

A Work Project, presented as part of the requirements for the Award of a Master's degree in
Economics from the Nova School of Business and Economics.

**IMPACT OF COVID-19 AND THE RUSSO-UKRAINIAN WAR ON
SUSTAINABLE INVESTMENTS:
A PERFORMANCE COMPARISON BETWEEN ESG ETFS AND
THE S&P 500 INDEX AND THE STOXX EUROPE 600 INDEX**

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Abstract

This thesis aims to investigate how 15 American ESG ETFs and 20 European ESG ETFs performed compared with the respective benchmarks (S&P500 and S&P500 ESG in the first case, STOXX Europe 600 and STOXX Europe 600 ESG-X in the second case) during the 2019-2023 period, considering the impact of COVID-19 crisis and Russo-Ukrainian War.

Appealing to risk-adjusted measures and a Fama-French and momentum analysis, the goal is to evidence if a high ESG score allows to outperform the market even during financial turmoil.

This trend is confirmed for the USA, meanwhile, in Europe the context offered different perspectives to explore.

Keywords

ESG, Exchange-Traded Funds, Socially Responsible Investing, Covid-19, Russo-Ukrainian War, Fama-French Model, S&P 500, STOXX Europe 600

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TABLE OF CONTENTS

<i>1. INTRODUCTION</i>	5
<i>2. THEORETICAL FRAMEWORK</i>	8
2.1 OVERVIEW	8
2.2 ENVIRONMENTAL, SOCIAL, GOVERNANCE.....	10
2.3 EXCHANGE-TRADED FUNDS	11
2.4 PRIOR STUDIES.....	11
<i>3. METHODOLOGY & DATA</i>	13
3.1 DATA	13
3.2 REFINITIV ESG SCORE.....	13
3.3 RISK-FREE RATE.....	15
3.4 BENCHMARKS	15
3.5 PERFORMANCE METRICS	17
3.6 FACTOR ANALYSIS	19
<i>4. RESULTS</i>	21
4.1 PERFORMANCE COMPARISON	21
4.2 RISK ADJUSTED PERFORMANCE	23
4.3 FAMA-FRENCH FIVE-FACTOR AND MOMENTUM ANALYSIS	26
<i>5. CONCLUSIONS</i>	28
<i>REFERENCES</i>	31
<i>APPENDICES</i>	34

LIST OF TABLES

Table 1. ESG Scores and European ETFs	14
Table 2. ESG Scores of American ETFs	14
Table 3. Returns and volatilities of American ETFs and indices	21
Table 4. Returns and volatilities of European ETFs and indices	22
Table 5. Risk measures for American ETFs and benchmark indices	24
Table 6. Risk measures for European ETFs and benchmark indices	25
Table 7. Returns and volatilities of American ETFs and indices	37
Table 8. Returns and volatilities of European ETFs and indices	37
Table 9. Risk measures for American ETFs and benchmark indices Before Covid-19 market distress.	38
Table 10. Risk measures for American ETFs and benchmark indices During Covid-19 market distress	38
Table 11. Risk measures for American ETFs and benchmark indices in Covid-19 recovery	39
Table 12. Risk measures for American ETFs and benchmark indices in the Russo-Ukrainian War	39
Table 13. Risk measures for European ETFs and benchmark indices Before Covid-19 market distress.	40
Table 14. Risk measures for European ETFs and benchmark indices During Covid-19 market distress.	40
Table 15. Risk measures for European ETFs and benchmark indices in Covid-19 recovery	41
Table 16. Risk measures for European ETFs and benchmark indices in the Russo-Ukrainian War	41
Table 17. Fama-French 5 Factor and Momentum Analysis – American ETFs – Before Covid-19 market distress.	42
Table 18. Fama-French 5 Factor and Momentum Analysis – American ETFs – During the Covid-19 market.....	42
Table 19. Fama-French 5 Factor and Momentum Analysis – American ETFs – Covid-19 recovery.	43
Table 20. Fama-French 5 Factor and Momentum Analysis – American ETFs – Russo-Ukrainian War	43
Table 21. Fama-French 5 Factor and Momentum Analysis – European ETFs – Before Covid-19 market distress.	44
Table 22. Fama-French 5 Factor and Momentum Analysis – European ETFs – During Covid-19 market distress.	44
Table 23. Fama-French 5 Factor and Momentum Analysis – European ETFs – Covid-19 recovery.	45
Table 24. Fama-French 5 Factor and Momentum Analysis – European ETFs – Russo-Ukrainian War	45

LIST OF TABLES

Figure 5. S&P500 and S&P500 ESG Performance Comparison (03/2019 – 03/2023).....	18
Figure 1. PRI growth 2006 – 2021	34
Figure 2. MSCI ESG Material Issues	34
Figure 3. United States 1-month Treasury bill rate	35
Figure 4. Germany 3-month bond	35
Figure 6. STOXX Europe and STOXX Europe ESG-X Performance Comparison (03/2019 – 03/2023).....	36

1. INTRODUCTION

“The only constant in life is change” (Heraclitus, 500 BC).

The economic landscape, marked by historical crises like the Great Depression (1929), Black Monday (1987), the Dot-Com Bubble (2001), and the 2008 financial crisis, consistently teaches us that the full impact of these events remains elusive. (Iraci and Iraci 2020; Sornette 2017).

Recent years have emphasized this lesson further through events like the 2020 COVID-19 pandemic and the 2022 Russo-Ukrainian conflict, underscoring the intricate nature of crises and their profound repercussions on global markets and civilization. (Lim et al. 2022, Zhang, Hu and Ji 2020; Claessens, Kose, Laeven & Valencia 2014).

The COVID-19 outbreak halted the world, causing stock markets to plummet and presenting haunting scenes of deserted cities and industries. Simultaneously, it provided a unique opportunity to assess the environmental effects of reduced pollution due to lockdowns enforced by affected nations.

Similarly, the Russia-Ukraine conflict in 2022 severely jolted global markets through military actions, trade blockades, and international sanctions, causing widespread disruptions on a global scale. (Ihle et al., Citation 2022).

Amidst these financial and environmental turmoil, experts advocate socially responsible investment as a shield against crises. Transparency, solid risk management and proper governance emerge as critical processes not only for recovering from crises but also for minimizing their impacts.

Research supports the resilience of mutual funds during crises, indicating their potential as risk-resilient investment tools. (Albuquerque et al. 2020, Singh 2020, Broadstock et al. 2021, Omura et al. 2021, and Rubbaniy 2021).

Sustainable investing, especially ESG investments (focusing on environmental, social, and governance factors), has gained substantial traction, reaching trillions of dollars globally, with projections of significant growth by 2030.

ESG mutual funds and ETFs (Exchange Traded Funds) have become prominent vehicles for investors seeking sustainable options that align with specific criteria while maintaining portfolio diversification and profitability.

Recognizing the unpredictability of markets during crises, the integration of ESG investing into portfolios has shown promise in sustaining returns during market downturns, serving as a strategy for investors to navigate through uncertain and volatile times. (Pastor and Vorsatz 2020, Singh 2020).

In this context, the objective of this work is to assess the performance of 15 American ETFs with strong ESG scores against the S&P 500 index and 20 European ETFs with high ESG scores against the STOXX Europe 600 index.

The study will extensively examine the risks and returns associated with ETFs boasting high ESG scores. It will utilize factor analysis to evaluate how ESG criteria impact these ETFs' performance. Moreover, the thesis delves into whether ESG ETFs present diversification benefits and showcase better risk-adjusted returns when compared to traditional index funds.

Although this study offers perspectives on the ESG ETFs' performance and correlation with traditional indices, it is essential to recognize several inherent limitations.

Specifically, the decision to concentrate solely on ETFs with high ESG ratings, excluding other investment instruments such as funds, individual stocks, or ETFs with low ESG ratings, could constrain the study's scope. This approach might impede a thorough analysis of how ESG criteria impact investment performance across different financial instruments.

Data for this thesis will be gathered from Refinitiv, Yahoo Finance, Bloomberg, and Investing, and despite these sources offering extensive information, they might contain mistakes that could potentially affect the accuracy of the study's conclusions.

The analysis will span four years, commencing from March 1, 2019. This timeline aims to provide a comprehensive overview of how ESG ETFs have performed with chosen indices in both the USA and EU markets, shedding light on their performance during the recent global crises. Simultaneously,

this constraint could restrict the applicability of the study's conclusions, considering that the ESG ETFs' performance might exhibit variations in different periods or conditions.

Based on this market stress period, the length of the sample is extended and divided into four sub-periods:

1. **Before COVID-19 market distress** (March 1, 2019 - February 20, 2020)
2. **During Covid-19 market distress** (February 21, 2020 - August 27, 2020)
3. **Covid-19 Recovery** (August 28, 2020 - February 23, 2022)
4. **Russo-Ukrainian War** (February 24, 2022 - March 31, 2023)

Moreover, the study will be guided by the following research questions:

Question 1: *How do the returns of ESG-scored ETFs stack up against those of the S&P 500 and STOXX Europe 600?*

This question aims to assess the comparative ESG ETFs' performances with selected indices and determine if the incorporation of ESG criteria positively or negatively affects the funds' performance.

Question 2: *"How have ESG-scored ETFs performed in terms of risk-adjusted returns?"*

Further exploring, this inquiry aims to look over the performance of ESG ETFs while taking into account the risk. Precisely, it seeks to ascertain whether ESG ETFs outperform or underperform compared to conventional indices when adjusting for risk levels. This evaluation will encompass risk-adjusted performance metrics such as Jensen's Alpha, Sharpe, Treynor, and Information ratios.

Question 3: *"Which are the principal factors influencing the returns of ESG-scored ETFs compared to traditional indices?"*

Through a factor analysis of financial performance indicators, this question aims to uncover the primary factors contributing to the performance of ESG ETFs.

This analysis will encompass the Fama-French Five-Factor model and Momentum Factors to identify the key drivers behind the returns of ESG ETFs in contrast to conventional indices.

In conclusion, this thesis is structured into five primary chapters.

The introduction establishes the context by exploring the current macroeconomic scenario, presenting the ESG performance, juxtaposing it with the market index, and outlining the research questions and motivations for the study.

The second chapter is dedicated to the theoretical framework, encompassing the application of the modern portfolio theory in the ESG market and exploring diverse portfolio performance measures.

Chapter three shows the methodologies employed in the study, providing an overview of the data used for analysis and the chosen analytical approaches.

In continuation, chapter four unveils the study's findings, conducting an extensive comparison between ESG ETFs and market indices. Moreover, it utilizes diverse performance metrics and conducts a detailed factor using Fama-French and momentum factors.

Lastly, the concluding chapter synthesizes the study's main discoveries, evaluates its reliability, and concludes with a reflective summary of the research process and the study's significance.

2. THEORETICAL FRAMEWORK

2.1 OVERVIEW

The emergence of Socially Responsible Investments (SRI) in the 1980s initially relied on negative screening techniques, excluding investments in industries deemed socially irresponsible, such as weapons, tobacco, or adult entertainment. The primary aim was to channel capital toward morally aligned enterprises guided by specific ethical standards, encompassing religious, personal, or political beliefs. This evolution laid the groundwork for Environmental, Social, and Governance (ESG) parameters, stemming from the Triple Bottom Line principle, conceptualized in the 1990s as "PPP"

(Planet, People, Profit). This principle emphasized that companies, beyond profit-making, should align actions with policies fostering environmental and social advancements.

The United Nations launched the Principles for Responsible Investment (PRI) in 2006, advocating institutional investors to adopt sustainable and responsible investment practices. This initiative preceded the Paris Agreement in 2015, a pivotal moment in setting global objectives and behavioral standards to protect the planet.

The Paris Agreement introduced Nationally Determined Contributions (NDCs), outlining each country's strategies to curtail greenhouse gas emissions and adapt to rising temperatures.

The Agreement's Enhanced Transparency Framework (ETF) mandates transparent reporting of climate-related actions, progress, and financial support, facilitating a global assessment of collective progress. Reflecting on the initial five years since adoption, the EU intensified efforts, targeting a 55% reduction in greenhouse gas emissions by 2030 and endorsing Carbon Neutrality, elevating the significance of the 1.5°C threshold.

The European Union's leadership in ESG, notably through the EU Taxonomy on Sustainable Activities, establishes criteria to achieve the European Green Deal's 2050 objectives. The Taxonomy introduces disclosure requirements for companies and financial market participants, enabling comparisons and facilitating the transition to sustainability without imposing obligations on companies or investors.

The ESG funds and ETFs have notably increased in recent years, indicating a growing capital allocation toward these strategies. A decade ago, ESG-focused investment tools weren't as prevalent as they are today, making early 2010s ESG-themed funds less common compared to more recent offerings (Cockrell, Phillips & Volker, 2020). Projections from the Global Sustainable Investment Alliance anticipate sustainable investments accounting for 44% of major financial markets' assets under management, totaling \$44 billion by 2023 in countries like the US, Australia, and Europe. Europe stands as the world's second-largest fund market, boasting nearly EUR 12 trillion in assets

under management across 30,000 funds. Notably, according to MSCI figures from April 2023, a majority of these assets, totaling EUR 7 trillion, are allocated to ESG funds or strategies.

The surge in assets labeled as ESG aligns with a growing number of wealth managers committing to the UN-backed Principles for Responsible Investment (PRI). The PRI, initiated in 2006, has witnessed consistent growth in signatories, reaching 4,902 by March 31, 2022, with an 18% surge in collective assets under management to \$121.3 trillion over the past year.

This substantial increase in assets managed sustainably mirrors the heightened demand for greener solutions globally. Initiatives such as the Green New Deal in the EU and the Paris Climate Accord have bolstered the call for sustainable practices in businesses. As a result, the influx of assets into European ESG funds surged in 2020. The implementation of SFDR (Sustainable Finance Disclosure Regulation) in 2021 notably boosted European sustainability-related investment funds from 3,700 to 6,150, an increase of 66%, now managing over a trillion euros (Morningstar, 2021).

2.2 ENVIRONMENTAL, SOCIAL, GOVERNANCE

When discussing responsibility and investment strategies that prioritize ethical considerations, the term ESG takes center stage, encompassing a company's Environmental, Social, and Governance facets. These ESG criteria establish benchmarks that investors analyze and factor into their investment decisions. The Environmental aspect (E) encompasses concerns like climate change, resource conservation, water scarcity, biodiversity, emissions, and waste management. Social responsibility (S) evaluates aspects such as human rights, demographic shifts, and how a company interacts with and manages its employees, customers, and wider stakeholders. Good Governance (G) pertains to a company's leadership, management practices, executive compensation, auditing, and internal controls that govern its operations (Kocmanová & Dočekalová 2013).

ESG ratings, drawing from traditional methodologies of classic rating systems, encapsulate ethical criteria alongside the financial perspective, considering social, environmental, and cultural

dimensions. Unlike traditional ratings that focus on value creation solely for shareholders and bondholders, ESG factors encompass all corporate stakeholders, significantly influencing a company's creditworthiness. Mathematical models alone prove inadequate to encompass variables linked to social, cultural, and religious systems, increasingly relevant in investment decisions. ESG rating variables encompass diverse preferences and values investors attribute to the ethical dimension. Several providers offer ESG ratings, including Bloomberg ESG Data Service, Dow Jones Sustainability Index (DJSI), Institutional Shareholders Services (ISS), MSCI ESG Research, Sustainalytics Company ESG Reports, and Thomson Reuters/Refinitiv ESG Research Data.

2.3 EXCHANGE-TRADED FUNDS

Exchange-traded funds (ETFs) consist of a basket holding underlying assets tracking a specific index/benchmark. With typically lower costs compared to mutual funds, ETFs have surged in popularity owing to their flexibility and cost-effectiveness (Hill, Nadig & Hougan, 2015). During the depths of the 2008-2009 financial crisis, certain funds faced challenges meeting redemption demands, leading to a tarnished reputation for those funds. This led to the trading of indexed products. While an actively managed mutual fund strives to surpass its benchmark index and outperform the market, an ETF aims to closely replicate the return of the index it tracks. (Cremers and Petajisto, 2009).

However, highly specialized ETFs, while offering focused exposure, may also carry unexpected volatility and risks (Lettau & Madhavan, 2018).

2.4 PRIOR STUDIES

The first study presented here is the one carried out by Dumitrescu, Järvinen & Zakriya (2023) regarding the Socially Responsible Investing ETF and ESG ETF portfolios. The authors assert that the performance of ETFs could be attributed to the industry's increased competition and the reduction of the concentration market. Furthermore, they report that initially, the ESG ETF portfolio

underperformed its benchmark, but between 2020 and 2022, reversed this pattern, recording a notable outperforming.

Moreover, in the analysis conducted by Pavlova & de Boyrie (2022), the assessment of risk-adjusted returns for ESG ETFs was conducted in both pre-and post-COVID-19 market distress. Before the pandemic, lower sustainability-rated ETFs outperformed the market and higher-rated ESG ETFs. During the market distress, high ESG ratings failed to protect from losses, but their performance aligned with the market. Although the study didn't explicitly highlight superior risk-adjusted returns for ESG ETFs, it confirmed that they didn't underperform the benchmark.

Ouchen's study (2022) discovered that ESG portfolios exhibit less volatility compared to benchmark portfolios, indicating lower volatility in ESG portfolios. This study aimed to gauge the volatility of selected ESG ETFs using risk-adjusted measurements (beta and Sharpe's ratio).

Furthermore, Fain, Naffa & Trinidad Segovia (2020), studied nine ESG portfolios and underwent analysis utilizing the Fama-French five-factor model. The study's objective was to ascertain whether investment in ESG-themed equity portfolios could deliver favorable risk-adjusted returns. As per the study's findings, the impact of environmental and technology megatrends initially generated substantial and positive alphas. However, this outperformance lost its statistical significance within the framework of the Fama-French 5-factor model.

Another interesting research was carried out by Ang, Madhavan & Sobczyk (2021), whose discoveries unveiled those funds with high ESG scores frequently displayed different factor exposures compared to funds with low ESG scores. Typically, highly ESG-scored funds showed a correlation with high quality and momentum factors. These factors could explain the performance of higher-scoring funds in comparison to low ESG-score funds if these factors significantly contribute to fund returns.

The relationship between stock price returns and ESG scores has been the subject of extensive research, yielding varied outcomes based on differing time frames and ESG selection parameters. One study demonstrated a clear positive impact on risk-adjusted returns when applying a 10% best-

in-class ESG screening approach in global and developed markets (Verheyden et al., 2016). This method, eliminating the lowest 10% ESG-rated companies, showed increased risk-adjusted returns, suggesting a correlation between higher ESG ratings and enhanced equity value. Another study focused on comparing sustainable and conventional indices to ascertain potential differences in overall returns and inherent risk. Surprisingly, this study found no significant variance in returns between ESG indices and conventional counterparts (Mansi et al., 2019).

3. METHODOLOGY & DATA

3.1 DATA

The study gathered data from various databases, incorporating 35 ETFs—15 from the United States and 20 from Europe—along with benchmark indices S&P 500 and S&P 500 ESG for the USA and STOXX Europe 600 for Europe and STOXX Europe 600 ESG-X, all sourced from Refinitiv.

For risk-free rates, the study adopted the U.S. 1-month treasury bill for U.S.-focused ETFs and the German 3-month bond for Europe-centric ETFs, obtained from Investing.

The data collection spanned from March 1st, 2019, to March 31st, 2023.

3.2 REFINITIV ESG SCORE

Refinitiv's ESG scores evaluate a company's Environmental, Social, and Governance (ESG) performance based on disclosed data. Leveraging over 600 company-level ESG metrics grouped into 10 categories, Refinitiv's scores offer a comprehensive evaluation considering industry-specific biases and company dimensions and comparing a company's ESG performance (Refinitiv). The selection process for these metrics accounts for factors like comparability, data reliability, and

industry-specific variations. This study analyzes the aggregate ESG performance score without dissecting its individual environmental, social, and governance dimensions.

Refinitiv categorizes ESG scores into four quartiles:

1. from 0 to 25 indicate poor ESG performance and inadequate transparency in ESG data;
2. between >25 to 50 denote satisfactory ESG performance;
3. from >50 to 75 signal good ESG performance and above-average transparency in ESG data reporting;
4. between >75 and 100 showcase excellent ESG performance and a high level of reported ESG.

Name	Ticker	ESG Score
Xtrackers MSCI Europe Health Care ESG Screen ETF1C	XSDR.L	86
iShares STOXX Europe 600 Health Care (DE)	EXV4d.CHI	85
AMUNDI ITALY MIB ESG	FMI.MI	85
WisdomTree Europe Equity	HEDJ.L	82
BNPPE MSCI Europ Sm Cp SRI SSrs PAB 5% Cppd ETF C	EESM.PA	82
iShares MSCI Europe Financials ETF	EUFN.O	81
Invesco STOXX Europe 600 Opt Chemicals U ETF Acc	X4PS.DE	81
Amundi Index MSCI Europe ESG BROAD CTB ETF	CE2D.L	81
iShares MSCI Europe ESG Enhanced UCITS ETF EUR Dis	EEUD.L	81
iShares MSCI Europe ESG Screened UCITS ETF EUR Acc	SAEU.L	81
Xtrackers MSCI Europe ESG Screened UCITS ETF 1C	XEUM.L	81
Ossiam Eur ESG Machine Learning UCITS ETF 1C/A	EUMV.L	80
Amundi STOXX Euro 600 Engy ESG Scrnd UCITS ETF Acc	ENRGA.PA	80
Amundi Index Msci Europe Sri Pab	EUSRI.PA	79
Invesco MSCI EU ESG Lds Cath Princpl UCITS ETF Dis	ICFP.MI	79
Xtrackers MSCI Europe Financials ESG Screen ETF 1C	XS7R.L	79
iShares MSCI Europe SRI UCITS ETF EUR (Acc)	IESG.L	79
BNP Paribas Easy ESG Quality Europe UCITS ETF C	EQUA.PA	78
Xtrackers MSCI Europe IT ESG Screened UCITS ETF 1C	XS8R.L	76
Lyxor MDAX ESG UCITS ETF I (D)	C007.DE	75

Table 1. ESG Scores and European ETFs

Name	Ticker	ESG Score
iShares MSCI USA ESG Select ETF	SUSA.K	76
iShares Russell Top 200 Growth Index Fund	IWY	76
Xtrackers MSCI USA ESG Leaders Equity ETF	USSG.K	75
iShares US Technology ETF	IYW	75
FlexShares STOXX US ESG Select Index Fund	ESG	75
Xtrackers MSCI USA ESG UCITS ETF 1C	XZMU.L	74
Lyxor MSCI USA ESG Leaders Extra	UESG.L	74
SPDR S&P 500 Fossil Fuel Reserves Free	SPYX.K	74
Lyxor MSCI USA ESG Broad CTB (DR) UCITS ETF - Dist	USAU.L	74
JPM US Research Enhncd Idx Eq ESG UCITS ETF USD A	JREU.L	74
BNPP Easy MSCI USA SRI S-Srs PAB 5% Cp ETF C	EKLD.PA	73
iShares MSCI USA ESG Screened UCITS ETF USD Dist	SDUS.L	73
Vanguard ESG US Stock ETF	ESGV.K	71
Nuveen ESG Small-Cap ETF	NUSC.K	54
iShares ESG Aware MSCI USA Small-Cap ETF	ESML.K	53

Table 2. ESG Scores of American ETFs

3.3 RISK-FREE RATE

This research will use two risk-free rates: the U.S. 1-month treasury bill for American ETFs, and the German 3-month bond or European ETFs.

In 2019, confirming the trend of previous years, the 1-month US Treasury rate rose steadily. In 2020, the rate experienced a significant drop close to 0.00, largely attributed to the impact of the COVID-19 pandemic. Subsequently, in 2022, the rate rose in response to the rising inflationary pressures.

The German 3-month bond serves as the risk-free rate due to Germany's economic position, commonly regarded as the benchmark for risk-free rates in Europe. This bond's rate stayed negative for an extended period from 2019 to 2022. However, in 2022, like the U.S. 1-month treasury bill, the rate has surged significantly to counter the escalating inflationary pressures.

3.4 BENCHMARKS

This thesis utilizes the S&P 500 and the STOXX Europe 600 Index as benchmarks for evaluating the performance of selected ETFs, focusing particularly on the S&P 500 ESG Index and STOXX Europe 600 ESG. This assessment aims to analyze their performance over the considered period and identify potential areas for contemplation and concerns.

The S&P 500 is a renowned stock market index that tracks the performance of 500 large-cap companies listed on US stock exchanges. Widely acknowledged, it serves as a benchmark for investment portfolio performance and strategy effectiveness in the US market. The index's weighting by market capitalization means that larger companies wield more influence over their performance (Tretina & Curry, 2021). Notably, the S&P 500 has a substantial representation of the technology sector (Trainer, 2021).

Preceding 2020, the index showcased consistent growth post the 2008 subprime mortgage crisis, but it stalled at the start of the year due to the COVID-19 pandemic's impact on the global economy. However, it later surged to a historic high, reflecting a bullish market and the technology sector's

growth (Figà, Talamanca & Patacca, 2022). In addition, in 2022, the index experienced a downturn due to aggressive interest rate increases aimed at curbing inflation, concerns about recession, and the Russia-Ukraine conflict (Wang, 2022). This study selects the S&P 500 as it offers broad market coverage and serves as a prevalent benchmark for academic research portfolios. Given that all chosen ETFs focus on the US, the S&P 500 serves as an apt equivalent. It is interesting to compare the S&P500's performance with the S&P500 ESG performance. The S&P 500 ESG Index is a market-cap-weighted index aiming to assess the performance of securities that meet sustainability criteria, retaining similar industry group weights overall as the S&P 500. During the same period, as can be seen from the graph, the two indices performed almost identically, until the spread of the Covid-19 pandemic. As can be seen, from 21 February 2020, a difference in performance in favor of the S&P 500 ESG began to mark itself out. This difference continued throughout the period under analysis and even widened within it, highlighting how the companies most focused on ESG issues that fell within this index, recorded better returns during this period of turbulence (Refinitiv).

On the other hand, the STOXX Europe 600 index acts as a benchmark for the European market, encompassing 600 companies from different European countries (17).

Over the same period, the STOXX Europe 600 Index did not witness as significant growth as the S&P 500. Its performance varied, resulting in moderate growth overall. In 2019, the index saw an increase of approximately 22%, principally justified by the monetary stimulus measures proposed by the ECB (European Central Bank) (Reisenbichler, 2020). Furthermore, in 2020, the index suffered due to the Covid-19 market crash (-14%). Subsequently, the STOXX Europe 600 mirrored movements akin to the S&P 500, influenced by similar factors affecting the latter.

The STOXX Europe 600 ESG-X index is derived from Europe's prominent STOXX Europe 600 index, incorporating standardized ESG exclusionary criteria. These exclusion screens align with leading asset owners' responsible policies, aiming to mitigate reputational and specific risks. STOXX implements exclusions based on Sustainalytics' assessment, omitting companies that violate Global

Standards Screening, engage in Controversial Weapons production, are associated with Tobacco production, derive revenue from Thermal Coal extraction or exploration, or possess power generation reliant on thermal coal. Designed for diverse investment instruments like mandates, passive funds, ETFs, structured products, and listed derivatives, the STOXX Europe 600 ESG-X index strives to bolster liquidity and decrease trading costs. In contrast to the previous case, here the two indices recorded a similar trend, with no obvious differences, even though the period of the covid 19 crisis, especially the impact of the outbreak of the Russian-Ukrainian war, might have suggested otherwise.

3.5 PERFORMANCE METRICS

Performance metrics serve as quantitative measures to assess the effectiveness and efficiency of various processes, systems, or investments.

In particular, mention should be made of beta, which is used to derive the ratios that follow, which in the study was researched both as raw beta and adjusted beta, the latter being preferred, whose daily data was taken from Bloomberg. Beta represents the risk of the portfolio relative to the reference market or index, measured as the volatility of a portfolio relative to the market.

A higher beta, a tendency more than 1, is correlated with a riskier portfolio. At the same time, as Levinson in 2006 observed, portfolios with higher beta normally outperform benchmark indices in markets in expansion (Bull market), but underperform in contractive markets (Bear market).

The first measure included in this analysis is the Sharpe Ratio, which measures the risk-adjusted performance of a portfolio per unit of total risk.

The Sharpe ratio, named after its economist creator, gauges the additional return earned by a portfolio in comparison to the risk-free rate concerning the portfolio's total risk (standard deviation of excess returns). This metric essentially assesses risk-adjusted returns and serves as an indicator of the balance between return and volatility (Fabozzi, 2019; Bodie, Kane & Marcus, 2005). A higher Sharpe ratio typically signifies a more favorable portfolio (Sharpe, 1966).

$$\text{Sharpe ratio} = ((R_p - R_f)) / \sigma_p$$

With,

R_p = Portfolio return; R_f = Risk free rate;

σ_p = Standard deviation of portfolio's excess return

The second metric used is the Treynor index, which, similar to the Sharpe index, measures the extra return, relative to the risk-free rate, realized by a portfolio (or a fund) per unit of systematic risk borne. It differs from the latter because in this case the risk is measured by the beta indicator, which is an indicator of systematic risk of a portfolio, while in the other case, the risk is measured by the standard deviation, which is an indicator of overall risk of a portfolio. The preference is for assets with a higher Treynor Index value. The Treynor Index can be used to assess the relative performance of an equity portfolio against that of other equity portfolios competing for inclusion in a single, well-diversified equity portfolio. Because of this, i.e. the fact that the portfolios being assessed are combined into a single well-diversified portfolio, the relevant risk is the systematic risk, as the specific risk will be eliminated by the diversification effect associated with inclusion in a broad portfolio.

$$\text{Treynor ratio} = ((R_p - R_f)) / \beta_p$$

With,

R_p = Portfolio return; R_f = Risk free rate; β_p = Portfolio's beta

The third metric is Jensen's alpha, which is a risk-adjusted performance measure that represents the incremental return (or extra-return) of a portfolio or mutual fund relative to the return that such a portfolio should have produced based on its level of systemic risk as measured by beta.

A positive alpha signifies that the portfolio is earning excess returns, while a negative alpha denotes that the portfolio has underperformed in comparison to the benchmark (Investopedia).

$$\mathbf{Jensen's\ alpha = Rp - [Rf + \beta p (Rm - Rf)]}$$

With,

$Rp = \text{Portfolio return}; Rf = \text{Risk free rate}$

$\beta p = \text{Portfolio's beta}; Rm = \text{Market return, based on the CAPM}$

Last, but not least, the Information Ratio is an indicator calculated as the ratio between the portfolio's extra return concerning the benchmark index and its tracking error volatility.

The information ratio measures the portfolio's premium returns and compares them to a selected benchmark. It provides the amount by which the portfolio outperforms the benchmark for each unit of relative risk (represented by the tracking error) and allows an assessment of the manager's ability to outperform the benchmark about the risk assumed (represented by the deviation from the benchmark) also ensuring consistent returns.

A high ratio (above 0.5) means that the portfolio is yielding more returns than its benchmark, whereas a low result indicates that the portfolio is underperforming its benchmark (Investopedia).

$$\mathbf{Information\ ratio = ((Rp - Rm))/\sigma ER = \alpha/\omega}$$

With,

$Rp = \text{Portfolio return}; Rm = \text{Market return}; \sigma ER = \text{Tracking error}$

3.6 FACTOR ANALYSIS

The Fama-French five-factor model expands upon the traditional Capital Asset Pricing Model (CAPM) by considering five elements—market risk, size, value, profitability, and investment—to forecast asset or portfolio returns. This model is the evolution of the renowned Fama and French three-factor model, based on the market factor (excess return of the market portfolio over the risk-free asset), the SMB (Small Minus Big) that represents the difference between returns on diversified portfolios of small and large stocks, and the HML (High Minus Low) that captures returns from

diversified portfolios of high and low book-to-market (B/M) stocks. This model has undergone rigorous empirical testing over the years across various studies analyzing data from developed markets (e.g., Huynh, 2017; Kubota & Takehara, 2018).

Empirical examinations generally reveal that the three-factor model falls short in completely elucidating equity return fluctuations. As a response to this evidence, Fama and French (2015) introduced two additional factors, profitability (RMW) and investment (CMA), to complement their three-factor model. RMW represents the return difference between portfolios of firms with robust profitability and those with weaker profitability, while CMA signifies the return difference between portfolios of firms with conservative versus aggressive investment policies.

The expansion to the five-factor model aims to enhance the explanatory power of standard factor asset pricing models regarding equity return variations. Fama and French (2015) clarify that while these four factors (profitability, size, value, and investment) may not directly mimic state variables, they allow researchers to capture return effects of state variables without explicitly defining them. Their empirical assessments, using international data, indicate that the five-factor model generally outperforms the three-factor model in elucidating variations in equity returns (Fama and French, 2017).

This model suggests that small-cap stocks, focusing on value while exhibiting high profitability and low investment, tend to outperform the market over extended periods. Conversely, large-cap stocks that emphasize growth, exhibit lower profitability, and higher investment, might experience underperformance (Horstmeyer, Liu & Wilkins, 2022). Conversely, momentum factor analysis focuses on recent strong-performing stocks, assuming they will sustain their positive performance in the short term. Momentum, calculated as per Kenneth R. French's Data Library (2023), compares the average returns of high and low prior-performing portfolios. Although momentum is a factor that combined with the Fama-French model, enhances the evaluation of portfolio performance, offering insights into the factors that most influence performance outcomes.

4. RESULTS

4.1 PERFORMANCE COMPARISON

This chapter will showcase the study's outcomes and discoveries. It begins with an overview of the annualized returns and volatilities across the four considered periods for the selected ETFs. Following that, the second section will delve into risk-adjusted metrics. Finally, the third section will unveil the findings from the analysis of the Fama-French five-factor model and the momentum factor.

Tables 5 and 6 in the appendix show the annualised returns and volatilities over the selected 2019-2022 timeframe, divided into four sub-periods. Table 3 shows the results of the US ETFs and the chosen benchmark indices, S&P 500 and S&P500 ESG. Table 4 focuses instead on the results of European ETFs and their benchmark indices, STOXX European 600 and STOXX European 600 ESG-X.

For ease of analysis, the average values for the selected sample are shown here (Tables 3 and 4), compared with the returns of the reference indices, and the most interesting results are evidenced.

Name	Before COVID-19 market distress		Covid-19 market distress		Covid-19 Recovery		Russo-Ukrainian War	
	Return	Volatility	Return	Volatility	Return	Volatility	Return	Volatility
S&P 500 Index	19,05%	11,76%	4,40%	32,50%	23,08%	18,46%	-4,18%	24,24%
S&P 500 ESG Index	30,22%	13,10%	-1,14%	33,71%	35,31%	18,77%	1,06%	21,49%
iShares US Technology ETF	36,36%	17,29%	25,13%	35,53%	25,25%	28,63%	-6,02%	35,50%
Nuveen ESG Small-Cap ETF	7,92%	13,96%	-4,29%	39,15%	27,49%	25,56%	-7,79%	27,59%
iShares ESG Aware MSCI USA Small-Cap ETF	8,16%	14,01%	-5,85%	37,83%	33,50%	24,85%	-7,08%	27,65%
Average	21,65%	12,63%	7,30%	30,25%	24,04%	21,24%	-5,59%	25,77%

Table 3. Returns and volatilities of American ETFs and indices

In Table 3, a noteworthy observation is the diverse performances observed, attributed to the period's defining events. Particularly intriguing is the consistent outperformance of most American ETFs against the benchmark index, the S&P500, across the first three sub-periods. However, two exceptions, the Nuveen ESG Small-Cap ETF and the iShares ESG Aware MSCI USA Small-Cap

ETF, deviated from this trend. This divergence can be attributed to their lower ESG scores, deliberately chosen to represent the entire US market.

Highlighting the iShares U.S. Technology ETF as the top performer in terms of average annualized return is noteworthy. The surge in the technology sector's success over recent years might have significantly influenced the performance of related stocks and funds.

However, an interesting shift occurred in the most recent sub-period: except for the JPM US Research Enhanced Index Equity ESG UCITS ETF USD A, all other ETFs surpassed the benchmark. Notably, the S&P 500 ESG Index stands out for achieving positive performance, a stark contrast to all other products analyzed during this timeframe.

Name	Before COVID-19 market distress		Covid-19 market distress		Covid-19 Recovery		Russo-Ukrainian War	
	Return	Volatility	Return	Volatility	Return	Volatility	Return	Volatility
STOXX Europe 600	15,39%	11,19%	-13,82%	25,69%	22,43%	17,63%	0,88%	19,16%
STOXX Europe 600 ESG-X	15,29%	11,30%	-13,47%	25,52%	22,15%	17,56%	0,62%	19,30%
Xtrackers MSCI Europe IT ESG Screened UCITS ETF 1C	23,35%	18,24%	14,93%	28,47%	6,42%	29,63%	0,23%	37,28%
AMUNDI ITALY MIB ESG	25,83%	14,19%	-19,63%	30,95%	34,95%	21,83%	3,62%	24,73%
WisdomTree Europe Equity	13,30%	13,33%	-11,45%	26,11%	21,18%	18,83%	10,33%	21,49%
Average	13,43%	13,50%	-6,27%	27,18%	20,51%	21,39%	-0,93%	26,14%

Table 4. Returns and volatilities of European ETFs and indices

In Europe (Table 4), a distinct pattern diverging from the previously observed trend emerges. The performance of the 20 selected ETFs reveals a mixed landscape, where not all ETFs outperformed the benchmark.

The best-performing ETFs during the periods analyzed were reported. In particular, during the pre-COVID-19 phase, amidst the benchmark's 15% gain, the AMUNDI ITALY MIB ESG stood out, which achieved an impressive return of almost 26%. This remarkable performance could be attributed to the ETF's structure, which allocates about 92% of its Western European investments in euros. The top five holdings, representing about 50% of the total, are concentrated in Italian companies in the financial, cyclical consumer goods and utilities sectors (UniCredit SpA (11.04%), Stellantis NV (11.03%), Intesa Sanpaolo (9.96%), Enel SpA (9.92%) and Ferrari NV (9%), source: Morningstar). These sectors serve as fundamental pillars of the Italian economy.

Throughout the pandemic-induced market stress, the benchmark plummeted to -13.8%. Surprisingly, the Xtrackers MSCI Europe IT ESG Screened UCITS ETF 1C showcased an impressive +14.9% performance, echoing the prior discussion on the technology sector. Conversely, the Xtrackers MSCI Europe Financials ESG Screen ETF 1C experienced a significant dip, registering a negative performance of over 30 percentage points.

The recovery phase post-pandemic witnessed a remarkable rally. Against the benchmark's +22.4% performance, the Xtrackers MSCI Europe Financials ESG Screen ETF 1C rebounded impressively, surging over 53%. In contrast, the iShares STOXX Europe 600 Health Care (DE) showed a comparatively modest increase, settling for a +18.5% performance.

Notably, European markets responded more favorably to the Russian-Ukrainian war compared to the previous crisis. While the benchmark showed a +0.9% performance, the WisdomTree Europe Equity outperformed tenfold as a result of its geographical and sector diversification (Morningstar). Conversely, the BNPPE MSCI Europ Sm Cp SRI SSrs PAB 5% Cppd ETF C experienced a -14.2% performance, marking the lowest performance amidst the turmoil.

4.2 RISK ADJUSTED PERFORMANCE

This part will assess the ETFs using various risk-adjusted measures, as the Beta, the Sharpe ratio, the Treynor ratio, the Jensen's alpha, and the Information ratio. These measures will be compared against those of the S&P 500 Index, S&P500 ESG Index and STOXX Europe 600 Index, and STOXX Europe 600 ESG-X. Notably, the Information ratio cannot be computed for benchmark indices. Tables 9,10,11,12 will display the risk measures applied to the selected American ETFs and their benchmark indices, for each subperiod. Moreover, table 13,14,15,16 will present the risk measures for the chosen European ETFs alongside benchmark indices.

In addition, tables 7 and 8 show a summary and a comparison of the four periods for the two geographical groups of ETFs under study.

	Before COVID-19 market distress			During Covid-19 market distress			Covid-19 Recovery			Russo-Ukrainian War		
	S&P 500	S&P 500 ESG	Average	S&P 500	S&P 500 ESG	Average	S&P 500	S&P 500 ESG	Average	S&P 500	S&P 500 ESG	Average
β ADJ	1,00	0,95	0,93	1,00	0,96	0,92	1,00	0,95	0,93	1,00	1,04	0,94
Sharpe Ratio	1,63	2,32	1,74	0,45	0,24	0,54	1,11	1,77	1,05	-0,37	-0,12	-0,35
Treynor Ratio	0,19	0,32	0,24	0,14	0,08	0,17	0,21	0,35	0,21	-0,09	-0,03	-0,09
Jensen's Alpha	0,00	0,12	0,04	0,00	-0,06	0,03	0,00	0,13	0,00	0,00	0,06	-0,00
Information Ratio	0,00	3,23	0,59	0,00	-0,54	0,10	0,00	3,05	-0,27	0,00	0,93	0,13

Table 5. Risk measures for American ETFs and benchmark indices

Starting with the Beta, that represents how the portfolio/ETF is sensible to the market's change, it is possible to observe the S&P500 ESG and the average of the chosen ETFs, are less sensible if compare with the benchmark. The unique exception is the S&P500 ESG during the last period, that presents a Beta slightly greater than 1.

Examining the Sharpe Ratio, a metric gauging performance adjusted for volatility, reveals an intriguing trend: the S&P500 ESG index generally outperforms the S&P500, barring the period coinciding with the Covid-19 pandemic outbreak. However, when evaluating the average performance of the selected ETFs, no distinct trend emerges. It surpasses the reference index in three out of four periods, but only outperforms the S&P500 ESG in two out of four periods. This trend holds true when considering the Treynor Ratio, a measure quantifying performance adjusted for systemic risk (beta). Interestingly, there's no apparent advantage in investing in ETFs over the reference index, as performances align almost identically in 50% of the cases.

At the end, a significant observation arises from examining the Information Ratio, particularly evident during the first and third periods, confirming that the S&P500 ESG has outperformed the benchmark.

Several noteworthy outcomes emerge across the subperiods (appendix).

Analyzing deeply the selected ETFs, in the initial phase the Xtrackers MSCI USA ESG UCITS ETF 1C stood out as the top American ETF in both Sharpe ratio and Jensen alpha. Overall, most ETFs displayed commendable Sharpe indices, except for the two ETFs with the lowest ESG scores, affirming the trend of higher ESG-scored ETFs performing better.

During the onset of the COVID-19 pandemic, there was a widespread decline in these metrics, likely due to the crisis's impact. However, the iShares Russell Top 200 Growth Index Fund recorded impressive results in terms of Sharpe and Jensen ratios.

Amidst the recovery from COVID-19, a notable shift occurred: the two ETFs with the lowest ESG scores didn't necessarily exhibit the poorest results in Sharpe and Jensen ratios.

Lastly, in the most recent period, it's crucial to note that the impact was significant, resulting in negative outcomes for all the analyzed ETFs.

	Before COVID-19 market distress			During Covid-19 market distress			Covid-19 Recovery			Russo-Ukrainian War		
	STOXX Europe 600	STOXX Europe 600 ESG-X	Average	STOXX Europe 600	STOXX Europe 600 ESG-X	Average	STOXX Europe 600	STOXX Europe 600 ESG-X	Average	STOXX Europe 600	STOXX Europe 600 ESG-X	Average
β ADJ	1,00	0,60	0,85	1,00	0,68	0,90	1,00	0,70	0,88	1,00	0,70	0,86
Sharpe Ratio	1,37	1,34	1,06	-0,54	-0,53	-0,17	1,06	1,04	0,88	0,24	0,22	0,16
Treynor Ratio	0,15	0,25	0,16	-0,14	-0,20	-0,06	0,19	0,27	0,17	0,05	0,06	0,04
Jensen's Alpha	0,00	0,06	0,00	0,00	-0,04	-0,25	0,00	0,05	-0,01	0,00	0,01	-0,01
Information Ratio	0,00	-0,03	-0,26	0,00	0,05	1,26	0,00	-0,05	-0,85	0,00	-0,05	-0,17

Table 6. Risk measures for European ETFs and benchmark indices

Regarding the selected European ETFs the primary observation centers on beta: notably, within the European market, both the STOXX Europe 600 ESG-X and the studied ETFs exhibit a lower beta compared to the market, indicating their lower risk profile. However, the more intriguing aspect emerges when examining the Sharpe ratio. In three out of the four analyzed periods, the market index outperformed, portraying a superior performance compared to the ETFs under study. Within the sample, diverse outcomes in risk-related performance were noted for each period, indicating the absence of a discernible trend. Notably, in the initial period, noteworthy performances include the Ossiam Eur ESG Machine Learning UCITS ETF 1C/A, surpassing the reference index by over 60% in terms of Sharpe ratio. Additionally, the Amundi STOXX Euro 600 Engy ESG Scrnd UCITS ETF Acc demonstrated remarkable performances, surpassing the index by 172% and 283% respectively over the last two periods.

4.3 FAMA-FRENCH FIVE-FACTOR AND MOMENTUM ANALYSIS

This section will outline the outcomes of factor analysis, utilizing the Fama-French five-factors model and the Momentum factor. The Fama-French five factors encompass Small Minus Big (SMB), High Minus Low (HML), Robust Minus Weak (RMW), Conservative Minus Aggressive (CMA), and $R_m - R_f$, representing the market return minus the risk-free rate¹. These factors, coupled with the Momentum factor (MOM), aim to elucidate the contributing elements affecting the returns of the selected ETFs in this study.

For this analysis, a linear regression was employed, correlating the returns of the individual daily ETFs, adjusted for the respective risk-free rates, with the six factors as mentioned earlier.

$$R_p = \alpha_p + \beta_1 (R_m - R_f) + \beta_2 (SMB) + \beta_3 (HML) + \beta_4 (RMW) + \beta_5 (CMA) + \beta_6 (MOM) + \varepsilon$$

The tables in the appendix show the results of the factor analysis for the four periods observed, outlining the results for US ETFs in the first four (Tables 17, 18, 19, and 20) and for European ETFs in the following four (21, 22, 23, and 24).

The primary point to note pertains to the statistical reliability of the findings. Specifically, American ETFs displayed a "reliability" rate ranging between 67% to 70%, contingent on the period examined, whereas European ETFs exhibited near-complete robustness within the proposed model. Notably, most dimensional factors demonstrated considerable significance, suggesting the influence of portfolio company size on these returns.

Across the board, quality factors (HMLs) consistently displayed significance, signifying the pivotal role of investment instrument quality in the chosen ETFs' returns. Furthermore, both profitability (RMW) and momentum (MOM) factors shed light on segments of the chosen ETFs' returns. Similar to the Ang et al. study, the quality factor notably contributes to the returns of high ESG-rated funds.

¹ Concerning the composition of the individual factors and how they are calculated, the reader is advised to refer to the Kenneth R. French's Data Library

In the initial period, within both groups of analyzed ETFs, it's evident that the market risk premium was positive for all statistically robust ETFs at a 95% confidence level. This underscores how these investments offer investors an additional return over the benchmark.

Subsequent periods partially affirmed these findings: while certain ETFs consistently displayed positive values, others indicated a negative impact from this factor, in particular during the second and the third periods which are the crisis periods.

For the remaining four factors, commencing with the dimension factor's (SMB) trajectory akin to the preceding factor, a notable discrepancy in the dimension of the same factors between the two ETF groups becomes apparent. The Small Minus Big Factor (SMB) hinges on a company's market capitalization, gauging the historical excess of small-cap companies relative to large-cap companies. It underscores the concept that, over time, smaller enterprises tend to generate superior returns compared to their larger counterparts in the market. Additionally, this factor, statistically robust at a 5% significance level for over 80% of ETFs, showcases a larger impact for European ETFs, particularly amplified during times of crisis, such as the second and fourth periods compared to those of recovery or preceding the crisis, observed across both ETF groups.

Moreover, the High Minus Low (HML) factor exhibits positivity across all robust ETFs, except those with lower ESG scores, further emphasizing the correlation with high ESG scores. Similar to the previous factor, a consistent trend in size and impact is discernible in the two analyzed groups.

This factor signifies the return contrast between companies with a high value/share ratio (identified as valued companies) and those with a low value/share ratio, spotlighting the inclination for securities (marked by a high value/price ratio) to yield greater returns over time compared to growth bonds (with a low value/price ratio).

Concerning the two supplementary factors in the model, the Robust Minus Weak (RMW) factor compares the returns of companies with robust operating profitability against those with weak or low operating profitability. Similarly, the Conservative Minus Aggressive (CMA) factor measures the

difference between companies that pursue aggressive investments and those adopting a more conservative approach, both factors exhibit analogous results.

To conclude, the momentum factor signifies the tendency of successful stocks to persist in performing well in the short term. It falls under the category of a "persistence" factor, capitalizing on ongoing trends within the markets.

The incorporation of this factor into the analysis bolstered the overall robustness of the results across the entire dataset. It also sheds light on an intriguing dimension for the majority of ETFs included in the study, emphasizing the correlation between their performance and this particular factor.

5. CONCLUSIONS

The thesis aimed to scrutinize the performance responses of ESG-focused ETFs amidst the evolving landscape between 2019 and 2023, where the Covid-19 pandemic and the Russo-Ukrainian War have been protagonists. ESG ETFs, a relatively recent addition to financial markets, comprised the core material, consisting of 15 US market ETFs and 20 European market ETFs, totaling 35 ETFs. Selection criteria revolved around ETF fund launch dates before March 1, 2019, and high ESG scores, with investments in either European or US markets. Benchmarks encompassed the Standard and Poor's 500 Index, Standard and Poor's 500 ESG Index, STOXX Europe 600 Index, and STOXX Europe 600 ESG-X.

The success of high ESG-scored ETFs underwent evaluation through various metrics, including the annualized average return, volatility, beta, Sharpe ratio, Treynor ratio, Jensen's alpha, Information ratio, Fama-French five-factor analysis and the momentum factor.

The thesis centered on three primary research inquiries. The first query explored performance comparisons between high ESG-scored ETFs and the SP500 and STOXX 600. The second question

delved into the risk-adjusted returns of high ESG-scored ETFs. Lastly, the third question aimed to unveil the pivotal factors influencing ETF returns with high ESG scores compared to indices, utilizing a factor analysis.

Addressing the initial research query, not every ETF with a high ESG score surpassed benchmarks. However, distinguishing between markets is crucial: in the American market, a prevailing trend suggests that high ESG-scored ETFs, with few exceptions, exhibited better performance than benchmarks, even amid crises. In Europe, two distinct trends emerged. During the periods preceding and amid the COVID-19 outbreak, ETFs with high scores showcased superior annualized returns. Yet, in the subsequent periods, barring a few exceptions, benchmarks outperformed ETFs. In Dumitrescu's study, the Socially Responsible Investment ETF and Environmental Social and Governance ETF portfolios underperformed their benchmark, as per Järvinen & Zakriya (2023).

Concerning the second question, during the 2019-2023 period, the selected ETFs exhibited commendable performance in terms of risk-adjusted returns. Specifically, in the US market, two distinct trends emerged: in the initial two sub-periods, with exceptions, all ETFs outperformed benchmarks across measures like Sharpe ratio, Treynor ratio, Information ratio, and Jensen alpha. However, in the subsequent two sub-periods, this trend weakened, showcasing similar performance to the benchmark.

Conversely, in Europe, similar performances to the benchmark were noticeable in the first sub-period. Yet, during the COVID-19 crisis, all ETFs surpassed the benchmarks, contrary to previous observations. Subsequently, the initial trend resurfaced for the following two periods.

Pavlova & de Boyrie's study revealed that ESG ETFs didn't underperform benchmarks in terms of risk-adjusted metrics during the COVID-19 pandemic. This aligns with the findings of this study. However, in this case, the majority of chosen ETFs outperformed the benchmarks.

Addressing the final inquiry, a comprehensive factor analysis was undertaken. Utilizing the five-factor Fama-French model alongside timing, revealed that factors like quality, profitability, and size played significant roles in shaping returns for high-scored ESG ETFs. Additionally, while the Momentum factor contributed, its significance wasn't as pivotal as observed in Ang et al.'s study (2021). Despite minor disparities between US and European ETFs, both groups exhibited fairly analogous outcomes.

The limited size of the dataset posed challenges, notably affecting the precision of the search results, particularly when assessing the performance of high ESG-rated ETFs. Collecting the data encountered hurdles due to the scarcity of funds with adequately high ESG scores at the research's outset in 2019. It is crucial to highlight that these findings stem from a relatively brief timeframe, potentially impacting their reliability. Future research endeavors should aim to expand the sample size, allowing for a more comprehensive exploration of how ESG-rated ETFs perform using the metrics employed in this study.

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APPENDICES

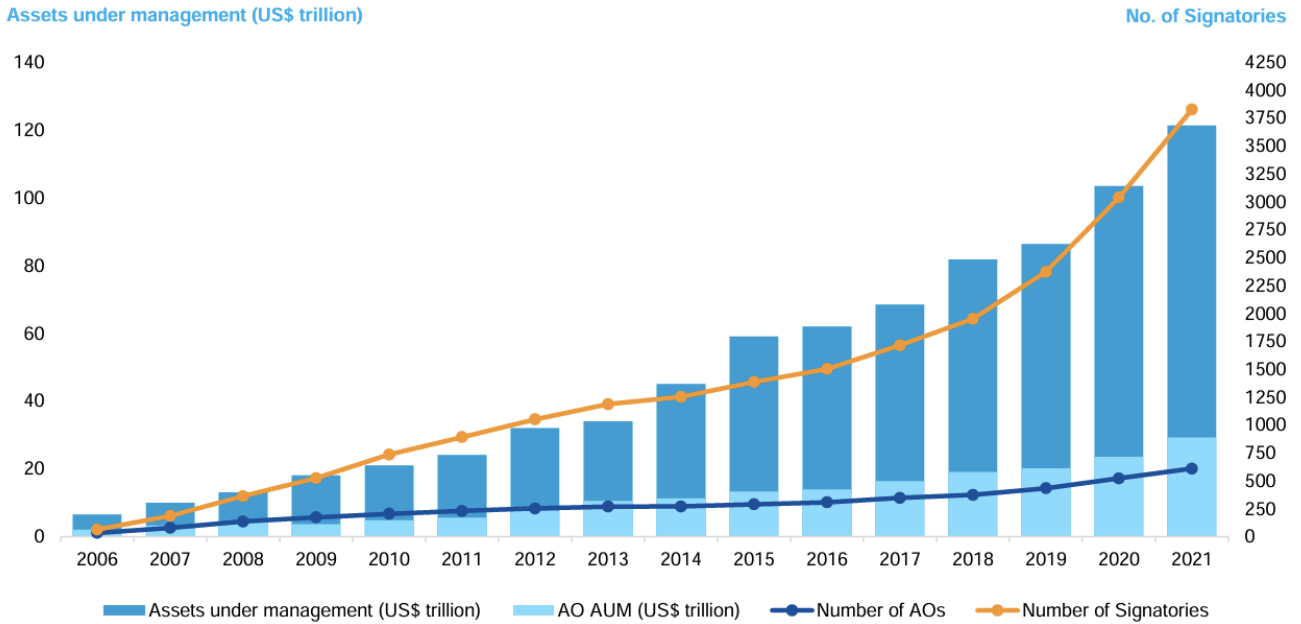


Figure 1. PRI growth 2006 – 2021

3 Pillars	10 Themes	35 ESG Key Issues	
Environment	Climate Change	Carbon Emissions Product Carbon Footprint	Financing Environmental Impact Climate Change Vulnerability
	Natural Capital	Water Stress Biodiversity & Land Use	Raw Material Sourcing
	Pollution & Waste	Toxic Emissions & Waste Packaging Material & Waste	Electronic Waste
	Environmental Opportunities	Opportunities in Clean Tech Opportunities in Green Building	Opportunities in Renewable Energy
Social	Human Capital	Labor Management Health & Safety	Human Capital Development Supply Chain Labor Standards
	Product Liability	Product Safety & Quality Chemical Safety Consumer Financial Protection	Privacy & Data Security Responsible Investment Health & Demographic Risk
	Stakeholder Opposition	Controversial Sourcing Community Relations	
	Social Opportunities	Access to Communications Access to Finance	Access to Health Care Opportunities in Nutrition & Health
Governance	Corporate Governance	Ownership & Control Board	Pay Accounting
	Corporate Behavior	Business Ethics Tax Transparency	

Figure 2. MSCI ESG Material Issues

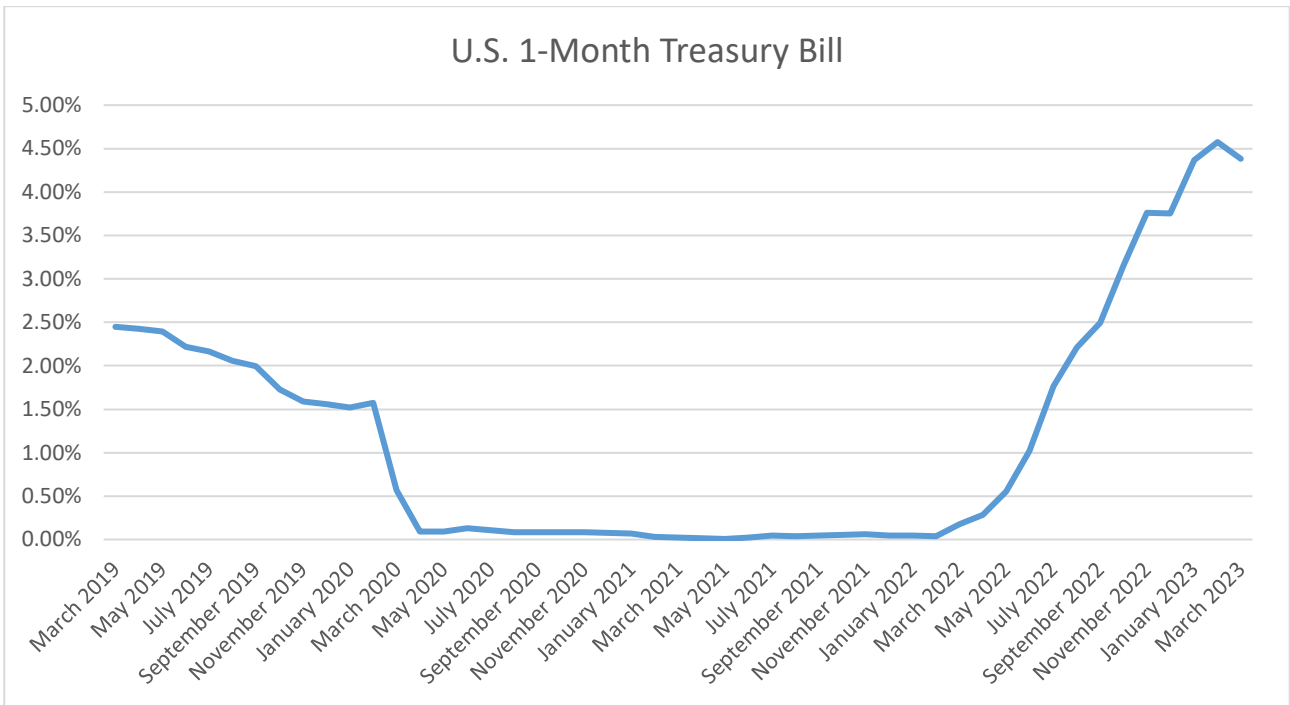


Figure 3. United States 1-month Treasury bill rate

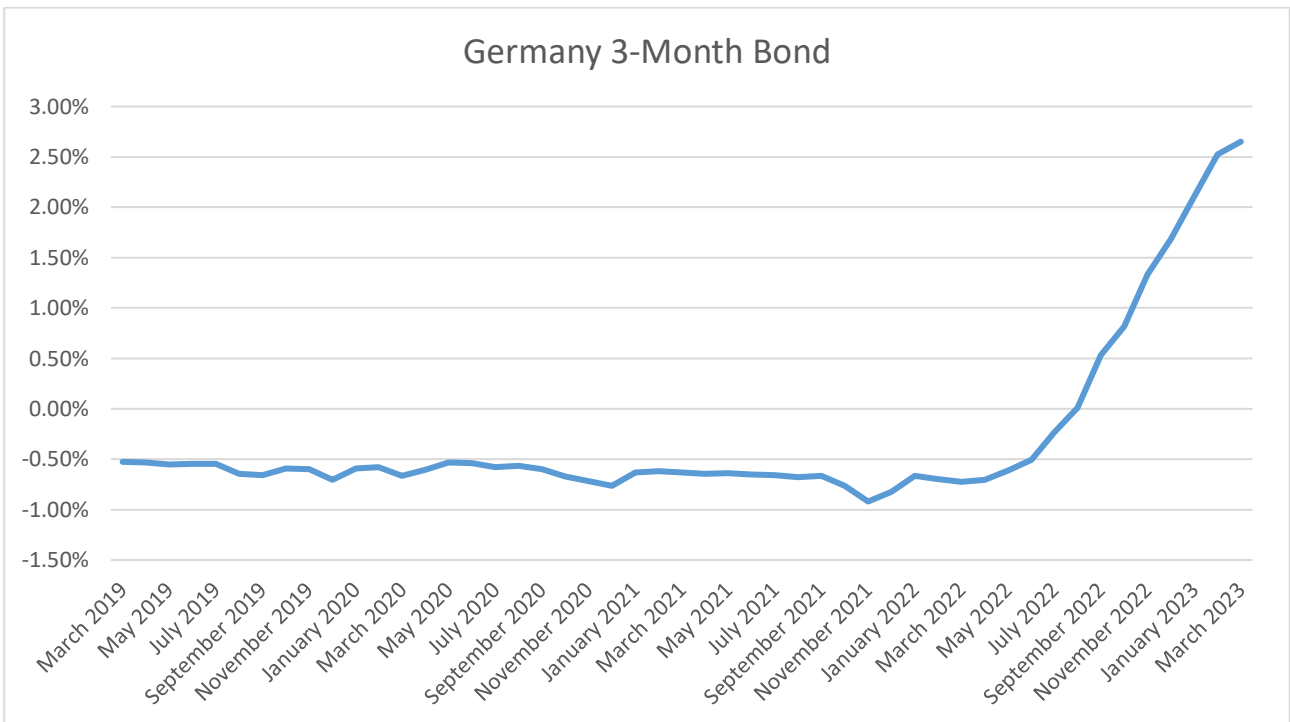


Figure 4. Germany 3-month bond

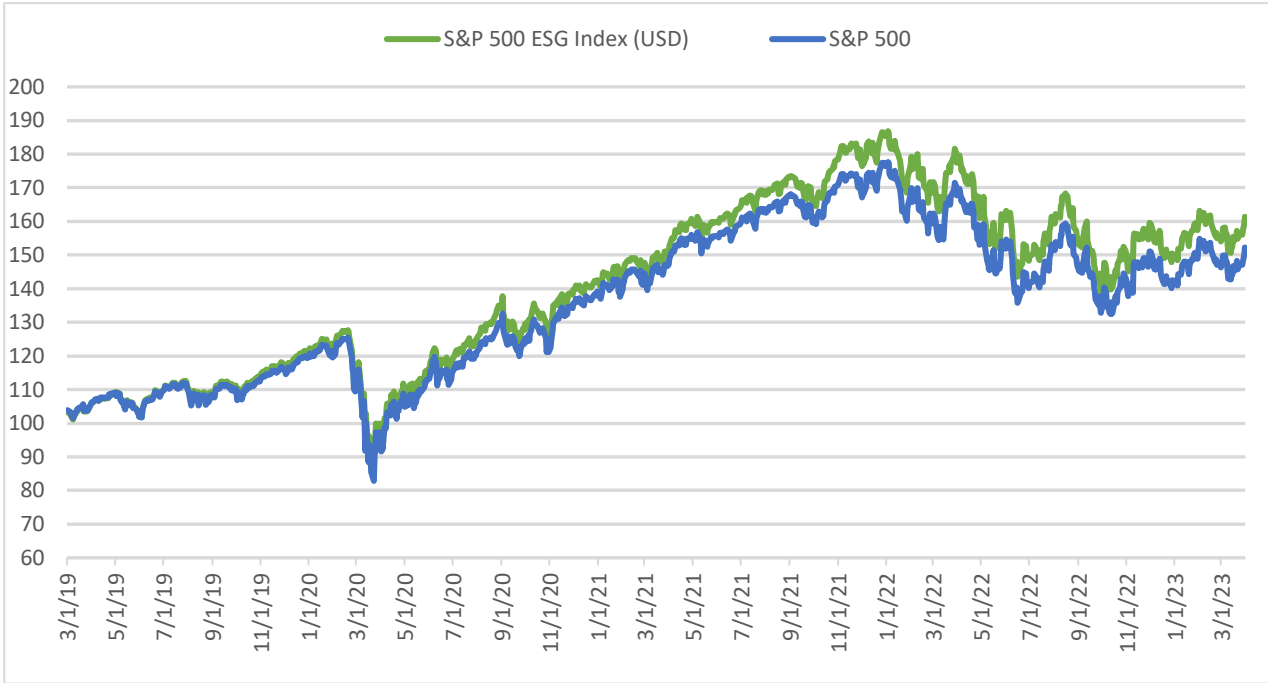


Figure 5. S&P500 and S&P500 ESG Performance Comparison (03/2019 – 03/2023)

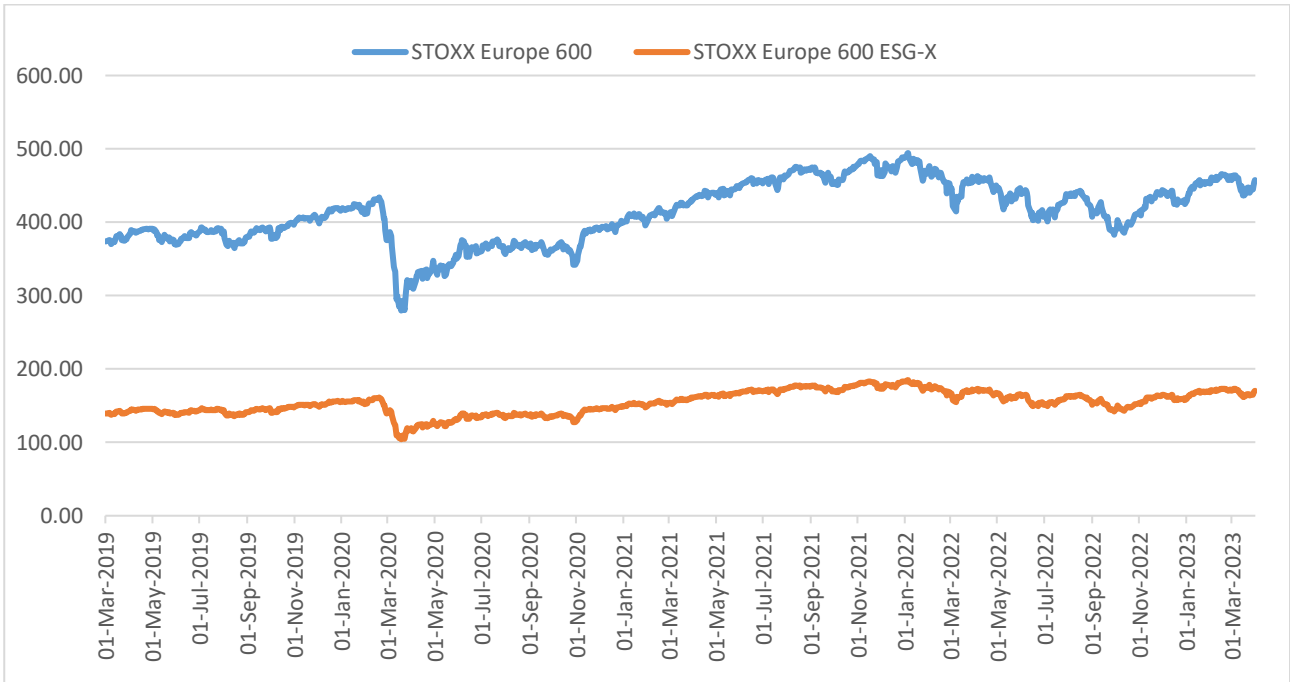


Figure 6. STOXX Europe and STOXX Europe ESG-X Performance Comparison (03/2019 – 03/2023)

Name	Before COVID-19 market distress		Covid-19 market distress		Covid-19 Recovery		Russo-Ukrainian War	
	Return	Volatility	Return	Volatility	Return	Volatility	Return	Volatility
S&P 500 Index	19,05%	11,76%	4,40%	32,50%	23,08%	18,46%	-4,18%	24,24%
S&P 500 ESG Index	30,22%	13,10%	-1,14%	33,71%	35,31%	18,77%	1,06%	21,49%
Xtrackers MSCI USA ESG UCITS ETF 1C	26,28%	11,73%	5,44%	25,64%	26,21%	20,74%	-4,45%	23,17%
Nuveen ESG Small-Cap ETF	7,92%	13,96%	-4,29%	39,15%	27,49%	25,56%	-7,79%	27,59%
iShares MSCI USA ESG Select ETF	19,46%	12,33%	9,25%	31,37%	21,57%	18,95%	-5,34%	25,27%
Lyxor MSCI USA ESG Leaders Extra	23,14%	11,73%	4,51%	24,96%	25,10%	20,05%	-4,57%	23,47%
BNPP Easy MSCI USA SRI S-Srs PAB 5% Cp ETF C	22,53%	11,97%	12,33%	24,82%	25,83%	19,80%	-5,02%	24,44%
Xtrackers MSCI USA ESG Leaders Equity ETF	23,91%	11,50%	3,22%	32,76%	24,61%	18,76%	-4,96%	24,74%
Vanguard ESG US Stock ETF	21,52%	12,54%	8,44%	31,77%	20,59%	19,73%	-7,26%	26,40%
SPDR S&P 500 Fossil Fuel Reserves Free	20,34%	12,26%	5,33%	31,79%	21,87%	18,51%	-5,34%	24,28%
iShares Russell Top 200 Growth Index Fund	28,76%	13,33%	22,40%	31,25%	17,68%	24,39%	-7,02%	29,73%
iShares US Technology ETF	36,36%	17,29%	25,13%	35,53%	25,25%	28,63%	-6,02%	35,50%
FlexShares STOXX US ESG Select Index Fund	20,09%	12,01%	6,50%	30,96%	22,30%	18,80%	-4,42%	24,92%
iShares MSCI USA ESG Screened UCITS ETF USD Dist	21,65%	11,65%	6,08%	25,29%	21,98%	20,16%	-5,41%	23,58%
Lyxor MSCI USA ESG Broad CTB (DR) UCITS ETF - Dist	21,19%	11,46%	4,89%	25,24%	20,83%	19,98%	-6,06%	23,13%
iShares ESG Aware MSCI USA Small-Cap ETF	8,16%	14,01%	-5,85%	37,83%	33,50%	24,85%	-7,08%	27,65%
JPM US Research Enhncd Idx Eq ESG UCITS ETF USD A	23,51%	11,64%	6,14%	25,43%	25,75%	19,63%	-3,12%	22,65%

Table 7. Returns and volatilities of American ETFs and indices

Name	Before COVID-19 market distress		Covid-19 market distress		Covid-19 Recovery		Russo-Ukrainian War	
	Return	Volatility	Return	Volatility	Return	Volatility	Return	Volatility
STOXX Europe 600	15,39%	11,19%	-13,82%	25,69%	22,43%	17,63%	0,88%	19,16%
STOXX Europe 600 ESG-X	15,29%	11,30%	-13,47%	25,52%	22,15%	17,56%	0,62%	19,30%
iShares MSCI Europe Financials ETF	1,48%	16,39%	-20,79%	40,35%	31,60%	26,97%	-6,27%	32,08%
Ossiam Eur ESG Machine Learning UCITS ETF 1C/A	18,62%	8,33%	-7,23%	19,18%	12,96%	13,72%	-1,50%	15,04%
iShares STOXX Europe 600 Health Care (DE)	20,96%	11,73%	1,64%	18,50%	4,89%	17,98%	0,76%	20,55%
WisdomTree Europe Equity	13,30%	13,33%	-11,45%	26,11%	21,18%	18,83%	10,33%	21,49%
Invesco STOXX Europe 600 Opt Chemicals U ETF Acc	16,94%	14,55%	2,22%	24,89%	16,22%	18,81%	-1,35%	23,54%
Amundi Index Msci Europe Sri Pab	23,50%	11,18%	-8,73%	25,01%	22,27%	18,33%	3,99%	19,70%
Amundi STOXX Euro 600 Engy ESG Scrdn UCITS ETF Acc	-5,47%	16,34%	-28,23%	41,67%	52,15%	30,83%	16,81%	30,19%
Lyxor MDAX ESG UCITS ETF I (D)	10,70%	13,27%	3,28%	27,25%	8,47%	20,56%	-16,29%	32,99%
Amundi Index MSCI Europe ESG BROAD CTB ETF	8,78%	12,24%	-5,19%	25,26%	16,87%	19,52%	-2,41%	25,39%
Xtrackers MSCI Europe Health Care ESG Screen ETF1C	22,52%	12,37%	2,18%	20,30%	8,76%	18,57%	2,74%	20,67%
BNPPE MSCI Europ Sm Cp SRI SSrs PAB 5% Cppd ETF C	14,81%	12,74%	-4,97%	27,69%	16,51%	22,35%	-14,12%	29,86%
iShares MSCI Europe ESG Enhanced UCITS ETF EUR Dis	11,00%	11,86%	-4,70%	24,96%	17,06%	19,15%	-5,02%	26,17%
BNP Paribas Easy ESG Quality Europe UCITS ETF C	8,19%	11,44%	0,09%	23,44%	14,44%	18,88%	-3,32%	26,08%
AMUNDI ITALY MIB ESG	25,83%	14,19%	-19,63%	30,95%	34,95%	21,83%	3,62%	24,73%
Invesco MSCI EU ESG Lds Cath Princpl UCITS ETF Dis	9,48%	11,69%	-3,55%	27,41%	12,59%	20,84%	-4,25%	28,15%
iShares MSCI Europe ESG Screened UCITS ETF EUR Acc	12,25%	16,91%	-3,23%	26,37%	19,74%	19,49%	-0,38%	25,99%
Xtrackers MSCI Europe ESG Screened UCITS ETF 1C	14,87%	12,98%	-2,54%	25,82%	22,40%	19,61%	-0,10%	25,72%
Xtrackers MSCI Europe Financials ESG Screen ETF 1C	-0,10%	18,50%	-30,20%	35,83%	53,43%	32,54%	-2,05%	31,43%
Xtrackers MSCI Europe IT ESG Screened UCITS ETF 1C	23,35%	18,24%	14,93%	28,47%	6,42%	29,63%	0,23%	37,28%
iShares MSCI Europe SRI UCITS ETF EUR (Acc)	17,62%	11,86%	0,64%	24,05%	17,28%	19,41%	-0,01%	25,77%

Table 8. Returns and volatilities of European ETFs and indices

Name	Before COVID-19 market distress				
	β ADJ	Sharpe Ratio	Treynor Ratio	Jensen's Alpha	Information Ratio
S&P 500 Index	1,00	1,63	0,19	0,00	0,00
S&P 500 ESG Index	0,95	2,32	0,32	0,12	3,23
Xtrackers MSCI USA ESG UCITS ETF 1C	0,77	2,25	0,34	0,12	1,71
Nuveen ESG Small-Cap ETF	0,92	0,58	0,09	-0,10	-2,71
iShares MSCI USA ESG Select ETF	0,99	1,59	0,20	0,01	0,11
Lyxor MSCI USA ESG Leaders Extra	0,76	1,99	0,31	0,09	0,98
BNPP Easy MSCI USA SRI S-Srs PAB 5% Cp ETF C	0,81	1,89	0,28	0,07	0,84
Xtrackers MSCI USA ESG Leaders Equity ETF	0,98	2,09	0,25	0,05	1,48
Vanguard ESG US Stock ETF	1,03	1,73	0,21	0,02	0,71
SPDR S&P 500 Fossil Fuel Reserves Free	0,98	1,67	0,21	0,02	0,37
iShares Russell Top 200 Growth Index Fund	1,10	2,17	0,26	0,08	2,78
iShares US Technology ETF	1,23	2,11	0,30	0,13	2,72
FlexShares STOXX US ESG Select Index Fund	0,88	1,68	0,23	0,03	0,29
iShares MSCI USA ESG Screened UCITS ETF USD Dist	0,84	1,87	0,26	0,06	0,60
Lyxor MSCI USA ESG Broad CTB (DR) UCITS ETF - Dist	0,82	1,86	0,26	0,06	0,48
iShares ESG Aware MSCI USA Small-Cap ETF	0,94	0,59	0,09	-0,10	-2,53
JPM US Research Enhncd Idx Eq ESG UCITS ETF USD A	0,84	2,03	0,28	0,08	0,98

Table 9. Risk measures for American ETFs and benchmark indices Before Covid-19 market distress.

Name	During Covid-19 market distress				
	β ADJ	Sharpe Ratio	Treynor Ratio	Jensen's Alpha	Information Ratio
S&P 500 Index	1,00	0,45	0,14	0,00	0,00
S&P 500 ESG Index	0,96	0,24	0,08	-0,06	-0,54
Xtrackers MSCI USA ESG UCITS ETF 1C	0,82	0,46	0,14	0,00	-0,40
Nuveen ESG Small-Cap ETF	1,03	0,13	0,05	-0,10	-0,56
iShares MSCI USA ESG Select ETF	0,97	0,62	0,20	0,05	0,38
Lyxor MSCI USA ESG Leaders Extra	0,80	0,43	0,14	-0,01	-0,51
BNPP Easy MSCI USA SRI S-Srs PAB 5% Cp ETF C	0,82	0,71	0,21	0,06	0,45
Xtrackers MSCI USA ESG Leaders Equity ETF	1,00	0,40	0,13	-0,02	-0,12
Vanguard ESG US Stock ETF	0,99	0,59	0,19	0,04	0,31
SPDR S&P 500 Fossil Fuel Reserves Free	0,98	0,48	0,16	0,01	0,06
iShares Russell Top 200 Growth Index Fund	1,01	1,10	0,34	0,19	1,56
iShares US Technology ETF	0,93	1,06	0,40	0,24	1,79
FlexShares STOXX US ESG Select Index Fund	0,89	0,54	0,19	0,04	0,18
iShares MSCI USA ESG Screened UCITS ETF USD Dist	0,84	0,49	0,15	0,00	-0,27
Lyxor MSCI USA ESG Broad CTB (DR) UCITS ETF - Dist	0,81	0,44	0,14	-0,01	-0,45
iShares ESG Aware MSCI USA Small-Cap ETF	1,02	0,09	0,03	-0,11	-0,65
JPM US Research Enhncd Idx Eq ESG UCITS ETF USD A	0,84	0,49	0,15	0,00	-0,26

Table 10. Risk measures for American ETFs and benchmark indices During Covid-19 market distress

Name	Covid-19 Recovery				
	β ADJ	Sharpe Ratio	Treynor Ratio	Jensen's Alpha	Information Ratio
S&P 500 Index	1,00	1,11	0,21	0,00	0,00
S&P 500 ESG Index	0,95	1,77	0,35	0,13	3,05
Xtrackers MSCI USA ESG UCITS ETF 1C	0,82	1,03	0,23	0,02	-0,32
Nuveen ESG Small-Cap ETF	1,06	1,36	0,24	0,03	0,87
iShares MSCI USA ESG Select ETF	0,97	1,04	0,20	-0,01	-0,27
Lyxor MSCI USA ESG Leaders Extra	0,80	0,98	0,23	0,02	-0,54
BNPP Easy MSCI USA SRI S-Srs PAB 5% Cp ETF C	0,81	0,98	0,22	0,02	-0,51
Xtrackers MSCI USA ESG Leaders Equity ETF	1,00	1,18	0,22	0,01	0,27
Vanguard ESG US Stock ETF	0,99	0,98	0,18	-0,02	-0,52
SPDR S&P 500 Fossil Fuel Reserves Free	0,99	1,04	0,20	-0,01	-0,29
iShares Russell Top 200 Growth Index Fund	0,99	0,78	0,15	-0,06	-1,16
iShares US Technology ETF	1,07	1,15	0,20	-0,01	0,15
FlexShares STOXX US ESG Select Index Fund	0,97	1,06	0,20	0,00	-0,20
iShares MSCI USA ESG Screened UCITS ETF USD Dist	0,81	0,80	0,18	-0,02	-1,39
Lyxor MSCI USA ESG Broad CTB (DR) UCITS ETF - Dist	0,81	0,74	0,17	-0,03	-1,62
iShares ESG Aware MSCI USA Small-Cap ETF	1,05	1,69	0,30	0,10	1,96
JPM US Research Enhncd Idx Eq ESG UCITS ETF USD A	0,82	1,00	0,23	0,02	-0,50

Table 11. Risk measures for American ETFs and benchmark indices in Covid-19 recovery

Name	Russo-Ukrainian War				
	β ADJ	Sharpe Ratio	Treynor Ratio	Jensen's Alpha	Information Ratio
S&P 500 Index	1,00	-0,37	-0,09	0,00	0,00
S&P 500 ESG Index	1,04	-0,12	-0,03	0,06	0,93
Xtrackers MSCI USA ESG UCITS ETF 1C	0,76	-0,21	-0,07	0,02	0,75
Nuveen ESG Small-Cap ETF	1,05	-0,53	-0,12	-0,03	-0,49
iShares MSCI USA ESG Select ETF	0,99	-0,42	-0,10	-0,01	-0,17
Lyxor MSCI USA ESG Leaders Extra	0,75	-0,22	-0,07	0,01	0,67
BNPP Easy MSCI USA SRI S-Srs PAB 5% Cp ETF C	0,82	-0,21	-0,06	0,02	0,69
Xtrackers MSCI USA ESG Leaders Equity ETF	1,00	-0,39	-0,09	-0,01	-0,08
Vanguard ESG US Stock ETF	1,04	-0,49	-0,11	-0,03	-0,44
SPDR S&P 500 Fossil Fuel Reserves Free	1,00	-0,41	-0,10	-0,01	-0,16
iShares Russell Top 200 Growth Index Fund	1,13	-0,46	-0,10	-0,01	-0,29
iShares US Technology ETF	1,23	-0,41	-0,08	0,01	-0,11
FlexShares STOXX US ESG Select Index Fund	1,00	-0,38	-0,09	0,00	-0,03
iShares MSCI USA ESG Screened UCITS ETF USD Dist	0,75	-0,24	-0,08	0,01	0,55
Lyxor MSCI USA ESG Broad CTB (DR) UCITS ETF - Dist	0,75	-0,28	-0,09	0,00	0,42
iShares ESG Aware MSCI USA Small-Cap ETF	1,06	-0,50	-0,11	-0,03	-0,42
JPM US Research Enhncd Idx Eq ESG UCITS ETF USD A	0,74	-0,15	-0,05	0,03	0,99

Table 12. Risk measures for American ETFs and benchmark indices in the Russo-Ukrainian War

Name	Before COVID-19 market distress				
	β ADJ	Sharpe Ratio	Treynor Ratio	Jensen's Alpha	Information Ratio
STOXX Europe 600	1,00	1,37	0,15	0,00	0,00
STOXX Europe 600 ESG-X	0,60	1,34	0,25	0,06	-0,03
iShares MSCI Europe Financials ETF	0,86	0,08	0,02	-0,12	-2,53
Ossiam Eur ESG Machine Learning UCITS ETF 1C/A	0,59	2,22	0,31	0,10	1,22
iShares STOXX Europe 600 Health Care (DE)	0,72	1,78	0,29	0,10	1,45
WisdomTree Europe Equity	0,94	0,99	0,14	-0,01	-0,46
Invesco STOXX Europe 600 Opt Chemicals U ETF Acc	0,97	1,16	0,17	0,02	0,31
Amundi Index Msci Europe Sri Pab	0,80	2,09	0,29	0,11	2,23
Amundi STOXX Euro 600 Engy ESG Scrnd UCITS ETF Acc	0,83	-0,34	-0,07	-0,18	-3,96
Lyxor MDAX ESG UCITS ETF I (D)	0,90	0,80	0,12	-0,03	-0,97
Amundi Index MSCI Europe ESG BROAD CTB ETF	0,83	0,71	0,10	-0,04	-1,59
Xtrackers MSCI Europe Health Care ESG Screen ETF1C	0,73	1,81	0,31	0,11	1,91
BNPPE MSCI Europ Sm Cp SRI SSrs PAB 5% Cppd ETF C	0,87	1,15	0,17	0,01	-0,12
iShares MSCI Europe ESG Enhanced UCITS ETF EUR Dis	0,85	0,92	0,13	-0,02	-1,03
BNP Paribas Easy ESG Quality Europe UCITS ETF C	0,82	0,71	0,10	-0,04	-2,05
AMUNDI ITALY MIB ESG	0,97	1,81	0,27	0,11	2,55
Invesco MSCI EU ESG Lds Cath Princpl UCITS ETF Dis	0,84	0,80	0,11	-0,03	-1,25
iShares MSCI Europe ESG Screened UCITS ETF EUR Acc	0,85	0,72	0,14	-0,01	-0,69
Xtrackers MSCI Europe ESG Screened UCITS ETF 1C	0,86	1,14	0,17	0,02	-0,11
Xtrackers MSCI Europe Financials ESG Screen ETF 1C	0,90	-0,01	0,00	-0,14	-2,19
Xtrackers MSCI Europe IT ESG Screened UCITS ETF 1C	1,04	1,27	0,22	0,07	1,53
iShares MSCI Europe SRI UCITS ETF EUR (Acc)	0,81	1,48	0,22	0,05	0,51

Table 13. Risk measures for European ETFs and benchmark indices Before Covid-19 market distress.

Name	During Covid-19 market distress				
	β ADJ	Sharpe Ratio	Treynor Ratio	Jensen's Alpha	Information Ratio
STOXX Europe 600	1,00	-0,54	-0,14	0,00	0,00
STOXX Europe 600 ESG-X	0,68	-0,53	-0,20	-0,04	0,05
iShares MSCI Europe Financials ETF	1,00	-0,40	-0,16	-0,03	-0,13
Ossiam Eur ESG Machine Learning UCITS ETF 1C/A	0,70	-0,40	-0,11	-0,05	0,92
iShares STOXX Europe 600 Health Care (DE)	0,71	0,05	0,01	0,09	4,04
WisdomTree Europe Equity	0,95	-0,43	-0,12	-0,03	0,31
Invesco STOXX Europe 600 Opt Chemicals U ETF Acc	0,91	0,07	0,02	0,04	2,41
Amundi Index Msci Europe Sri Pab	0,86	-0,36	-0,10	0,01	0,82
Amundi STOXX Euro 600 Engy ESG Scrnd UCITS ETF Acc	1,05	-0,66	-0,26	0,03	-1,92
Lyxor MDAX ESG UCITS ETF I (D)	0,89	0,11	0,03	0,02	1,86
Amundi Index MSCI Europe ESG BROAD CTB ETF	0,88	-0,20	-0,06	0,21	1,02
Xtrackers MSCI Europe Health Care ESG Screen ETF1C	0,87	0,06	0,01	0,25	3,53
BNPPE MSCI Europ Sm Cp SRI SSrs PAB 5% Cppd ETF C	0,91	-0,15	-0,05	0,04	0,83
iShares MSCI Europe ESG Enhanced UCITS ETF EUR Dis	0,88	-0,17	-0,05	0,00	1,29
BNP Paribas Easy ESG Quality Europe UCITS ETF C	0,83	0,01	0,00	-0,01	1,89
AMUNDI ITALY MIB ESG	0,97	-0,61	-0,19	-0,11	-0,45
Invesco MSCI EU ESG Lds Cath Princpl UCITS ETF Dis	0,92	0,01	0,00	-0,01	1,36
iShares MSCI Europe ESG Screened UCITS ETF EUR Acc	0,88	-0,11	-0,03	-1,07	1,58
Xtrackers MSCI Europe ESG Screened UCITS ETF 1C	0,89	-0,09	-0,03	-1,07	1,15
Xtrackers MSCI Europe Financials ESG Screen ETF 1C	1,03	-0,78	-0,27	-1,09	-1,07
Xtrackers MSCI Europe IT ESG Screened UCITS ETF 1C	0,98	0,55	0,16	-1,08	3,62
iShares MSCI Europe SRI UCITS ETF EUR (Acc)	0,86	0,04	0,01	-1,07	2,08

Table 14. Risk measures for European ETFs and benchmark indices During Covid-19 market distress.

Name	Covid-19 Recovery				
	β ADJ	Sharpe Ratio	Treynor Ratio	Jensen's Alpha	Information Ratio
STOXX Europe 600	1,00	1,06	0,19	0,00	0,00
STOXX Europe 600 ESG-X	0,70	1,04	0,27	0,05	-0,05
iShares MSCI Europe Financials ETF	1,04	1,34	0,23	0,04	0,56
Ossiam Eur ESG Machine Learning UCITS ETF 1C/A	0,67	0,66	0,18	-0,01	-2,22
iShares STOXX Europe 600 Health Care (DE)	0,68	0,11	0,03	-0,11	-3,42
WisdomTree Europe Equity	0,93	0,98	0,19	0,00	-0,31
Invesco STOXX Europe 600 Opt Chemicals U ETF Acc	0,87	0,73	0,15	-0,03	-1,19
Amundi Index Msci Europe Sri Pab	0,86	1,12	0,23	0,04	0,21
Amundi STOXX Euro 600 Engy ESG Scrnd UCITS ETF Acc	1,09	2,88	0,47	0,31	3,68
Lyxor MDAX ESG UCITS ETF I (D)	0,85	0,20	0,04	-0,13	-2,65
Amundi Index MSCI Europe ESG BROAD CTB ETF	0,88	0,62	0,13	-0,05	-1,49
Xtrackers MSCI Europe Health Care ESG Screen ETF1C	0,68	0,34	0,09	-0,07	-2,73
BNPPE MSCI Europ Sm Cp SRI SSrs PAB 5% Cppd ETF C	0,88	0,62	0,13	-0,06	-1,25
iShares MSCI Europe ESG Enhanced UCITS ETF EUR Dis	0,87	0,64	0,13	-0,05	-1,35
BNP Paribas Easy ESG Quality Europe UCITS ETF C	0,80	0,56	0,13	-0,05	-1,79
AMUNDI ITALY MIB ESG	0,98	1,65	0,30	0,11	1,57
Invesco MSCI EU ESG Lds Cath Princpl UCITS ETF Dis	0,91	0,42	0,08	-0,10	-1,92
iShares MSCI Europe ESG Screened UCITS ETF EUR Acc	0,87	0,77	0,16	-0,03	-0,94
Xtrackers MSCI Europe ESG Screened UCITS ETF 1C	0,87	0,92	0,19	0,00	-0,44
Xtrackers MSCI Europe Financials ESG Screen ETF 1C	1,08	2,16	0,36	0,18	1,93
Xtrackers MSCI Europe IT ESG Screened UCITS ETF 1C	0,94	0,21	0,04	-0,14	-2,09
iShares MSCI Europe SRI UCITS ETF EUR (Acc)	0,86	0,70	0,15	-0,04	-1,12

Table 15. Risk measures for European ETFs and benchmark indices in Covid-19 recovery

Name	Russo-Ukrainian War				
	β ADJ	Sharpe Ratio	Treynor Ratio	Jensen's Alpha	Information Ratio
STOXX Europe 600	1,00	0,24	0,05	0,00	0,00
STOXX Europe 600 ESG-X	0,70	0,22	0,06	0,01	-0,05
iShares MSCI Europe Financials ETF	0,96	-0,11	-0,02	-0,06	-0,80
Ossiam Eur ESG Machine Learning UCITS ETF 1C/A	0,59	0,04	0,01	-0,02	-0,92
iShares STOXX Europe 600 Health Care (DE)	0,64	0,23	0,07	0,02	-0,02
WisdomTree Europe Equity	0,95	0,79	0,16	0,11	1,87
Invesco STOXX Europe 600 Opt Chemicals U ETF Acc	0,89	0,12	0,03	-0,02	-0,40
Amundi Index Msci Europe Sri Pab	0,85	0,35	0,08	0,03	0,37
Amundi STOXX Euro 600 Engy ESG Scrnd UCITS ETF Acc	0,80	0,92	0,22	0,14	1,89
Lyxor MDAX ESG UCITS ETF I (D)	0,91	-0,63	-0,13	-0,16	-1,84
Amundi Index MSCI Europe ESG BROAD CTB ETF	0,85	0,13	0,03	-0,01	-0,35
Xtrackers MSCI Europe Health Care ESG Screen ETF1C	0,63	0,31	0,09	0,03	0,27
BNPPE MSCI Europ Sm Cp SRI SSrs PAB 5% Cppd ETF C	0,89	-0,55	-0,12	-0,14	-1,94
iShares MSCI Europe ESG Enhanced UCITS ETF EUR Dis	0,86	-0,03	-0,01	-0,04	-0,74
BNP Paribas Easy ESG Quality Europe UCITS ETF C	0,82	0,02	0,00	-0,03	-0,60
AMUNDI ITALY MIB ESG	0,98	0,44	0,09	0,04	0,54
Invesco MSCI EU ESG Lds Cath Princpl UCITS ETF Dis	0,91	0,01	0,00	-0,04	-0,59
iShares MSCI Europe ESG Screened UCITS ETF EUR Acc	0,85	0,24	0,05	0,01	0,00
Xtrackers MSCI Europe ESG Screened UCITS ETF 1C	0,85	0,25	0,06	0,01	0,03
Xtrackers MSCI Europe Financials ESG Screen ETF 1C	1,02	0,30	0,06	0,01	0,17
Xtrackers MSCI Europe IT ESG Screened UCITS ETF 1C	1,03	0,16	0,03	-0,02	-0,16
iShares MSCI Europe SRI UCITS ETF EUR (Acc)	0,85	0,21	0,05	0,00	-0,10

Table 16. Risk measures for European ETFs and benchmark indices in the Russo-Ukrainian War

Name	Before COVID-19 market distress						
	Mkt-Rf	SMB	HML	RMW	CMA	Mom	R-Squared
S&P 500 Index	0,0001	0,0905	0,0406	-0,0121	-0,0997	0,9686	0,99
S&P 500 ESG Index	0,0005	0,0319	0,1740	0,0209	-0,0669	1,0056	0,87
Xtrackers MSCI USA ESG UCITS ETF 1C	-0,0003	-0,2473	0,2087	0,0309	-0,2370	0,5385	0,36
Nuveen ESG Small-Cap ETF	0,0008	0,0054	-0,1113	0,0695	0,6447	0,9641	0,96
iShares MSCI USA ESG Select ETF	0,0002	0,1394	0,0965	-0,0052	-0,0601	0,9983	0,96
Lyxor MSCI USA ESG Leaders Extra	-0,0006	-0,1624	0,2116	0,0214	-0,2452	0,5378	0,36
BNPP Easy MSCI USA SRI S-Srs PAB 5% Cp ETF C	-0,0005	-0,1628	0,2541	-0,0007	-0,2205	0,5448	0,36
Xtrackers MSCI USA ESG Leaders Equity ETF	0,0007	0,1478	0,3576	0,0060	-0,2826	0,7452	0,61
Vanguard ESG US Stock ETF	0,0005	-0,0166	0,0334	-0,0258	-0,0065	1,0151	0,98
SPDR S&P 500 Fossil Fuel Reserves Free	0,0006	-0,0786	0,0011	0,0595	-0,0932	0,9793	0,93
iShares Russell Top 200 Growth Index Fund	0,0002	-0,2626	0,1642	-0,1955	-0,1458	1,0290	0,97
iShares US Technology ETF	-0,0017	-0,4475	-0,4238	-0,0818	0,1692	0,1851	0,10
FlexShares STOXX US ESG Select Index Fund	0,0003	-0,0369	0,1188	0,0397	-0,1149	0,9718	0,97
iShares MSCI USA ESG Screened UCITS ETF USD Dist	-0,0008	-0,1889	0,2659	0,0191	-0,2337	0,5242	0,37
Lyxor MSCI USA ESG Broad CTB (DR) UCITS ETF - Dist	-0,0008	-0,1972	0,2589	0,0268	-0,2279	0,5118	0,37
iShares ESG Aware MSCI USA Small-Cap ETF	0,0007	0,0928	-0,0816	0,0876	0,6221	0,9780	0,97
JPM US Research Enhncd Idx Eq ESG UCITS ETF USD A	-0,0009	-0,2109	0,2641	0,0330	-0,2300	0,5160	0,37

Table 17. Fama-French 5 Factor and Momentum Analysis – American ETFs – Before Covid-19 market distress.

Name	During Covid-19 market distress						
	Mkt-Rf	SMB	HML	RMW	CMA	Mom	R-Squared
S&P 500 Index	0,0000	0,1011	0,0247	-0,0096	-0,0812	1,0058	1,00
S&P 500 ESG Index	-0,0001	-0,0056	0,0205	-0,0914	-0,0999	1,0404	0,96
Xtrackers MSCI USA ESG UCITS ETF 1C	-0,0037	-0,3436	-0,0372	-0,1566	0,1749	-0,0716	0,10
Nuveen ESG Small-Cap ETF	0,0002	-0,0740	-0,1783	0,1484	0,6921	1,0386	0,98
iShares MSCI USA ESG Select ETF	0,0000	0,3032	-0,0225	-0,0407	-0,0553	0,9758	0,98
Lyxor MSCI USA ESG Leaders Extra	-0,0037	-0,2861	-0,1437	-0,1628	0,1823	-0,0397	0,09
BNPP Easy MSCI USA SRI S-Srs PAB 5% Cp ETF C	-0,0037	-0,1626	-0,0662	-0,1923	0,1766	-0,0703	0,09
Xtrackers MSCI USA ESG Leaders Equity ETF	0,0004	0,0638	-0,0281	0,0030	-0,0157	1,0095	0,99
Vanguard ESG US Stock ETF	0,0005	-0,0366	0,0282	-0,0018	0,0239	0,9748	0,99
SPDR S&P 500 Fossil Fuel Reserves Free	0,0002	0,0879	0,0142	-0,0128	-0,0210	0,9818	0,99
iShares Russell Top 200 Growth Index Fund	-0,0003	-0,2019	0,2190	-0,2852	-0,1656	1,0034	0,99
iShares US Technology ETF	-0,0004	-0,3848	0,2846	-0,3831	-0,1249	1,1298	0,97
FlexShares STOXX US ESG Select Index Fund	-0,0004	0,0962	0,0297	-0,0813	-0,0148	0,9597	0,98
iShares MSCI USA ESG Screened UCITS ETF USD Dist	-0,0040	-0,3098	-0,0931	-0,1844	0,1389	-0,0327	0,09
Lyxor MSCI USA ESG Broad CTB (DR) UCITS ETF - Dist	-0,0037	-0,2607	-0,0858	-0,1639	0,1766	-0,0484	0,10
iShares ESG Aware MSCI USA Small-Cap ETF	-0,0005	-0,0932	-0,1051	0,1028	0,6131	1,0095	0,99
JPM US Research Enhncd Idx Eq ESG UCITS ETF USD A	-0,0037	-0,2615	-0,1005	-0,1458	0,1437	-0,0436	0,09

Table 18. Fama-French 5 Factor and Momentum Analysis – American ETFs – During the Covid-19 market

Name	Covid-19 Recovery						
	Mkt-Rf	SMB	HML	RMW	CMA	Mom	R-Squared
S&P 500 Index	-0,0002	-0,0017	0,0951	0,0229	-0,0978	0,9340	0,97
S&P 500 ESG Index	-0,0005	-0,0806	0,1537	0,0227	-0,1774	0,8319	0,73
Xtrackers MSCI USA ESG UCITS ETF 1C	0,0003	-0,2320	-0,0868	0,1713	-0,1934	0,5050	0,23
Nuveen ESG Small-Cap ETF	-0,0001	0,0149	0,0562	-0,0009	0,7557	0,8877	0,88
iShares MSCI USA ESG Select ETF	0,0000	-0,0305	0,1245	-0,0203	-0,0362	0,9239	0,95
Lyxor MSCI USA ESG Leaders Extra	0,0003	-0,2138	-0,0507	0,1316	-0,1660	0,4830	0,23
BNPP Easy MSCI USA SRI S-Srs PAB 5% Cp ETF C	0,0006	-0,2094	-0,0066	0,1373	-0,1258	0,4693	0,22
Xtrackers MSCI USA ESG Leaders Equity ETF	-0,0003	-0,1029	0,1314	0,0216	-0,0844	0,9235	0,93
Vanguard ESG US Stock ETF	0,0000	-0,0608	0,0861	-0,0563	-0,0221	0,9463	0,97
SPDR S&P 500 Fossil Fuel Reserves Free	-0,0003	-0,0113	0,1185	-0,0024	-0,0919	0,9268	0,96
iShares Russell Top 200 Growth Index Fund	0,0003	0,1042	0,1140	-0,3123	-0,2156	1,0497	0,95
iShares US Technology ETF	0,0005	0,2008	0,0477	-0,4382	-0,1637	1,1542	0,93
FlexShares STOXX US ESG Select Index Fund	-0,0002	0,0064	0,0826	0,0196	-0,1105	0,9393	0,94
iShares MSCI USA ESG Screened UCITS ETF USD Dist	0,0003	-0,1482	-0,1171	0,1474	-0,1888	0,4989	0,24
Lyxor MSCI USA ESG Broad CTB (DR) UCITS ETF - Dist	0,0002	-0,1427	-0,1206	0,1555	-0,1880	0,5006	0,24
iShares ESG Aware MSCI USA Small-Cap ETF	0,0000	-0,0640	-0,0472	0,1134	0,6583	0,9345	0,95
JPM US Research Enhncd Idx Eq ESG UCITS ETF USD A	0,0003	-0,1358	-0,0559	0,1625	-0,1901	0,5027	0,24

Table 19. Fama-French 5 Factor and Momentum Analysis – American ETFs – Covid-19 recovery.

Name	Russo-Ukrainian War						
	Mkt-Rf	SMB	HML	RMW	CMA	Mom	R-Squared
S&P 500 Index	-0,0001	0,0521	0,0668	0,0087	-0,1140	0,9880	1,00
S&P 500 ESG Index	0,0007	0,1291	0,0679	-0,1473	-0,0705	0,8033	0,81
Xtrackers MSCI USA ESG UCITS ETF 1C	-0,0036	0,1693	-0,2845	0,2920	-0,2711	0,3944	0,33
Nuveen ESG Small-Cap ETF	0,0005	-0,0732	-0,0053	0,1662	0,8062	1,0330	0,97
iShares MSCI USA ESG Select ETF	-0,0003	0,0306	0,1200	-0,0061	0,0015	1,0051	0,99
Lyxor MSCI USA ESG Leaders Extra	-0,0037	0,1496	-0,2972	0,3070	-0,2643	0,4024	0,34
BNPP Easy MSCI USA SRI S-Srs PAB 5% Cp ETF C	-0,0040	0,2335	-0,2664	0,3216	-0,2189	0,3808	0,28
Xtrackers MSCI USA ESG Leaders Equity ETF	0,0000	-0,0200	0,1352	-0,0621	-0,0673	0,9715	0,98
Vanguard ESG US Stock ETF	-0,0005	-0,0089	0,0895	-0,0538	-0,0394	1,0112	0,99
SPDR S&P 500 Fossil Fuel Reserves Free	-0,0003	0,0407	0,1214	-0,0352	-0,0952	0,9676	0,99
iShares Russell Top 200 Growth Index Fund	-0,0003	0,0140	0,1109	-0,2597	-0,3024	1,0903	0,98
iShares US Technology ETF	-0,0017	0,0706	0,1091	-0,3329	-0,2948	1,1839	0,94
FlexShares STOXX US ESG Select Index Fund	-0,0003	-0,0074	-0,0012	0,0553	-0,1226	0,9843	0,98
iShares MSCI USA ESG Screened UCITS ETF USD Dist	-0,0040	0,2263	-0,3330	0,3226	-0,2903	0,4190	0,36
Lyxor MSCI USA ESG Broad CTB (DR) UCITS ETF - Dist	-0,0036	0,1875	-0,3331	0,3440	-0,2697	0,4225	0,36
iShares ESG Aware MSCI USA Small-Cap ETF	0,0003	-0,0876	-0,0550	0,2037	0,7593	1,0350	0,98
JPM US Research Enhncd Idx Eq ESG UCITS ETF USD A	-0,0036	0,1803	-0,3207	0,3568	-0,3091	0,4140	0,35

Table 20. Fama-French 5 Factor and Momentum Analysis – American ETFs – Russo-Ukrainian War

Name	Before COVID-19 market distress						
	Mkt-Rf	SMB	HML	RMW	CMA	Mom	R-Squared
STOXX Europe 600	-0,0006	-0,1223	0,0408	0,1009	-0,5481	0,7673	0,82
STOXX Europe 600 ESG-X	-0,0007	-0,1353	0,0741	0,1294	-0,5274	0,7766	0,81
iShares MSCI Europe Financials ETF	-0,0034	-0,7567	-0,4306	0,6571	-0,1356	0,8265	0,53
Ossiam Eur ESG Machine Learning UCITS ETF 1C/A	0,0021	-0,0946	-0,1462	0,0327	-0,4643	0,5231	0,67
iShares STOXX Europe 600 Health Care (DE)	0,0034	0,2188	-0,4736	-0,5981	-0,1508	0,8059	0,61
WisdomTree Europe Equity	-0,0029	-0,3426	-0,1200	-0,0385	-0,6079	0,8470	0,79
Invesco STOXX Europe 600 Opt Chemicals U ETF Acc	-0,0026	-0,2714	0,0966	0,1652	-0,7164	0,8362	0,70
Amundi Index Msci Europe Sri Pab	0,0003	-0,1864	0,1094	0,1423	-0,6195	0,7277	0,77
Amundi STOXX Euro 600 Engy ESG Scrnd UCITS ETF Acc	-0,0005	0,1357	1,6196	1,4154	-0,7706	0,6827	0,59
Lyxor MDAX ESG UCITS ETF I (D)	-0,0022	-0,2357	-0,1896	-0,3855	-0,0620	1,0157	0,78
Amundi Index MSCI Europe ESG BROAD CTB ETF	0,0006	0,1705	0,0635	0,0973	-0,1491	0,9938	0,80
Xtrackers MSCI Europe Health Care ESG Screen ETF1C	0,0039	0,3477	-0,2986	-0,5260	-0,2592	0,8612	0,65
BNPPE MSCI Europ Sm Cp SRI SSrs PAB 5% Cppd ETF C	-0,0009	-0,0703	-0,0782	-0,1895	0,6452	1,1517	0,80
iShares MSCI Europe ESG Enhanced UCITS ETF EUR Dis	0,0006	0,1817	0,1776	0,0455	-0,2095	0,9293	0,78
BNP Paribas Easy ESG Quality Europe UCITS ETF C	0,0010	0,0998	0,2811	-0,0812	-0,0338	0,9436	0,80
AMUNDI ITALY MIB ESG	-0,0001	-0,5938	-0,5607	0,4616	-0,8295	0,7995	0,67
Invesco MSCI EU ESG Lds Cath Princpl UCITS ETF Dis	-0,0004	-0,2782	0,0994	0,2499	-0,0187	-0,0545	0,01
iShares MSCI Europe ESG Screened UCITS ETF EUR Acc	-0,0005	0,2767	-0,2313	-0,1426	-0,5918	0,9752	0,51
Xtrackers MSCI Europe ESG Screened UCITS ETF 1C	-0,0004	-0,1016	0,2027	0,0620	0,1616	1,1041	0,83
Xtrackers MSCI Europe Financials ESG Screen ETF 1C	-0,0055	0,2596	-1,1377	0,3649	0,0736	1,2423	0,85
Xtrackers MSCI Europe IT ESG Screened UCITS ETF 1C	-0,0017	-0,4773	-0,1307	-0,4421	-0,0220	1,3517	0,71
iShares MSCI Europe SRI UCITS ETF EUR (Acc)	0,0013	0,0898	0,1063	0,0468	-0,1449	0,9927	0,83

Table 21. Fama-French 5 Factor and Momentum Analysis – European ETFs – Before Covid-19 market distress.

Name	During Covid-19 market distress						
	Mkt-Rf	SMB	HML	RMW	CMA	Mom	R-Squared
STOXX Europe 600	-0,0046	1,0505	-0,6584	-1,1156	1,8959	0,4070	0,22
STOXX Europe 600 ESG-X	0,0007	0,5034	-0,1034	-0,1514	-0,3128	0,9205	0,94
iShares MSCI Europe Financials ETF	-0,0174	-2,8769	0,3714	-0,2579	0,1718	0,0592	0,21
Ossiam Eur ESG Machine Learning UCITS ETF 1C/A	0,0024	0,9117	-0,4491	-0,6703	-0,0837	0,7755	0,85
iShares STOXX Europe 600 Health Care (DE)	0,0014	0,9958	-0,7877	-1,3064	0,1411	0,8009	0,77
WisdomTree Europe Equity	-0,0002	0,5702	-0,1837	-0,1706	-0,3119	0,8903	0,90
Invesco STOXX Europe 600 Opt Chemicals U ETF Acc	0,0006	0,4981	-0,0302	-0,1299	-0,4475	0,8032	0,83
Amundi Index Msci Europe Sri Pab	0,0014	0,3106	0,2797	0,0247	-0,4119	0,8718	0,93
Amundi STOXX Euro 600 Engy ESG Scrnd UCITS ETF Acc	0,0025	1,3229	2,4649	1,5245	-0,5736	0,9379	0,79
Lyxor MDAX ESG UCITS ETF I (D)	-0,0016	-0,3672	0,0026	-0,1994	0,5124	1,0708	0,85
Amundi Index MSCI Europe ESG BROAD CTB ETF	-0,0039	0,6715	0,5876	-0,4702	0,4860	0,8150	0,64
Xtrackers MSCI Europe Health Care ESG Screen ETF1C	0,0014	0,7898	-0,2935	-1,1452	-0,2150	0,8227	0,83
BNPPE MSCI Europ Sm Cp SRI SSrs PAB 5% Cppd ETF C	-0,0027	-0,2096	0,2997	-0,1240	0,8127	1,1239	0,94
iShares MSCI Europe ESG Enhanced UCITS ETF EUR Dis	-0,0013	0,3347	0,0985	-0,3542	-0,0335	0,9655	0,95
BNP Paribas Easy ESG Quality Europe UCITS ETF C	0,0000	0,4062	0,0726	-0,2620	0,0421	0,9220	0,94
AMUNDI ITALY MIB ESG	0,0015	0,4681	-0,4532	0,2528	-0,4232	0,9421	0,83
Invesco MSCI EU ESG Lds Cath Princpl UCITS ETF Dis	-0,0103	-2,0366	-0,0553	-0,5081	-0,1490	0,4345	0,32
iShares MSCI Europe ESG Screened UCITS ETF EUR Acc	0,0001	0,1352	-0,0840	-0,1224	-0,1187	0,9911	0,94
Xtrackers MSCI Europe ESG Screened UCITS ETF 1C	-0,0048	0,4212	0,0427	-0,7425	0,8566	0,9413	0,65
Xtrackers MSCI Europe Financials ESG Screen ETF 1C	-0,0042	0,4962	-1,0061	0,2137	-0,1378	1,0148	0,92
Xtrackers MSCI Europe IT ESG Screened UCITS ETF 1C	-0,0019	-0,6822	0,3218	-0,3960	0,0273	1,0892	0,84
iShares MSCI Europe SRI UCITS ETF EUR (Acc)	-0,0008	0,1836	0,1114	-0,3562	-0,0413	0,9461	0,94

Table 22. Fama-French 5 Factor and Momentum Analysis – European ETFs – During Covid-19 market distress.

Name	Covid-19 Recovery						Mom	R-Squared
	Mkt-Rf	SMB	HML	RMW	CMA			
STOXX Europe 600	-0,0005	-0,0115	-0,0549	-0,0300	-0,4158	0,8221	0,85	
STOXX Europe 600 ESG-X	-0,0004	-0,0374	-0,0477	-0,0280	-0,4177	0,8160	0,85	
iShares MSCI Europe Financials ETF	-0,0026	-0,8103	-0,5879	0,7355	-0,2222	0,9004	0,71	
Ossiam Eur ESG Machine Learning UCITS ETF 1C/A	0,0014	0,2933	-0,0061	-0,3730	-0,5337	0,4842	0,69	
iShares STOXX Europe 600 Health Care (DE)	-0,0006	0,3194	0,0071	-0,5497	-0,2829	0,6212	0,52	
WisdomTree Europe Equity	-0,0005	-0,1217	-0,0091	0,0089	-0,5682	0,8021	0,77	
Invesco STOXX Europe 600 Opt Chemicals U ETF Acc	0,0010	0,0901	0,3224	0,1024	-0,5177	0,7511	0,66	
Amundi Index Msci Europe Sri Pab	-0,0009	-0,1648	0,0568	-0,1092	-0,5174	0,8076	0,83	
Amundi STOXX Euro 600 Engy ESG Scrnd UCITS ETF Acc	-0,0018	0,0934	-0,3608	0,6543	-0,0729	1,0464	0,62	
Lyxor MDAX ESG UCITS ETF I (D)	0,0007	-0,2175	-0,1755	-0,1143	0,1998	0,9578	0,84	
Amundi Index MSCI Europe ESG BROAD CTB ETF	-0,00003	0,12173	0,04664	0,03050	-0,17454	0,97421	0,89	
Xtrackers MSCI Europe Health Care ESG Screen ETF1C	-0,0004	0,6429	0,0990	-0,7576	-0,4943	0,6942	0,65	
BNPPE MSCI Europ Sm Cp SRI SSrs PAB 5% Cppd ETF C	-0,0002	-0,0162	0,1644	0,1096	0,5964	1,1113	0,86	
iShares MSCI Europe ESG Enhanced UCITS ETF EUR Dis	-0,0002	0,0854	0,0509	0,0405	-0,1572	0,9638	0,91	
BNP Paribas Easy ESG Quality Europe UCITS ETF C	0,0005	0,1911	0,2403	-0,1279	-0,0153	0,9518	0,90	
AMUNDI ITALY MIB ESG	-0,0004	-0,2659	-0,3210	0,2501	-0,3983	0,9043	0,74	
Invesco MSCI EU ESG Lds Cath Princpl UCITS ETF Dis	-0,0004	-0,1250	-0,0455	0,0062	-0,1499	1,0400	0,93	
iShares MSCI Europe ESG Screened UCITS ETF EUR Acc	0,0000	-0,0224	0,0101	0,0131	-0,2283	0,9715	0,92	
Xtrackers MSCI Europe ESG Screened UCITS ETF 1C	0,0005	0,0525	-0,0292	-0,0288	0,0502	0,9677	0,86	
Xtrackers MSCI Europe Financials ESG Screen ETF 1C	-0,0026	-0,7546	-0,4539	1,1463	0,1547	1,1985	0,85	
Xtrackers MSCI Europe IT ESG Screened UCITS ETF 1C	0,0010	-0,8778	-0,2098	-0,2557	-0,0270	1,1587	0,79	
iShares MSCI Europe SRI UCITS ETF EUR (Acc)	-0,0004	-0,0519	0,0570	-0,0907	-0,2358	0,9430	0,89	

Table 23. Fama-French 5 Factor and Momentum Analysis – European ETFs – Covid-19 recovery.

Name	Russo-Ukrainian War						Mom	R-Squared
	Mkt-Rf	SMB	HML	RMW	CMA			
STOXX Europe 600	0,0002	-0,2402	-0,1375	-0,0218	-0,4616	0,6234	0,84	
STOXX Europe 600 ESG-X	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,85	
iShares MSCI Europe Financials ETF	-0,0022	-0,2885	-0,7728	0,6354	-0,2528	0,9531	0,72	
Ossiam Eur ESG Machine Learning UCITS ETF 1C/A	0,0011	0,1026	-0,0758	-0,3323	-0,3265	0,4618	0,67	
iShares STOXX Europe 600 Health Care (DE)	0,0029	0,4188	-0,0783	-0,6313	-0,0958	0,7290	0,68	
WisdomTree Europe Equity	-0,0015	-0,0421	-0,1069	-0,0368	-0,5921	0,6448	0,81	
Invesco STOXX Europe 600 Opt Chemicals U ETF Acc	-0,0017	-0,0888	0,4014	0,1220	-0,5816	0,6573	0,73	
Amundi Index Msci Europe Sri Pab	-0,0008	-0,2548	0,0022	-0,1573	-0,6240	0,5482	0,82	
Amundi STOXX Euro 600 Engy ESG Scrnd UCITS ETF Acc	0,0059	-0,6500	0,8691	1,3438	0,2598	0,7216	0,47	
Lyxor MDAX ESG UCITS ETF I (D)	-0,0027	-0,1716	-0,1134	0,2539	0,3454	1,1821	0,91	
Amundi Index MSCI Europe ESG BROAD CTB ETF	0,0008	0,0642	-0,0726	-0,0603	-0,1099	0,9995	0,94	
Xtrackers MSCI Europe Health Care ESG Screen ETF1C	0,0040	0,3395	-0,1408	-0,7623	-0,1177	0,7367	0,71	
BNPPE MSCI Europ Sm Cp SRI SSrs PAB 5% Cppd ETF C	-0,0023	-0,1570	-0,0116	0,0954	0,5158	1,0749	0,92	
iShares MSCI Europe ESG Enhanced UCITS ETF EUR Dis	-0,0004	0,1889	-0,0296	-0,1109	-0,1396	1,0046	0,94	
BNP Paribas Easy ESG Quality Europe UCITS ETF C	-0,0008	-0,1329	0,2177	0,0164	-0,0890	0,8775	0,82	
AMUNDI ITALY MIB ESG	-0,0012	-0,8345	-0,5265	0,6413	-0,7019	0,6593	0,78	
Invesco MSCI EU ESG Lds Cath Princpl UCITS ETF Dis	-0,0017	0,0425	0,0253	-0,0121	-0,2748	1,0188	0,96	
iShares MSCI Europe ESG Screened UCITS ETF EUR Acc	0,0005	0,0233	-0,0460	-0,0676	-0,2037	1,0044	0,96	
Xtrackers MSCI Europe ESG Screened UCITS ETF 1C	0,0011	0,1707	-0,1069	-0,1902	-0,0688	1,0137	0,91	
Xtrackers MSCI Europe Financials ESG Screen ETF 1C	-0,0002	-0,0925	-0,7836	0,4174	-0,1499	1,1716	0,92	
Xtrackers MSCI Europe IT ESG Screened UCITS ETF 1C	-0,0032	-0,3180	0,5041	-0,2053	-0,0995	1,1390	0,87	
iShares MSCI Europe SRI UCITS ETF EUR (Acc)	-0,0004	0,1502	0,0317	-0,2405	-0,1845	0,9615	0,95	

Table 24. Fama-French 5 Factor and Momentum Analysis – European ETFs – Russo-Ukrainian War