more than 2000 empirical studies between 1970s and 2014, and find that in about 90% of the studies, the relationship between ESG and corporate financial performance (CFP) was non-negative, with a large majority of studies showing a positive relationship. This finding, based on a large body of research, highlights the empirical basis for ESG investing and its positive impact on financial performance. Understanding the specific mechanisms driving this relationship is crucial for investors, thus this chapter will discuss the possible underlying mechanisms behind the correlation.

Several key mechanisms are proposed through which ESG practices are said to enhance financial outcomes. Firstly, ESG practices can be an effective risk management tool to protect companies from the financial consequences of adverse events. Godfrey et al. (2009) provide empirical evidence for this "insurance-like" effect, observing that companies with robust activities experienced less severe stock price declines during negative events, such as legal or regulatory actions, by generating "moral capital" or good-

will with stakeholders. This suggests that positive attributes from stakeholders mitigate negative judgments and sanctions, thereby reducing reputational and financial damage during crises. From this perspective, ESG-focused ETFs investing in such resilient companies can demonstrate lower volatility and better performance in market downturns, such as those caused by the COVID-19 pandemic or geopolitical shocks. Velte (2017) reinforces this further by anchoring the link between ESG and financial performance in stakeholder theory, according to which meeting the requirements of different stakeholders improves ESG and financial performance, and acts as a risk management tool in case of adverse events, thus preserving the value of the firm.

Secondly, operational efficiency represents another mechanism for ESG to improve financial performance. Eccles et al. (2014) conduct a study of 180 US companies comparing "high sustainability" firms to "low sustainability" counterparts. They find that high sustainability companies significantly outperform in both stock market and accounting performance. This advantage stems from improved resource utilization, reduced waste, and higher workforce productivity which are outcomes of strong ESG integration, which translates to competitive advantages that drive superior long-term returns. This mechanism implies that funds holding companies committed to robust ESG practices may benefit from the inherent operational efficiency of their constituent firms, which can lead to superior long-term returns.

Thirdly, improved access to capital serves is a meaningful factor, especially during economic uncertainty. Cheng et al. (2014) demonstrate through a large cross-section of publicly listed firms across 49 countries that companies with better CSR performance face lower capital constraints. They attribute this to two complementary mechanisms: a reduction in agency costs due to better stakeholder engagement and a reduction in information asymmetry due to increased transparency through CSR disclosure. Their findings indicate that both the social and environmental dimensions of CSR are important in reducing capital constraints, suggesting that firms committed to these aspects are perceived as less risky by capital providers, which allows them to obtain fi-

nance on more favorable terms. This mechanism implies that funds with a high ESG rating may include companies that are better at enduring financial stress, such as liquidity shortages during a crisis, leading to faster recovery and sustained performance. Charlo et al. (2015) support this by observing higher leverage in socially responsible Spanish firms, which suggests that strong ESG practices enhance access to capital by signaling lower risk or promoting trust among financial providers.

Lastly, reputation and brand value offer a link between ESG and financial gains. Servaes and Tamayo (2013) show that CSR activities increase firm value, but only when customers are aware of these efforts, as evidenced by advertising expenditures. In consumer-facing industries, strong ESG performance can enhance brand loyalty, increase sales, and even support premium pricing by influencing consumer purchasing decisions. This suggests that funds that invest in companies with a solid reputation, supported by visible ESG initiatives, may enjoy more stable returns, as customer loyalty sustains revenues during economic downturns. The economic impact will depend on the visibility of ESG efforts and broader market sentiment toward sustainability.

These mechanisms provide a theoretical framework for the observed positive relationship between ESG and financial performance. While each mechanism provides a distinct pathway, they often work together, reinforcing the notion that integrating ESG considerations are not simply an ethical choice, but can be a strategic imperative for long-term financial success. The challenge for researchers and investors is to understand how these mechanisms play out under different market conditions and in different investment vehicles.

5.2 ESG ratings and financial performance

Understanding the underlying mechanisms of ESG's impact is complemented by empirical evidence on how ESG ratings have affected the financial performance. In this section, the literature is divided into different chapters according to market conditions, as

the importance and impact of ESG factors can vary significantly in times of stability and crisis.

5.2.1 ESG's impact on financial performance in stable market conditions

This chapter reviews papers that examine the financial implications of ESG integration during periods characterized by relatively stable or low volatility market conditions. Early work, such as Mill's (2006) study analyzing the transition of a UK unit trust from conventional principles to SRI principles, finds that average risk-adjusted performance remains unaffected and does not produce significant over- or underperformance relative to the benchmark index. This initial finding points to the challenges of early integration of ESG and suggests that direct and consistent outperformance in stable markets might not be a given. Interestingly, Mill (2006) also observe a temporary increase in returns volatility following the SRI adoption, which returned to its previous level after about four years, possibly due to the wider adoption of CSR practices by companies and learning by fund managers.

Additional studies add to this complex picture, highlighting geographical and methodological aspects. Capelle-Blancard and Monjon (2014) examine French SRI mutual funds between 2004 and 2007 and find that higher screening intensity, e.g. exclusion of "sin stocks", can have a negative impact on financial performance, while broader cross-sectoral screens, e.g. commitment to UN Global Compact Principles, has no significant impact. This suggests that the method of ESG integration matters, as certain exclusion practices may limit returns due to diversification costs. Auer and Schuhmacher (2016) provide a broader international perspective by analyzing companies from Asia-Pacific, the United States, and Europe using ESG data from Sustainalytics between 2004 and 2012. They find no evidence that active selection of high ESG or low ESG rated stocks provide better risk-adjusted performance compared to passive stock market investments. While investors in Asia-Pacific and the US can achieve returns similar to the broad market, a key finding is that investors in Europe tend to pay a price for socially responsible investing, experiencing significantly lower risk-adjusted performance de-

pending on the industry focus and ESG criterion used. These previous studies often conclude that the performance of ESG integration or SRI is no better or worse than conventional style of investing.

However, more recent literature, which leverages larger datasets and improved methodologies, has begun to reveal a more optimistic outlook for ESG in stable conditions. Chen et al. (2023) use a large global dataset of 3332 listed companies from 2011 to 2020 and find a statistically significant positive correlation between ESG performance and corporate financial performance, represented by ROA. Their analysis highlights that this positive effect is more pronounced in large-scale companies and in developed countries, which suggests a growing maturity in how ESG factors are recognized and rewarded by the market. Similarly, Yin et al. (2023) study the period between 2011 and 2020. They focus on Chinese listed companies and find a statistically significant positive impact of ESG performance on stock returns, particularly for non-state-owned companies and those in the eastern region. Additionally, the results show that there are varying degrees of partial intermediary effects by firm's financial performance and innovative capability on the correlation between ESG performance and stock returns. Velte (2017), in his study on German listed firms from 2010 to 2014, also finds a positive impact of overall ESG performance on accounting-based financial performance, presented by ROA, with governance performance having the strongest individual impact, which further contributes to this positive trend. However, he finds that there is no significant impact of ESG performance on the market-based financial performance, which is represented by Tobin's Q. The emerging evidence can suggest that as the quality and reporting of ESG data improves and market participants become more accustomed to these non-financial factors, the positive economic impact of ESG is becoming more consistent.

5.2.2 ESG's impact on financial performance in volatile market conditions

The behavior of investments, which consider ESG integration in their strategies, during periods of market stress and high volatility is of particular interest to this thesis, as it

directly addresses the hypotheses related to the COVID-19 pandemic and the Russian invasion of Ukraine. Thus, this chapter will discuss papers that examine the financial implications of ESG integration during periods of market stress and high volatility.

Some studies suggest that ESG, particularly its social and governance components, might offer a defensive advantage during crises. Nofsinger and Varma (2014) study US domestic equity mutual funds between 2000 and 2011 and find that while socially responsible mutual funds underperform conventional funds during non-crisis periods, they outperform during market crises. This downside risk and outperformance is driven by funds focusing on ESG integration and positive screening techniques which hint that specific ESG strategies might provide resilience. Capelle-Blancard et al. (2021) examine 573 SRI stock indexes worldwide during the first half of 2020, including the COVID-19 market crash and rebound. They find that, on average, SRI indexes perform similarly to conventional ones but observe significant heterogeneity within the SRI strategies. For example, SR impact strategy indexes were able to slightly outperform their matching conventional indexes. They also note that resilience of the impact strategy is stronger in countries and periods with increasing COVID-19 cases. This suggests that ESG investments may offer some defensive advantages in times of severe market stress, but the specific nature of the ESG strategy is crucial. Huang (2024) examines ESG ETFs between March 2012 and January 2022 and provides further evidence on the relationship by focusing on the COVID-19 period. He finds that ESG ETFs offer better Value-at-Risk but identical modified Sharpe Ratio when compared to Oil & Gas ETFs during the COVID-19 pandemic crisis. He shows that while ESG ETFs do not yield superior risk-adjusted returns during a crisis, they can provide protection against extreme losses because ESG ETFs typically invest in three types of firms: large, conservative and firms with lower Book-to-Market ratios.

Conversely, other research presents a less positive view, which directly challenges the notion of ESG as a possible protection against a market crisis. Bae et al. (2021) use a sample of 1750 US firms and two sources of ESG ratings, MSCI and LSEG, and find no

evidence that CSR affected stock returns during the COVID-19 crash period, between February and March 2020, or the post-crash recovery, between March and June 2020. They conclude that pre-crisis CSR activities are not effective at shielding shareholder wealth in times of crisis. Similarly, Pavlova and de Boyrie (2022) study the period between November 2019 and May 2020, and find that higher-rated ESG ETFs do not protect them from losses during the COVID-19 crash and these funds do not perform worse than the market. Interestingly, they observe that lower-rated ESG ETFs outperform higher-rated ESG ETFs before the crash. Folger-Laronde et al. (2022) affirm this sentiment when they conclude that higher ESG ratings do not safeguard ETFs from financial losses during the COVID-19 market downturn, between February and March 2020. They note that higher-rated ETFs often show similar or worse returns than lower-rated ETFs.

5.3 ESG ratings and financial performance of ETFs

While the broader literature on ESG and firm performance is rather extensive, the specific intersection of ESG ratings and the financial performance of ETFs is a newer but rapidly growing area of research. This distinction is crucial as ETFs, due to their unique structure, passive replication strategies, and liquidity characteristics, may respond differently to ESG factors compared to individual stocks or actively managed mutual funds.

Some studies suggest that ETFs with higher ESG ratings can offer advantages, often linked to evolving market dynamics and investor preferences. Dumitrescu et al. (2023) analyze 121 passive US SRI equity ETFs from January 2010 to December 2020. Their findings reveal a detailed picture: while the SRI ETF portfolio underperformed its passive S&P 500 ETF benchmark over the full sample period, there was no significant difference in performance in the second half, and notably, the SRI ETF portfolio significantly outperformed in the last two years. They demonstrate that investors may have outperformed the market and passive benchmark ETFs in recent years by including ESG preferences into their ETF investing choices which could indicate that investor recognition of ESG's value has increased over time. They also found that positive screening or

inclusion strategy, and particularly environmental inclusion, was the driver of abnormal returns. Similarly, Fiordelisi et al. (2023) observed passive SRI-oriented ETFs demonstrated superior average returns and higher liquidity compared to similar non-SRI-oriented passive ETFs between 2008 and 2019. They examine that this outperformance takes place around the 2015 Paris Climate Agreement which is a period characterized by heightened climate awareness. Nevertheless, this effect reverses during an economic downturn which implies that economic considerations dominate non-material assessments in times of market stress. However, Huang (2024) shows that ESG ETFs can provide downside risk protection during a market crisis, even if overall risk-adjusted returns may not be superior. He attributes this feature to ESG ETFs tendency to invest in larger, more conservative firms with lower Book-to-Market ratios, which are sources of risk protection during an economic downturn.

However, the evidence for ESG ETFs is not uniformly positive, especially during acute crises. Omura et al. (2021) find that while MSCI SRI indexes outperform conventional indexes during the COVID-19 pandemic, ESG ETFs in their sample do not outperform benchmark indexes. They suggest this discrepancy might be due to the varied mix of positive and negative screening strategies used by ETFs, which potentially dilutes responsible investment factors, as well as the impact of ETF management fees and the time required for passive ETFs to reflect benchmark changes. This is a critical point, as it implies that the structure and specific implementation of ESG within an ETF can significantly influence its performance during turbulent times, especially when a portfolio is created with different ESG-oriented ETFs. As noted earlier, Pavlova and de Boyrie (2022) find that ESG ETFs did not perform better than the market during the COVID-19 market crash, and higher sustainability ratings do not offer protection. Folger-Laronde et al. (2022) further reinforce this, concluding that higher ESG ratings do not safeguard ETFs from financial losses during the COVID-19 market downturn, and higher-rated ETFs often show similar or worse returns than lower-rated ETFs.

This evidence suggests that while ESG factors can contribute to long-term value or provide a hedge against tail risk in certain situations, their direct protective effect during sudden and severe market downturns is complex, not consistently evident and may even be absent. This multifaceted landscape makes this thesis's investigation into performance across specific and different market conditions particularly valuable.

6 Data and Methodology

The first part of this chapter presents the study's data, beginning with a description of the dataset and an overview of the ESG data along with a more in-depth explanation of MSCI's methodology for calculating ESG scores for funds. Following this, descriptive statistics are provided. The second part of this chapter outlines the research methodologies used to evaluate the impact of ESG ratings on ETF performance. The methodologies include Jensen's alpha, Sharpe ratio and a multivariate regression model. All results are evaluated through statistical significance as well.

6.1 Data

6.1.1 Data description

The data for this study consists of two main sources: ETF price data from the Thomson Reuters Eikon database and ESG ratings sourced from MSCI (2024). MSCI was chosen as the primary source for ESG ratings due to its extensive history, comprehensive coverage of equity ETFs, and its established methodology for assessing fund-level ESG quality, which enhances the comparability and reliability of the ESG data used in this study (MSCI, 2024; MSCI, 2025). The focus is on equity ETFs listed on exchanges in Europe and the United States, although these ETFs may track indices covering markets from anywhere in the world.

Equity ETFs were specifically selected due to their high correlation with broader market performance and their relevance to retail and institutional investors as accessible, diversified equity investments. Another reason to only choose equity ETFs is their alignment with the study's objective to analyze performance in response to ESG characteristics under different market conditions. Unlike fixed-income or other asset classes, equity ETFs provide a more direct link to corporate ESG practices and are more responsive to changes in market volatility and sentiment. Therefore, equity ETFs tend to exhibit

more consistent reactions to ESG ratings, which makes them suitable for analyzing the impact of ESG factors on market performance.

The initial sample included 5289 ETFs. To ensure consistency and relevance, the dataset was refined through several filtering criteria. ETFs without MSCI ESG ratings were removed from the sample, as were duplicate funds and non-equity ETFs, such as leveraged, money market, and fixed-income funds. After filtering, the final sample consists of 1427 equity ETFs, each rated by MSCI with ESG scores ranging from AAA to B. This ESG rating distribution in the sample is as follows: 26 AAA ETFs, 504 AA ETFs, 696 A ETFs, 183 BBB ETFs, 17 BB ETFs and 1 B ETF. Although MSCI's ESG scores range from AAA to CCC the final sample has zero CCC rated ETFs. The 1427 ETFs will be divided into four portfolios. The portfolios are AAA and AA rated ETFs together (530 ETFs), A rated ETFs alone (692 ETFs), BBB, BB and B rated ETFs together (201 ETFs) and a market portfolio which includes four S&P 500 ETFs which all have an ESG rating of A. The performance of these portfolios will be evaluated and compared through overall return, Jensen's alpha and Sharpe ratio.

For a more detailed evaluation of the ESG rating's effect on ETF performance a multivariate regression model will be used. The regression model has control variables which are ESG rating, assets under management (AUM), age of the fund, expense ratio and number of holdings. For the regression model, the sample is reduced to 698 ETFs, as etf.com (2024) provided data on control variables for this number of ETFs of the initial 1427 ETFs' sample. Additionally, the MSCI ESG scores are quantified by using the average of MSCI's fund ESG Quality Scores for each corresponding fund ESG rating as seen below in **Table 1**.

Table 1. Mapping of Fund ESG Quality Scores to Fund ESG Ratings (MSCI, 2023)

Fund ESG Quality Score	Average ESG Quality Score	Fund ESG Rating
8,571 - 10,0	9,2855	AAA
7,143 - 8,571	7,8570	AA
5,714 - 7,143	6,4285	A
4,286 - 5,714	5,0000	BBB
2,857 - 4,286	3,5715	BB
1,429 - 2,857	2,1430	B
0,000 - 1,429	0,7145	CCC

The MSCI ESG Quality Score is a fund-level metric, ranging from 0 (lowest) to 10 (highest), that measures the aggregate ESG quality of a fund's holdings (MSCI, 2023). A higher score indicates that the fund is primarily invested in companies that demonstrate strong management of key ESG risks relative to their industry peers. The fund's final ESG Quality Score is calculated as the asset-weighted average of the ESG scores of all the securities it holds. For this reason, a fund's overall score depends heavily on the companies in which it has the largest positions. Quality Score is a quantitative measure from which MSCI's final letter-based ESG rating (AAA–CCC) is derived as seen in **Table 1**. Thus, the MSCI ESG Quality Score provides a continuous numerical variable to represent the ESG rating variable in this study's regression models.

The study compares ETF performance across three distinct periods: a high-volatility period during the COVID-19 pandemic from February 2020 to February 2022, and a Russian invasion of Ukraine period from February 2022 to February 2024. Also, to counter the two high volatility time periods, a stable market period from February 2016 to February 2018, is used as a control period. This control period was chosen by analyzing the average 2-year values of VIX index which describes financial market volatility and gives investors a picture of market stress, uncertainty and investors' sentiment. The average 2-year VIX values for the time periods were the following: 12,94 for control period, 25,12 for COVID-19 pandemic and 20,47 for Russian invasion of Ukraine period. By analyzing performance across these varied conditions, this study aims to examine the effect of ESG ratings on ETF performance within different market environments.

6.1.2 Descriptive statistics

Below in **Table 2** are the descriptive statistics for the ETFs which are used in the evaluation through a multivariate regression model. In total the observations include 698 ETFs of which 2 are rated AAA, 136 are rated AA, 417 are rated A, 133 are rated BBB, 9 are rated BB, and 1 is rated B. The table has average and median statistics for AUM, fund age, expense ratio, number of holdings and average standard deviation for the periods.

Table 2. Descriptive statistics of the ETFs for the regression model

Number of ETFs	ESG rating		AUM (million USD)	ETF age in years	Expense ratio	Number of holdings	Standard deviation
2	AAA	Average	47,34	13,66	0,53 %	31	23,12 %
		Median	47,34	13,66	0,53 %	31	23,12 %
136	AA	Average	6 205,08	16,52	0,43 %	351	21,24 %
		Median	604,71	16,81	0,45 %	103	20,11 %
417	A	Average	13 531,16	16,22	0,36 %	397	22,69 %
		Median	1 050,29	16,73	0,37 %	109	21,48 %
133	BBB	Average	4 302,77	15,12	0,50 %	451	27,25 %
		Median	372,92	14,18	0,56 %	109	25,06 %
9	BB	Average	631,95	12,51	0,83 %	101	25,98 %
		Median	126,78	13,57	0,65 %	63	25,81 %
1	B	Average	42,88	10,48	0,65 %	489	23,12 %
		Median	42,88	10,48	0,65 %	489	23,12 %

6.2 Methodology

This chapter will outline the methodologies in more detail. The overall period and annualized return of the different portfolios and ETFs will be used as a more general performance indicator. To find more detailed results, this study will use three methods to evaluate the relationship between ESG and financial performance of ETFs: Jensen's alpha, Sharpe ratio and a multivariate regression model. In brief, the three portfolios, which were classified according to ESG ratings and consist of 1427 ETFs, are examined with Jensen's alpha and Sharpe ratio, and the regression model will be used to analyze

the second sample of 698 ETFs. All results are evaluated through statistical significance as well.

6.2.1 Jensen's alpha

Consistent with the methodologies applied by Dumitrescu et al. (2023) and Renneboog et al. (2008), Jensen's alpha is derived from the CAPM and is employed to measure the performance of ETFs in terms of their risk-adjusted returns relative to the market. Jensen's alpha provides a measure of excess returns which are returns achieved beyond what is expected based on the asset's beta, or systematic risk, and the market performance. The formula is the following:

$$R_p - R_f = \alpha_p + \beta_p(R_m - R_f) + \varepsilon_p$$

Where R_p is the portfolio return, R_f is the risk-free rate, α_p is Jensen's alpha for the portfolio, β_p is the beta of the portfolio, R_m is the return of the market portfolio and ε_p is the error term or the idiosyncratic risk.

A positive Jensen's alpha indicates that the ETF outperformed its expected return based on market risk, while a negative alpha suggests underperformance. This metric will be used to evaluate the ability of ETFs with varying ESG ratings to deliver superior performance during different market conditions. By evaluating Jensen's alpha this study can find whether ESG ratings are associated with value-added performance after accounting for systematic risk.

6.2.2 Sharpe ratio

Following Auer and Schuhmacher (2016) and Capelle-Blancard and Monjon (2014), the Sharpe ratio is used in this study. The Sharpe ratio measures the risk-adjusted performance of a security, such as an ETF, or a portfolio of ETFs, by comparing their returns to the risk-free rate and adjusting for volatility. The equation of Sharpe ratio is:

$$Sharpe\ Ratio = \frac{R_p - R_f}{\sigma_p}$$

Where R_p is the portfolio return, R_f is the risk-free rate and σ_p is the standard deviation of portfolio returns. A higher Sharpe ratio indicates better risk-adjusted performance. The Sharpe ratio will be used to evaluate how portfolios and ETFs with different ESG ratings perform relative to their risk levels.

6.2.3 Regression model

A multivariate regression analysis is used to identify the impact of ESG rating and other control factors on ETF performance. This methodology aligns with studies such as Renneboog et al. (2008), Hartzmark and Sussman (2019) and Dumitrescu et al. (2023) which employ multivariate regressions to analyze the relationship between ESG or SRI and performance while controlling for fund characteristics. In this study, the regression model is run multiple times with three different performance indicators as the dependent variable. These three indicators are return, Jensen's alpha and Sharpe ratio. The regression model is as follows:

$$\text{Performance } (R_i,\ \alpha_i,\ SR_i) = \alpha + \beta_1 ESG_i + \beta_2 {ESG^2}_i + \beta_3 LN\_AUM_i$$
$$+\beta_4 LN\_AGE_i + \beta_5 EXPENSE\ RATIO_i + \beta_6 LN\_HOLDINGS_i + \epsilon_i$$

Where R_i is the annualized return of an ETF i, α_i is the alpha of an ETF i, SR_i is the Sharpe ratio of an ETF i, ESG is the ESG rating of an ETF i, ESG^2 is the squared term of an ESG rating of an ETF i, LN_AUM is the assets under management of an ETF i, LN_AGE corresponds to the of age of an ETF i, EXPENSE RATIO is the expense ratio for an ETF i, LN_HOLDINGS stands for the number of holdings an ETF i, and ϵ is the error term. AUM, age and number of holdings are measured as natural logarithms to address the skewed nature of these financial variables and to capture potential non-linear relationships, where the marginal effect of an increase in these variables may diminish at higher val-

ues. The use of natural logarithms is also seen in research by Renneboog et al. (2008), Hartzmark and Sussman (2019) and Dumitrescu et al. (2023), who similarly apply logarithmic transformations to fund size, age and other characteristics.

This model isolates the effect of ESG ratings while controlling for fund-specific characteristics which can influence ETF performance independently of ESG factors. Data for fund-specific characteristics is sourced from etf.com (2024), with a final sample of 698 ETFs used in the regression analysis.

6.2.4 Correlation matrix of the independent variables

Prior to conducting the regression analysis, a correlation matrix of the independent variables is generated to assess the relationships between them and identify any potential issues of multicollinearity. This matrix, presented below in **Figure 6**, displays the correlation coefficients between the ESG rating, ESG^2, LN_AUM, LN_AGE, expense ratio, and LN_HOLDINGS.

As shown in the correlation matrix, several relationships between the independent variables are noteworthy. A very high positive correlation (0,99) is observed between ESG and ESG^2. This is expected, as ESG^2 is the squared term of the ESG variable, included to capture potential non-linear relationships between ESG and ETF performance. While this high correlation indicates a form of multicollinearity, it is inherent when including polynomial terms, and the primary interest is in the overall non-linear effect rather than the isolated linear effect of ESG when ESG^2 is present.

Beyond the ESG and ESG^2 relationship, other correlations also require attention. LN_AUM exhibits a moderate negative correlation with expense ratio (-0,52), which suggests that larger funds tend to have lower expense ratios, which is most likely due to economies of scale. LN_AUM also shows a positive correlation with LN_AGE (0,36), indicating that older funds tend to accumulate more assets. Furthermore, expense ratio has a negative correlation with LN_HOLDINGS (-0.42), implying that funds with

higher expense ratios might have fewer holdings, or vice versa. This could also be an indication that because actively managed ETFs have higher expense ratios, they also have fewer holdings because it is not possible for a fund manager to actively manage as many holdings as a passive ETF can.

While none of these correlations, excluding the ESG and ESG^2 pair, indicate perfect multicollinearity, some exhibit moderate relationships. The presence of these correlations will be considered during the interpretation of the results.

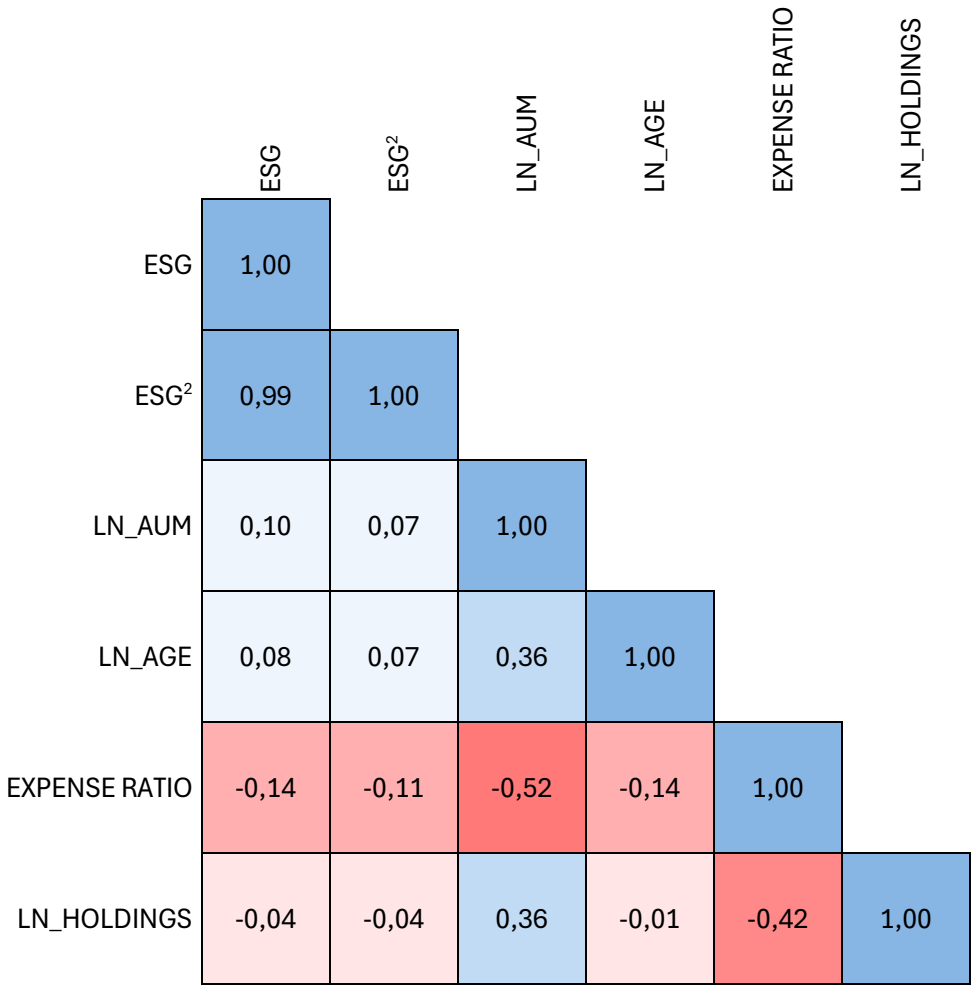

Figure 6. Correlation matrix for multivariate regression model's variables

7 Results

This chapter presents the empirical results obtained with the methods described in the previous chapter. The performance of the constructed portfolios, the results of Jensen's alpha and Sharpe ratio calculations, and the results of multivariate regression models are discussed in detail. The aim is to present the evidence clearly and interpret its immediate implications for the study's hypotheses and across the different ESG ratings and time periods: the stable control period (February 2016 to February 2018), the COVID-19 pandemic period (February 2020 to February 2022) and the Russian invasion of Ukraine period (February 2022 to February 2024).

7.1 Performance of the Portfolios

This section visually presents the cumulative performance of the four ETF portfolios, AAA-AA rated, A rated, BBB-B rated, and the Market portfolio, across the three time periods. The figures below illustrate the relative performance trends, offering an initial insight into how different ESG rating tiers performed against each other and against the broader market. This section only provides evidence of the performance in absolute terms as it only shows the cumulative returns, and the returns are not risk-adjusted. The performance of each portfolio is indexed to a base value of 100 at the beginning of each respective period.

The performance of the different ESG portfolios during the control period is visualized below in **Figure 7**. During the control period, characterized by relatively stable market conditions, all four portfolios showed an upward trend, indicating positive cumulative performance. The BBB-B portfolio performed the best, achieving the highest cumulative performance by the end of the period. The Market portfolio and the A-rated portfolio showed rather similar performance, with both underperforming the BBB-B portfolio slightly. The AAA-AA portfolio exhibited the poorest performance among the four, although it still maintained a positive trend. Thus, between 2016 and 2018, the investor did not receive additional returns by investing in ETFs with better ESG scores, but

on the contrary, the investor benefited by investing in a portfolio with the worst ESG score, which also outperformed the market portfolio, in absolute terms. These results could be interpreted using Friedman's (1970) shareholder theory, according to which ETFs that hold companies with high ESG ratings may have suffered from higher costs associated with sustainability practices without receiving corresponding financial benefits, while ETFs with lower ESG ratings avoided such costs and thus were valued more highly by investors. On the other hand, these results may reflect elements of signaling theory. ETFs with lower ESG ratings may have engaged in greenwashing by making superficial ESG claims and thus gained some reputational benefits without making significant ESG investments.

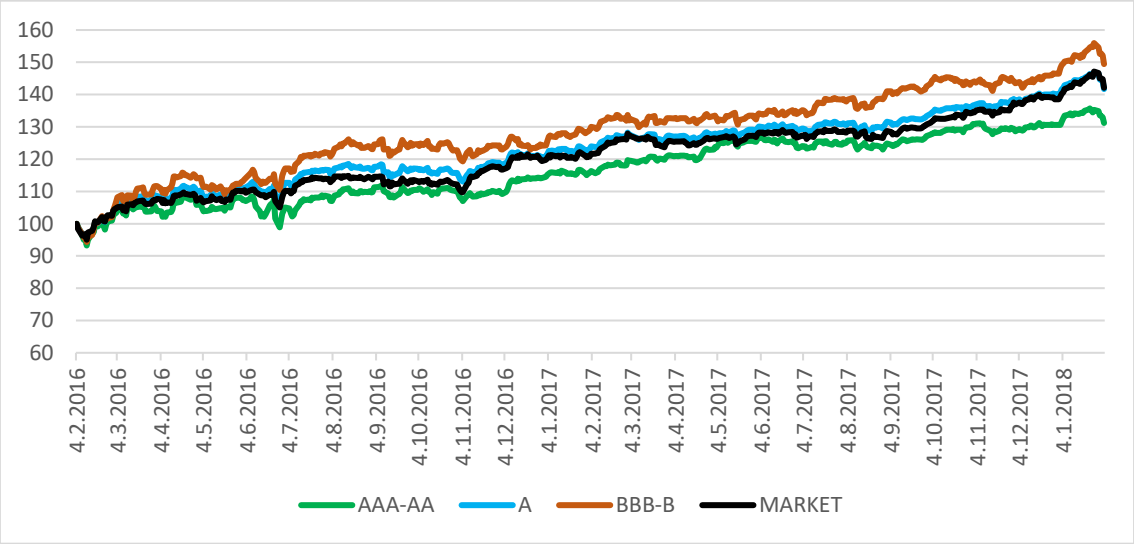

Figure 7. Cumulative Performance of Portfolios during the Control Period (February 2016 – February 2018)

The COVID-19 pandemic period introduced market volatility. As observed below in **Figure 8**, all portfolios experienced a decline in early 2020, followed by a recovery. The Market portfolio demonstrated the strongest rebound, achieving the highest cumulative return by the end of the period. Among the ESG portfolios, the A-rated portfolio lagged the market portfolio but showed relatively stronger performance compared to the AAA-AA and BBB-B portfolios. This visualization of cumulative returns provides a preliminary picture of how different ESG-rated ETF portfolios have weathered the mar-

ket stress and subsequent recovery. Regarding the first hypothesis, Figure 8 shows no clear evidence of the statistical significance of the effect of ESG rating on ETF returns during the COVID-19 pandemic. While the AAA-AA and BBB-B portfolios have similar cumulative returns, the A-rated portfolio performs better. These results are broadly consistent with previous studies, such as Capelle-Blancard et al. (2021), who observe significant heterogeneity within SRI strategies, with some SRI strategies slightly outperforming their conventional index counterparts during the COVID-19 market crash and rebound. Similarly, the evidence presented here suggests that the benefits of ESG integration were not uniformly distributed across all rating levels.

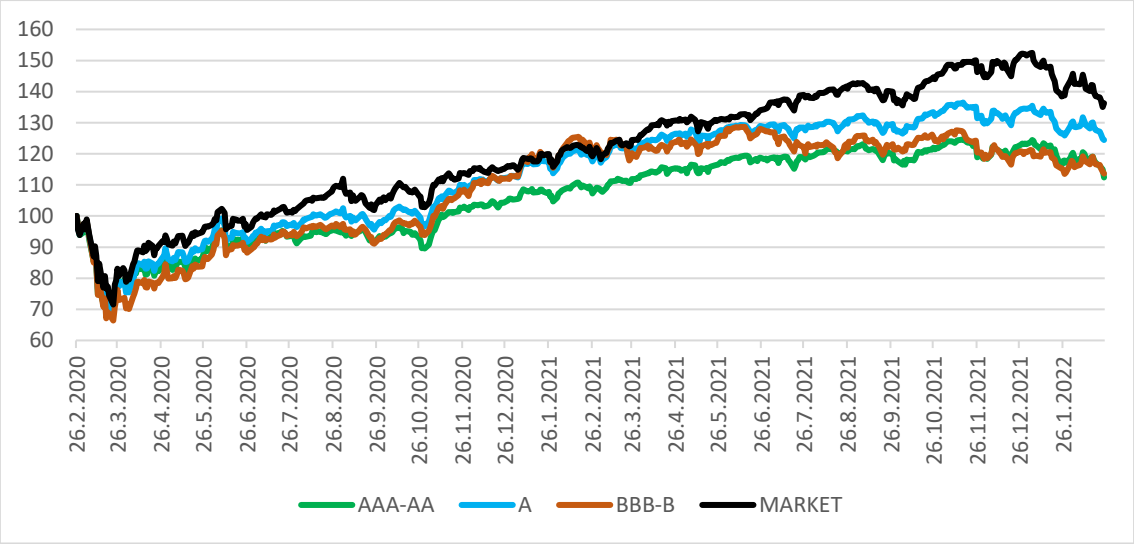

Figure 8. Cumulative Performance of Portfolios during the COVID-19 Period (February 2020 – February 2022)

The period of the Russian invasion of Ukraine presented a new set of geopolitical and economic uncertainties. As shown in **Figure 9**, the Market portfolio achieved the strongest performance and generated positive returns. The AAA-AA and A-rated portfolios show modest positive returns but underperform the Market portfolio. In contrast, the BBB-B portfolio ends the period with negative cumulative returns. These results indicate a divergence in performance across ESG ratings, with higher-rated portfolios showing greater resilience than the lower-rated ones. Regarding the second hypothesis, Figure 9 indicates that the ESG rating of an ETF has a positive correlation with ETF per-

formance during the Russian invasion of Ukraine. This supports the view of Curto et al. (2022) that the invasion has made ESG and sustainability considerations more central to investment decisions. This pattern is consistent with stakeholder theory, which argues that companies with stronger ESG practices are better able to maintain trust and manage relationships with employees, customers, and governments during crises, thereby reducing risk and improving stability (Freeman, 1984). At the same time, behavioral finance offers a complementary explanation because in times of geopolitical tension, investors may exhibit herd behavior and reallocating capital to funds with higher ESG ratings which are perceived as safer or more socially aligned, regardless of their fundamentals.

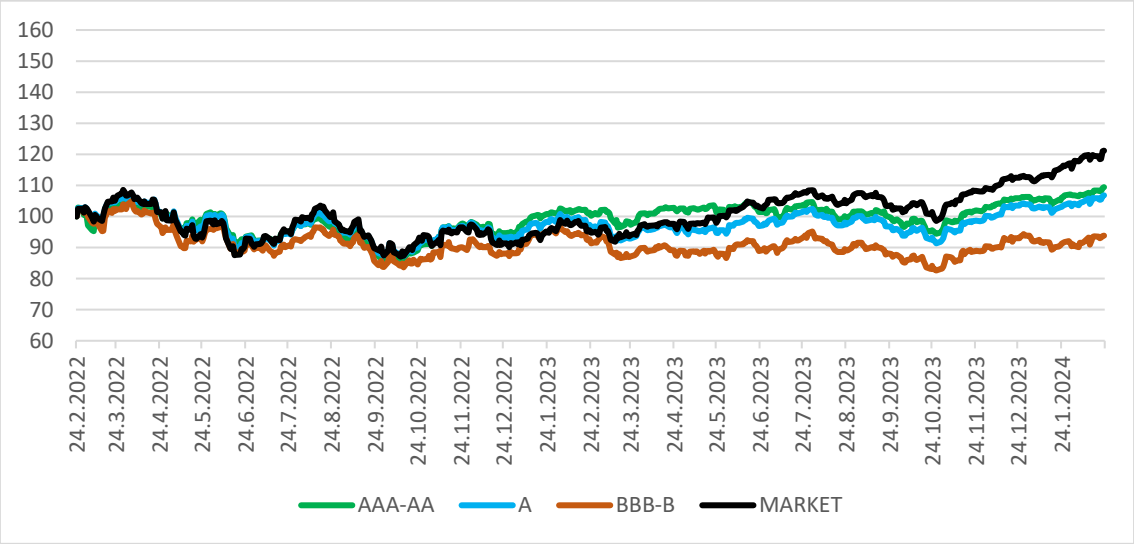

Figure 9. Cumulative Performance of Portfolios during the War Period (February 2022 – February 2024)

In summary, the visual analysis of cumulative returns across the three periods provides initial insights into the absolute performance of the ESG-rated ETF portfolios. During the Control period, the BBB-B rated portfolio demonstrates the strongest absolute performance, even outperforming the Market portfolio, while the AAA-AA portfolio underperforms, which suggests a negative relationship between ESG rating and ETFs' absolute returns in stable conditions. For the COVID-19 pandemic, the Market portfolio shows the strongest recovery, and among ESG portfolios, the A-rated performs relative-

ly better, indicating no clear linear trend in absolute returns. Finally, during the Russian invasion of Ukraine period, a positive correlation between ESG rating and absolute performance is observed, as higher-rated portfolios outperform the lowest-rated BBB-B portfolio, although all ESG portfolios underperform the Market. These preliminary findings, based solely on cumulative returns, highlight the varying absolute performance trends across different market conditions and set the stage for the risk-adjusted analyses in the subsequent sections.

7.2 Results for the Alphas and Sharpe ratios of Portfolios

This section presents the results from the CAPM or Jensen's alpha calculations, along with Sharpe ratios, and provides a more rigorous assessment of risk-adjusted performance for each portfolio across the three market conditions.

Panel A of **Table 3** presents the CAPM regression results for the Control period. None of the annualized Jensen's alpha values for the portfolios are statistically significant. Based on the alphas there is a negative correlation between ESG rating and ETF performance. The beta values for the portfolios are close to 1, indicating that the portfolios generally moved in line with the market portfolio. The R-squared values are relatively high, implying that a significant portion of the portfolios' movements are explained by market movements.

Table 3. Portfolio-level results for Control period

Time period: Control	AAA-AA	A	BBB-B	MARKET
Panel A: CAPM				
Jensen's alpha	-3,57 % (-0,79)	1,02 % (0,49)	2,20 % (0,52)	
Beta	0,98	0,92	1,02	
R-squared	0,65	0,89	0,70	
Panel B: Performance				
Total return	27,13 %	34,88 %	40,18 %	35,11 %
Total return annualized	13,12 %	16,87 %	19,43 %	16,98 %
Excess return annualized	11,02 %	14,76 %	17,33 %	14,88 %
Standard deviation	10,98 %	8,88 %	11,03 %	9,05 %
Sharpe ratio	1,00	1,66	1,57	1,64

Statistical significance at 10%, 5% and 1% levels are denoted by *, ** and *** respectively. The numbers in parentheses represent the t-statistics.

Panel B of Table 3 details the performance indicators and shows that the BBB-B portfolio had the highest annualized excess return, followed by the A-rated portfolio. The A-rated portfolio has the best risk-adjusted performance, and the BBB-B portfolio is the second best, indicated by the Sharpe ratios. The results in Table 3 vary between Jensen's alpha and Sharpe ratio. Jensen's alpha supports the view of Capelle-Blancard and Monjon (2014) that some ESG integration strategies may result in lower returns on sustainable investments compared to more traditional investment strategies. This is consistent with Friedman's (1970) shareholder theory. The Sharpe ratio results, on the other hand, show that moderate ESG integration strategies can lead to better financial performance than more traditional strategies, which supports the findings of Chen et al. (2023).

For the COVID-19 pandemic period, Panel A of **Table 4** shows that all portfolios demonstrate negative annualized Jensen's alpha values. Importantly, none of these alpha values are statistically significant. The alphas are neither linearly in line with the portfolios because the A-rated portfolio has the highest alpha, AAA-AA has the second highest and BBB-B has the worst. These findings support Hypothesis 1, which supposes that the ESG rating of an ETF did not have a statistically significant effect on ETF perfor-

mance during the COVID-19 pandemic. The betas for the portfolios indicate varying sensitivity to market movements, with the AAA-AA portfolio being less sensitive than the others. R-squared values remain high.

Table 4. Portfolio-level results for COVID-19 pandemic period

Time period: COVID-19	**AAA-AA**	**A**	**BBB-B**	**MARKET**
Panel A: CAPM				
Jensen's alpha	-5,84 % (-0,79)	-3,25 % (-0,75)	-8,35 % (-1,10)	
Beta	0,75	0,92	0,97	
R-squared	0,73	0,92	0,81	
Panel B: Performance				
Total return	11,68 %	21,84 %	12,74 %	30,94 %
Total return annualized	5,65 %	10,56 %	6,16 %	14,97 %
Excess return annualized	4,47 %	9,38 %	4,98 %	13,79 %
Standard deviation	20,30 %	22,05 %	24,83 %	23,10 %
Sharpe ratio	0,22	0,43	0,20	0,60

Statistical significance at 10%, 5% and 1% levels are denoted by *, ** and *** respectively. The numbers in parentheses represent the t-statistics.

Panel B of Table 4 reveals that the Market portfolio achieved the highest annualized excess return and Sharpe ratio. Among the ESG-rated portfolios, the A-rated portfolio performs best in terms of both annualized excess return and Sharpe ratio. The AAA-AA portfolio has the second highest Sharpe ratio whereas the BBB-B portfolio has the second highest annualized excess return. This indicates that ESG portfolios did not generate statistically significant alphas, and their risk-adjusted returns were generally lower than the market during this volatile period. As shown in Figure 8, Table 4 presents evidence supporting the finding by Capelle-Blancard et al. (2021) that there are significant differences in the results of SRI strategies during the COVID-19 pandemic.

Panel A of **Table 5** indicates that during the Russian invasion of Ukraine period, each portfolio generates negative annualized Jensen's alpha values, with only the BBB-B rated portfolio's alpha being statistically significant at the 10% level. Despite this overall

underperformance relative to the CAPM, a trend emerges where portfolios with higher ESG ratings exhibit less severe negative alphas compared to the lowest-rated BBB-B portfolio. This pattern suggests that higher ESG ratings are associated with relatively better (less negative) risk-adjusted returns and provides a degree of support for Hypothesis 2's proposition of a positive correlation between ESG rating and ETF performance during the Russian invasion of Ukraine.

Table 5. Portfolio-level results for Russian invasion of Ukraine period

Time period: Russian invasion of Ukraine	**AAA-AA**	**A**	**BBB-B**	**MARKET**
Panel A: CAPM				
Jensen's alpha	-2,84 % (-0,48)	-5,11 % (-1,48)	-11,31 %* (-1,73)	
Beta	0,63	0,82	0,81	
R-squared	0,60	0,88	0,67	
Panel B: Performance				
Total return	9,01 %	6,54 %	-6,37 %	19,20 %
Total return annualized	4,36 %	3,16 %	-3,08 %	9,29 %
Excess return annualized	0,74 %	-0,45 %	-6,70 %	5,67 %
Standard deviation	13,37 %	14,35 %	16,31 %	16,38 %
Sharpe ratio	0,06	-0,03	-0,41	0,35

Statistical significance at 10%, 5% and 1% levels are denoted by *, ** and *** respectively. The numbers in parentheses represent the t-statistics.

Panel B of Table 5 shows similar results to Panel A: among the ESG-rated portfolios, the AAA-AA portfolio has the strongest performance across all metrics, the A-rated portfolio follows with the second-best performance and the BBB-B portfolio exhibits the worst performance, with negative total returns and the lowest annualized excess return and Sharpe ratio. Again, this relative ranking of performance among the ESG portfolios supports Hypothesis 2. However, it is important to note that all ESG-rated portfolios underperform the Market portfolio during this period. The results in Table 5 are consistent with Freeman's (1984) stakeholder theory and the findings of Nofsinger and Varma (2014) and Lins et al. (2017) who show that more sustainable investments can yield better results than conventional ones during market crises.

In summary, the analysis of Jensen's alphas and Sharpe ratios across the three distinct market periods provides a detailed perspective on the risk-adjusted performance of ESG-rated ETF portfolios. While only one alpha value, specifically for the BBB-B portfolio during the Russian invasion of Ukraine period, achieved statistical significance, the results offer varying degrees of support for this study's hypotheses. For the Control period, a negative correlation between ESG rating and performance is observed based on alpha and Sharpe ratio rankings. The lack of statistically significant alphas across all portfolios during the COVID-19 pandemic and the inconsistent linear trends are broadly consistent with Hypothesis 1, suggesting that ESG has no clear statistically significant effect on ETF performance. Conversely, despite overall negative alphas, the Russian invasion of Ukraine period reveals a relative outperformance among higher-rated ESG portfolios (AAA-AA and A having less severe negative alphas and better Sharpe ratios than BBB-B), offering some support for Hypothesis 2's proposition of a positive correlation between ESG rating and ETF performance, albeit within a context of general market underperformance.

7.3 Results for the multivariate regression model

This section presents the results from the multivariate regression analysis, which examines the impact of ESG rating on ETF performance while controlling for fund-specific characteristics AUM, age, expense ratio, and number of holdings. The regression models were applied to three different dependent variables: ETF returns, Jensen's alpha, and Sharpe ratio, across each of the three market periods. For each dependent variable and time period, three distinct models are presented. The first model (Model 1, 4, and 7) includes only the ESG rating as an independent variable, examining its direct linear effect on the dependent variable. The second model (Model 2, 5, and 8) includes the ESG rating and all control variables to assess a potential linear relationship further with other factors. The third and most comprehensive model (Model 3, 6, and 9) includes both the linear ESG rating and its squared term (ESG^2), along with all control variables.

This comprehensive model aims to capture both linear and non-linear effects of ESG while accounting for other factors influencing ETF performance.

7.3.1 Return

Table 6 below presents the regression results where the dependent variable is the ETFs' annualized returns. During the Control Period, Model 1 shows that the ESG coefficient is -1,54, indicating a statistically significant negative relationship at the 1% level between ESG rating and ETF returns. This suggests that during this stable period, ETFs with higher ESG ratings are associated with lower returns. In Model 2, ESG is also statistically significant at the 1% level and negative. The results from models 1 and 2 are consistent with the findings of Capelle-Blancard and Monjon (2014) and Auer and Schuhmacher (2016), which show that some ESG integration strategies may have a negative effect on portfolio performance. In Model 3, ESG is positive but not statistically significant, while ESG^2 is negative and significant at the 5% level. This suggests a more complex, possibly inverted U-shaped relationship where very high ESG scores might start to negatively impact returns after a certain point.

Table 6. Results of regression model with annualized return as a dependent variable

	Return								
	Control			COVID-19 pandemic			Russian invasion of Ukraine		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ESG	-1,54***	-1,52***	3,32	0,32	-0,08	11,26***	1,78***	1,39***	10,54***
	(-5,65)	(-5,51)	(1,41)	(0,98)	(-0,26)	(4,18)	(5,45)	(4,33)	(3,88)
ESG^2			-0,38**			-0,90***			-0,73***
			(-2,07)			(-4,24)			(-3,39)
LN_AUM		0,42***	0,39**		0,46**	0,39**		0,64***	0,58***
		(2,68)	(2,48)		(2,56)	(2,17)		(3,51)	(3,20)
LN_AGE		0,03	0,02		1,96*	1,94*		1,36	1,35
		(0,03)	(0,03)		(1,92)	(1,93)		(1,33)	(1,33)
EXPENSE RATIO		2,71**	3,17**		-5,71***	-4,64***		-5,32***	-4,45***
		(2,14)	(2,47)		(-3,89)	(-3,15)		(-3,62)	(-3,01)
LN_HOLDINGS		0,08	0,12		-0,58**	-0,50**		-0,37	-0,31
		(0,38)	(0,53)		(-2,25)	(-1,96)		(-1,45)	(-1,21)
Observations	698	698	698	698	698	698	698	698	698
R-squared	0,04	0,06	0,06	0,00	0,07	0,09	0,04	0,12	0,13
Adj. R-squared	0,04	0,05	0,05	0,00	0,06	0,09	0,04	0,11	0,12
S.E. of regression	6,97	6,95	6,93	8,32	8,05	7,95	8,38	8,07	8,01
F-statistic	31,90	8,39	7,74	0,95	10,39	11,86	29,73	18,27	17,37
Prob(F-statistic)	0,00	0,00	0,00	0,33	0,00	0,00	0,00	0,00	0,00

Statistical significance at 10%, 5% and 1% levels are denoted by *, ** and *** respectively. The numbers in parentheses represent the t-statistics.

For the COVID-19 pandemic period, Model 4 shows that the ESG coefficient is not statistically significant and Model 4's results are unreliable as F-statistic probability is too high. Similarly, ESG in Model 5 is not significant. Model 5 supports Hypothesis 1, which states that the ESG rating of an ETF did not have a statistically significant effect on ETF performance during the COVID-19 pandemic. However, with the inclusion of control variables in Model 6, ESG becomes significant at the 1% level and positive, while ESG^2 is significant at the 1% level and negative. This suggests a strong non-linear relationship, potentially an inverted U-shape, where very high ESG scores might lead to lower returns after a certain point. However, these results show that investing in ETFs with moderate ESG ratings may be beneficial in the early stages, which differs from the findings of Pavlova and de Boyrie (2022) and Folger-Laronde et al. (2022). Furthermore, these results could be explained by herd behavior, where investors, faced with uncertainty, rushed into funds with moderate ratings without fully understanding their financial implications. This view is supported by Hartzmark and Sussman (2019), who show that investors can react strongly to simple ESG signals.

During the Russian invasion of Ukraine period, Model 7 reveals that the ESG coefficient is 1,78, indicating a statistically significant positive relationship at the 1% level between ESG rating and ETF returns. Model 8 shows that ESG is also positive and significant at the 1% level. When ESG^2 is included in Model 9, ESG remains positive and significant at the 1% level, but ESG^2 is negative and significant at the 1% level. This indicates a non-linear, inverted U-shaped relationship, where the positive impact of ESG on returns diminishes and potentially reverses at very high ESG scores. Models 7 and 8 initially support Hypothesis 2 but this complex relationship in Model 9 does not fully support the simple positive correlation proposed in Hypothesis 2.

7.3.2 Jensen's alpha

Table 7 presents the regression results where the dependent variable is Jensen's alpha. For the Control Period, Model 1 shows that ESG is negative and significant at the 1%

level, suggesting higher ESG ratings were associated with lower risk-adjusted returns. Model 2 shows that ESG remains negative and significant at the 1% level. In Model 3, ESG becomes positive and significant at the 10% level, while ESG² is negative and significant at the 5% level, again indicating a non-linear relationship.

Table 7. Results of regression model with Jensen's alpha as a dependent variable

	Jensen's alpha								
	Control			COVID-19 pandemic			Russian invasion of Ukraine		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ESG	-1,19***	-1,13***	4,43*	0,56*	0,32	7,74***	1,77***	1,43***	8,45***
	(-4,30)	(-4,07)	(1,88)	(1,86)	(1,06)	(3,04)	(5,46)	(4,46)	(3,10)
ESG²			-0,44**			-0,59***			-0,56***
			(-2,37)			(-2,93)			(-2,60)
LN_AUM		0,21	0,18		0,36**	0,31*		0,52***	0,48***
		(1,36)	(1,13)		(2,13)	(1,85)		(2,89)	(2,64)
LN_AGE		-3,56***	-3,57***		0,40	0,39		0,79	0,78
		(-4,02)	(-4,04)		(0,41)	(0,41)		(0,77)	(0,76)
EXPENSE RATIO		-0,09	0,44		-3,78***	-3,08**		-5,02***	-4,35***
		(-0,07)	(0,34)		(-2,75)	(-2,21)		(-3,41)	(-2,93)
LN_HOLDINGS		0,09	0,13		-0,19	-0,14		-0,27	-0,23
		(0,42)	(0,59)		(-0,78)	(-0,57)		(-1,07)	(-0,88)
Observations	698	698	698	698	698	698	698	698	698
R-squared	0,03	0,05	0,06	0,00	0,04	0,05	0,04	0,10	0,11
Adj. R-squared	0,02	0,04	0,05	0,00	0,03	0,04	0,04	0,09	0,10
S.E. of regression	7,06	6,99	6,97	7,68	7,56	7,52	8,30	8,07	8,03
F-statistic	18,51	7,29	7,06	3,47	5,89	6,40	29,80	15,17	13,87
Prob(F-statistic)	0,00	0,00	0,00	0,06	0,00	0,00	0,00	0,00	0,00

Statistical significance at 10%, 5% and 1% levels are denoted by *, ** and *** respectively. The numbers in parentheses represent the t-statistics.

During the COVID-19 pandemic period, Model 4 shows that ESG is positive and significant at the 10% level. However, Model 4's results are not robust as F-statistic probability is too high. Model 5 shows ESG is positive but not significant. In Model 6, ESG is positive and significant at the 1% level, while ESG² is negative and significant at the 1% level. This non-linear relationship for risk-adjusted returns during COVID-19 does not align with Hypothesis 1's expectation of no statistically significant effect.

For the Russian invasion of Ukraine period, Model 7 shows that ESG is positive and significant at the 1% level, suggesting higher ESG ratings were associated with higher risk-adjusted returns. Model 8 shows that ESG is positive and significant at the 1% level. Similarly in Model 9, ESG is positive and significant at the 1% level, while ESG² is nega-

tive and significant at the 1% level. Again, this indicates a non-linear, inverted U-shaped relationship. While the model 8 initially supports Hypothesis 2, the complex finding in model 9 does not fully support the simple positive correlation.

The results of models 3, 6 and 9 are somewhat consistent with Fiordelisi et al. (2023) who find that SRI-oriented ETFs generated higher average returns than their non-SRI-oriented counterparts between 2008 and 2019. However, the results in models 3, 6 and 9 show that the superiority of ETFs with high ESG ratings might weaken at very high ESG rating levels.

7.3.3 Sharpe ratio

Table 8 presents the regression results where the dependent variable is the Sharpe ratio, another measure of risk-adjusted performance. During the Control Period, Model 1 shows that ESG is not significant and Model 1's results are unreliable as F-statistic probability is too high. Model 2 shows ESG is negative and significant at the 10% level. In Model 3, ESG is positive and significant at the 1% level, while ESG^2 is negative and significant at the 1% level. This indicates a non-linear, inverted U-shaped relationship.

Table 8. Results of regression model with Sharpe ratio as a dependent variable

	Sharpe ratio								
	Control			COVID-19 pandemic			Russian invasion of Ukraine		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ESG	-0,02 (-1,30)	-0,03* (-1,84)	0,92*** (6,33)	0,02* (1,95)	0,01 (0,85)	0,34*** (4,34)	0,06*** (4,79)	0,05*** (3,62)	0,45*** (4,13)
ESG²			-0,08*** (-6,59)			-0,03*** (-4,26)			-0,03*** (-3,73)
LN_AUM		0,05*** (4,87)	0,04*** (4,36)		0,02*** (3,31)	0,02*** (2,92)		0,04*** (4,78)	0,03*** (4,45)
LN_AGE		-0,08 (-1,41)	-0,08 (-1,48)		0,02 (0,75)	0,02 (0,74)		0,04 (0,93)	0,04 (0,92)
EXPENSE RATIO		-0,09 (-1,16)	0,00 (-0,04)		-0,17*** (-3,89)	-0,13*** (-3,15)		-0,19*** (-3,19)	-0,15** (-2,53)
LN_HOLDINGS		0,06*** (4,41)	0,07*** (5,01)		0,00 (-0,24)	0,00 (0,07)		-0,02** (-2,11)	-0,02* (-1,85)
Observations	698	698	698	698	698	698	698	698	698
R-squared	0,00	0,13	0,18	0,01	0,09	0,11	0,03	0,12	0,14
Adj. R-squared	0,00	0,12	0,17	0,00	0,08	0,10	0,03	0,11	0,13
S.E. of regression	0,47	0,44	0,43	0,24	0,23	0,23	0,34	0,33	0,33
F-statistic	1,68	20,27	25,17	3,81	13,48	14,54	22,96	19,04	18,48
Prob(F-statistic)	0,20	0,00	0,00	0,05	0,00	0,00	0,00	0,00	0,00

Statistical significance at 10%, 5% and 1% levels are denoted by *, ** and *** respectively. The numbers in parentheses represent the t-statistics.

For the COVID-19 pandemic period, Model 4 shows that ESG is positive and significant at the 10% level. Again, Model 4's results are not robust as F-statistic probability is too high. Model 5 shows that ESG is not significant which initially supports Hypothesis 1. In Model 6, ESG is positive and becomes significant at the 1% level, while ESG² is negative and significant at the 1% level. This non-linear relationship for Sharpe ratio during COVID-19 does not align with Hypothesis 1's expectation of no statistically significant effect. The results of Model 6 are similar to those of Dumitrescu et al. (2023), which show that SRI ETFs demonstrated some resilience during the COVID-19 crisis.

During the Russian invasion of Ukraine period, Model 7 shows that ESG is positive and significant at the 1% level. In Model 8, ESG is also positive and significant at the 1% level, suggesting higher ESG ratings were associated with higher Sharpe ratios. In Model 9, ESG is positive and significant at the 1% level, while ESG² is negative and significant at the 1% level. This indicates a non-linear, inverted U-shaped relationship, where the positive impact of ESG on Sharpe ratio diminishes at very high ESG scores. This

complex finding does not fully support the simple positive correlation predicted by Hypothesis 2.

Again, models 3, 6 and 9 show that an investor can gain a positive benefit on risk-adjusted returns by investing in ETFs with higher ESG ratings. A result similar to Chen et al. (2023), Yin et al. (2023) and Velte (2017) who all show a positive impact between ESG and financial performance.

7.3.4 Concluding discussion of the multivariate regression model

The regression analysis reveals a detailed and often non-linear relationship between ESG ratings and ETF performance across different market conditions. Hypothesis 1 is not supported by these models. They suggest a more complex, often non-linear, relationship. For Hypothesis 2, the findings are also complex. While a positive linear relationship is sometimes observed, the significant negative coefficient for ESG^2 consistently points to an inverted U-shaped relationship, implying that the benefits of ESG may diminish or even reverse at very high ESG ratings. However, positive ESG coefficients and the significance of both ESG and ESG^2 in models 7, 8 and 9 may indicate that investors have shifted capital to more sustainable investments which is consistent with the observations of Curto et al. (2022). Control variables, particularly AUM and expense ratio, frequently show expected relationships with performance. LN_AUM values are often statistically significant and positive, implying that larger ETFs perform better. The expense ratio coefficients are also often significant but negative. This suggests that ETFs with higher fees are associated with poorer performance which is intuitive. Generally, the R-squared values are low which indicates that this model has weak explanatory power. However, the explanatory power increases when control variables are added.

8 Summary and conclusion

This master's thesis aims to evaluate the effect of ESG ratings on the financial performance of equity ETFs across different market conditions: a stable period between February 2016 and February 2018, the highly volatile COVID-19 pandemic between February 2020 and February 2022, and the period following the Russian invasion of Ukraine between February 2022 and February 2024. By employing a methodology that included portfolio performance analysis using returns, Jensen's alpha, and Sharpe ratio, alongside a multivariate regression model controlling for fund-specific characteristics, this study seeks to provide detailed insights into the evolving role of ESG in investment decision-making during varying levels of market stress.

8.1 Key Findings

The empirical analysis yields several key findings, which offer a complex picture of the relationship between ESG ratings and ETF performance across different market environments. Interestingly, during the stable control period all methodologies show that there is a negative correlation between ESG ratings and ETF performance. Although, when controlling for fund-specific characteristics, ESG ratings show a non-linear inverted U-shaped effect on ETF returns, Jensen's alpha and Sharpe ratio.

Regarding Hypothesis 1, which states that "The ESG rating of an ETF did not have a statistically significant effect on ETF performance during the COVID-19 pandemic", the results were mixed. The portfolio-level alpha and Sharpe ratio analysis indicates that there is no clear linear relationship. The alphas of the ESG portfolios are not statistically significant during this period and the A-rated portfolio outperforms AAA-AA and BBB-B portfolios. Similarly, the multivariate regression model reveals a more complex relationship. When controlling for fund-specific characteristics ESG ratings show a statistically significant, albeit a non-linear inverted U-shaped effect on ETF returns, Jensen's alpha and Sharpe ratio. This suggests that while a simple linear relationship might not be present, ESG factors did influence performance in a more complex manner, where

moderate ESG ratings might have been beneficial, but extremely high scores potentially led to diminishing returns. These findings highlight that the market stress created by the COVID-19 pandemic did not lead to a straightforward linear advantage for ETFs with high ESG ratings.

Hypothesis 2, which posits that "The ESG rating of an ETF has a positive correlation with ETF performance during the Russian invasion of Ukraine," is largely supported, but with some complexity. The portfolio-level analysis indicates a positive correlation between higher ESG ratings and better performance metrics, including returns, alphas and Sharpe ratios, during this period of geopolitical and energy crisis. The multivariate regression analysis further confirms a statistically significant positive relationship between ESG ratings and ETF performance. However, similar to the COVID-19 period, a significant inverted U-shaped relationship was observed for returns, Jensen's alpha, and Sharpe ratio. This shows that while ESG factors generally had a positive impact on performance during this crisis, the benefits may have been greatest at a particular ESG rating level, with very high ESG scores leading to a less pronounced positive impact. This finding aligns with the notion that in times of geopolitical uncertainty and energy shocks, investors prioritize resilience and sustainability, viewing strong ESG practices as a signal of better risk management and adaptability to evolving market conditions.

Overall, the results of the study suggest that the impact of ESG ratings on ETF returns depends on prevailing market conditions and the specific nature of the crisis. The COVID-19 pandemic, a health and economic crisis, shows a complex, non-linear relationship, while the geopolitical and energy crisis resulting from Russia's invasion of Ukraine shows a more consistent positive, albeit non-linear, correlation. The fact that the regression models consistently found an inverted U-shaped relationship across both crises is a significant finding, suggesting that there may be an optimal level of ESG integration above which increased ESG efforts do not lead to better financial performance. And interestingly, during a more stable period the positive impact of ESG rating on ETF performance might not be present. However, it is still important to remember

the general rule in finance “past performance is not indicative of future results” and while these results provide valuable information of the past, differently rated ETFs may perform differently in future crises.

8.2 Limitations

Despite its contributions, this study is subject to several limitations that need acknowledgment. Firstly, while the initial sample of ETFs was substantial, the multivariate regression analysis was conducted on a reduced sample of 698 ETFs due to the availability of comprehensive control variable data. This reduction, while necessary for the multivariate analysis, might limit the generalizability of the regression findings to the entire universe of ETFs. Secondly, the study exclusively used MSCI ESG ratings. While MSCI is among the leading providers of ESG ratings, different ESG rating agencies use varying methodologies, which can lead to inconsistencies in scores for the same company or fund. Relying on a single provider might introduce a bias specific to that methodology and may not fully capture the complex nature of ESG performance as perceived by the broader market. Thirdly, the use of CAPM and Jensen's alpha relies on certain assumptions, such as market efficiency, which may not hold true in all market conditions. Lastly, the study analyzed two specific crisis periods. While these were chosen for their distinct natures, the findings may not be generalizable to all types of economic or geopolitical crises, each of which may present unique challenges and investor responses. The study also treats ESG ratings as a composite score and does not examine the individual impact of the Environmental, Social, or Governance pillars, which might have distinct effects on performance during different crises.

8.3 Practical Implications

The findings of this thesis offer several practical implications for various stakeholders in the financial industry. For investors, both retail and institutional, it is crucial to recognize that the financial benefits of ESG integration are not universal and depend on market conditions. During geopolitical and energy crises, ESG factors appear to offer a

degree of resilience, but during health and economic shocks, their impact might be more complex. The consistent observation of an inverted U-shaped relationship suggests that simply investing in ETFs with the highest ESG ratings may not always yield the best financial returns. Instead, investors should consider a balanced approach to ESG integration, understanding that there might be an optimal level of ESG commitment that maximizes financial performance. Furthermore, given the different methodologies of ESG rating providers and the nuances of ESG performance, investors should conduct a thorough due diligence, not limited to ESG ratings alone, and understand the underlying ESG strategies and exposures of the ETFs they choose.

For fund managers and product developers, the findings suggest opportunities for developing ESG ETF products specifically designed to be resilient in different types of crises, which could take advantage of the insights of how ESG factors perform under varying market stresses. It is crucial that fund managers are transparent about the expected performance of ETFs and manage investors' expectations, both in terms of economic returns and sustainability implications, especially in times of volatility. Moreover, the inverted U-shape finding suggests that managers might need to optimize their ESG integration strategies to find the sweet spot where ESG efforts translate most effectively into financial performance, rather than pursuing maximum ESG scores at all costs.

For policymakers and regulators, the challenges presented by varying ESG methodologies highlight the ongoing need for greater standardization and transparency in ESG reporting and ratings to enhance comparability and reliability for investors. Understanding how ESG factors influence ETF performance during crises can also inform regulatory efforts aimed at promoting financial stability and investor protection in the financial markets.

8.4 Future Research

The results and limitations of this study suggest several options for future research. Firstly, future research could examine the reasons behind the observed inverted U-

shaped relationship between ESG ratings and ETF performance. This could include qualitative studies examining the specific ESG practices of funds at different rating levels or the role of investor perceptions and market saturation in driving this non-linearity. Secondly, a comparative analysis of ESG ratings from multiple providers, such as MSCI, Sustainalytics and S&P Global, across different market conditions would offer valuable insights into the consistency and reliability of ESG data in predicting financial outcomes. Thirdly, future research could analyze the individual impact of the Environmental, Social, and Governance pillars on ETF performance during crises, which would help identify which specific ESG aspects contribute most to resilience or vulnerability in different types of market shocks. Fourthly, replicating this study for ESG ETFs in other asset classes, such as fixed income and commodities, would expand the understanding of ESG's financial implications beyond equity ETFs. Finally, as ESG data and reporting mature, longitudinal studies could track the evolution of the ESG-performance relationship over longer periods, which could capture the long-term effects of sustained ESG integration and the impact of evolving regulatory landscape.

By addressing these areas, future studies can further refine our understanding of ESG integration in investing, which contributes to both academic theory and practical investment strategies in an increasingly complex and sustainability-conscious financial landscape.

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