Do investors achieve any benefits when investing with ESG objectives? Risk-Return efficiency and performance analysis of equity investment funds in Europe based on the Sustainable Finance Disclosure Regulation (SFDR).

Draft version

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Abstract

This study investigates whether investors benefit from selecting equity funds that integrate ESG factors, as categorized under the EU's Sustainable Finance Disclosure Regulation (SFDR). By evaluating a sample of 4,779 equity funds traded in Europe and classifying them according to Articles 6, 8, and 9 of the SFDR, the analysis aims to determine whether sustainability-focused funds deliver superior risk-return efficiency. Drawing on performance and risk metrics such as beta, Sharpe ratio, Alpha, Jensen's alpha, and total returns, the study uses methods including descriptive statistics, One-Way-ANOVA, linear regression and logit model to assess differences across SFDR classifications. The study suggests that funds compliant with Articles 8 and 9 may exhibit more consistent results for certain efficiency measures compared to non-sustainable funds, but results vary depending on the specific metric and time frame. Once again burden of regulatory compliance has been confirmed for ESG funds resulting in higher costs. Decreasing the investment universe of ESG funds had impact on lower Alpha returns for these funds. The study contributes to the limited but growing body of literature analyzing fund performance directly through the lens of SFDR classification, rather than ESG ratings alone. These insights have practical implications for investors, fund managers, and regulators seeking to understand the financial impact of sustainability objectives in portfolio construction.

KEY WORDS

SFDR, Risk-Return of equity ESG funds, ESG fund performance, sustainable investments, market transparency

1 | Introduction

The increasing awareness of environmental, social, and governance (ESG) factors among investors has led to a growing interest in sustainable investing, with a significant portion of European investors now considering ESG criteria when making investment decisions (Hartzmark et al. 2019).

The Sustainable Finance Disclosure Regulation (SFDR), implemented by the European Union on March 10, 2021, has several critical objectives designed to foster a more transparent and

sustainable financial landscape. The primary goals include enhancing the transparency requirements for financial market participants in their sustainability-related disclosures, enabling investors to make informed decisions based on reliable and comparable information (Bengo et al., 2022). The SFDR's framework seeks to reduce greenwashing, which involves exaggerating or misrepresenting the environmentally friendly nature of products or services (Bengo et al., 2022; Maheresmi et al., 2023).

Additional point of action addressed by the SFDR is that it aims to improve the consistency and

comparability of sustainability disclosures across financial institutions. By standardizing what must be disclosed regarding ESG factors, the regulation facilitates a clearer understanding of how different products perform in terms of sustainability. This is particularly significant as it addresses the diverse interpretations of sustainability that have previously existed, leading to confusion among investors and potential greenwashing by firms (Gebhardt et al., 2023).

Moreover, the SFDR reflects a broader commitment to achieving sustainable development goals (SDGs). Its emphasis on sustainability reporting aligns with global initiatives aimed at addressing climate change and promoting sustainable finance as a fundamental component of economic growth (Seabrooke & Stenström, 2022). This connection to the SDGs is critical, as it positions the SFDR not only as a regulatory measure but also as part of a collective effort to guide the financial industry toward greater social responsibility (Zhang & Xie, 2024).

The most important aim of the SFDR in the light of this paper is the classification of equity investment funds according to their ESG objectives. The SFDR introduces three main categories which will be the reference for equity funds:

(1a) products with no specific sustainability focus: Article 6.

(1b) products promoting ESG characteristics: Article 8.

(1c) products targeting specific sustainable investments e.g. renewable energy, sustainable water usage or carbon reduction: Article 9.

Investing in ESG funds, particularly within the framework of the SFDR, has garnered significant attention due to its implications for financial performance and sustainability outcomes for investors. Several studies highlight various aspects of investor returns from ESG investments, suggesting that integrating ESG factors can yield beneficial results (Friede et al. 2015).

There is a vivid debate in the literature on this topic. A study by Eccles et al. (2014) highlights that companies with strong sustainability performance face lower capital costs, resulting in improved financial performance over the long term. Their findings indicate that firms integrating ESG factors are likely to experience lower levels of risk, which correlates to better overall returns for investors. According to a report by the World Economic Forum (2019), companies that proactively address ESG factors are likely to outperform their competitors in the long run, which translates into better returns for investors. The report cites various case studies highlighting the resilient performance of firms that prioritize sustainability.

A 2020 study by Ali et al. analyzes the relationship between ESG performance and equity returns across international markets. Their findings suggest a positive correlation, with better ESG ratings leading to enhanced financial performance, particularly in sectors where sustainability is critical. A sector-specific analysis by Zhu et al. (2021) highlights that ESG integration can produce varying effects across industries. The study identifies sectors such as renewable energy and technology where ESG considerations have led to significantly higher returns compared to traditional sectors.

This article is structured in the following order: Section 2 focuses on the literature review with regards to risk-return & performance of ESG funds and develops stated hypothesizes. Section 3 describes characteristics of data sample used, process of cleaning the data and methods implemented. Section 4 focuses on presenting the results of the study. Section 5 aims to discuss the mail findings and lastly, Section 6 sums up the conclusions of this research and explain possible implications and presents occurring limitations.

2 | Theoretical background and hypothesis

Investment strategies in socially responsible funds (SRI) are shaped by criteria that prioritize ESG considerations over purely financial performance. These funds typically rely on two main approaches: exclusionary and inclusionary screening. Exclusionary (or negative) screening filters out companies or industries that engage in practices deemed harmful or unethical, such as fossil fuels or arms manufacturing. Inclusionary (or positive) screening, on the other hand, aims to identify and invest in companies that lead their sectors in ESG performance - a method often referred to as the "best-in-class" approach (Widyawati, 2020). The degree to which a mutual fund integrates these ESG-

based criteria reflects its overall commitment to sustainability, which is commonly evaluated through independent sustainability ratings.

While higher ESG scores are often associated with ethical performance, the evidence does not consistently support a direct correlation between ESG ratings and superior financial returns. Research conducted by He et al. found that the screening processes used in ESG funds do not significantly impact financial performance, suggesting that while ESG scores can provide insights into ethical performance, these scores do not necessarily indicate better financial outcomes for investors He et al. (2023). Similarly, findings from Lo indicate that while adopting ESG principles can mitigate certain risks, the advantages do not guarantee higher financial returns. The effective execution of ESG strategies necessitates ongoing modifications to prevent pitfalls like greenwashing (Lo, 2024).

The diversity and subjectivity of ESG ratings present challenges, as ratings can vary significantly between providers due to different methodologies and perspectives. Curtis et al. argue that ESG mutual funds should not be evaluated solely on assigned ratings but should be examined in conjunction with quantitative and qualitative factors that reflect actual performance and risk management practices (Curtis et al., 2021).

Additionally, Amosh et al. observe that stakeholders' interest in ESG performance extends beyond numerical evaluations; they seek transparency and accountability, which are not fully captured by ESG ratings. Relying exclusively on these ratings without comprehensive analysis could lead to misallocation of funds and a neglect of underlying corporate practices (Amosh et al., 2022).

Investing in ESG funds, particularly within the framework of the SFDR, has garnered significant attention due to its implications for financial performance and sustainability outcomes for investors. Several studies highlight various aspects of investor returns from ESG investments, suggesting that integrating ESG factors can yield beneficial results.

Numerous studies demonstrate that ESG indices often outperform conventional indices, particularly during periods of market distress. For example, Górka and Kuziak found that ESG investments exhibited lower volatility and better recovery after economic downturns, implying a risk-adjusted return advantage for socially responsible funds compared to their conventional counterparts (Bengo et al., 2022). This resilience indicates that embracing ESG principles may align investments with ethical standards while providing a financial safety net against market fluctuations.

Research by Gupta and Chaudhary emphasizes that ESG indices have shown superior performance in both developed and emerging markets, reinforcing the notion that investors can achieve positive results through ESG-focused strategies. Their findings reveal an upward trend in returns, especially for investments in firms with robust ESG practices (Fricke & Schlepper, 2024). However, it is important to note that ESG factors are not static; they can evolve due to regulatory shifts, changing consumer preferences, and evolving industry norms, which presents a dynamic landscape for ESG integration in investment strategies (Fricke & Schlepper, 2024).

Yunus and Nanda highlight the growing demand for ESG-integrated investment products, establishing a connection between institutional recognition of material ESG factors and better risk-adjusted returns. They note that institutional investors are increasingly aligning their strategies with sustainability objectives, which drives positive performance outcomes (Cremasco & Boni, 2022). Investments in firms that adhere to strong ESG standards are generally viewed favorably by the market, as they alleviate long-term risks and potentially enhance shareholder value.

Moreover, studies by Kulal et al. illustrate that companies with strong ESG performance tend to generate higher stock prices and better investment outcomes compared to those with less favorable ESG traits (Gebhardt et al., 2023). Such empirical insights suggest that incorporating ESG factors into investment decisions correlates with enhanced financial performance. The findings from this body of research provide a compelling case for investors looking to optimize both financial returns and social impact through ESG investments.

Additionally, the analysis involving portfolio optimization, as examined by Jia, indicates that ESG considerations lead to superior risk-adjusted returns. The study underscores that integrating ESG factors into portfolio management

strategies aligns investor goals with societal benefits, presenting an additive layer to performance metrics (Cosma et al., 2023).

There is also a strong presence of views that undermine ESG factors when it comes to risk-adjusted returns. Research conducted by Bauer et al. highlights that the risk-adjusted returns of ethical mutual funds are statistically indistinguishable from those of conventional funds. Their analysis employed metrics such as Jensen's alpha, Sharpe ratio, and Treynor ratio, evidencing that social screening does not systematically enhance investment performance (Cremasco & Boni, 2022). This finding suggests that incorporating ESG criteria may not necessarily lead to improved financial outcomes for investors, challenging the commonly held belief that sustainable investing inherently yields higher returns.

Similarly, Bello's work supports this notion by demonstrating no significant differences in performance between socially responsible investment (SRI) funds and traditional mutual funds. Bello's study observed that both socially responsible and conventional funds underperformed relative to major market indices, thus raising questions about whether SRI funds deliver better risk-adjusted returns or if they merely reflect broader market performance (Fricke & Schlepper, 2024).

A more recent investigation by Nair et al. reveals that while the sustainability index had lower risk-adjusted returns compared to traditional investments, the differences were not statistically significant regarding overall returns. This suggests that investors may be sacrificing potential higher returns for sustainable criteria without a corresponding return on that sacrifice (Gebhardt et al., 2023).

Further research from Sim and Kim indicates that while ESG funds maintain higher ESG scores, this attribute is negatively correlated with future risk-adjusted performance. Their findings indicate that higher ESG scores do not equate to better performance outcomes compared to conventional funds, implying that ESG-focused strategies may not significantly differ in their financial efficacy and could be adversely impacted by the associated costs of maintaining those standards (Cosma et al., 2023).

Kwak et al. also address this issue, indicating the absence of consistent evidence showing that ESG funds outperform non-ESG funds. Their analysis suggests that constraining investment to ESG strategies can lead to diminished performance, supporting the assertion that an exclusively ESG-focused approach might not yield better financial outcomes when considering risk-adjusted returns (Becker et al., 2022).

2.1 Risk-adjusted results and performance of ESG funds

It has been confirmed by the literature review that there is strong belief over difference between ESG and non-ESG funds. With regards to this assumption the following hypothesis is stated:

Hypothesis 1. There is a significant difference between funds that promote ESG (article 8, SFDR Regulation) and funds that have sustainable investment as its objective (article 9, SFDR Regulation) over funds that do not consider ESG criteria (article 6, SFDR Regulation) between their risk-adjusted ratios as follows:

(1a) Beta 6 months

(1b) Sharpe ratio 6 months

(1c) Treynor ratio 6 months

(1d) Information ratio 6 months

(1e) Total return 1 Year

(1f) Total return 3 Year

(1g) Expense Ratio

(1h) Sortino 6 months

(1i) Alpha 3 Year

(1j) Jensen Alpha 6 months

(1k) Total Assets Under Management US$

2.2 Beta of ESG funds

ESG investments have increasingly been recognized for their potential to mitigate risks associated with investments, which can lead to a lower Beta. However, Keeley et al. Keeley et al. (2022) discuss the lack of common theorization and

commensurability in ESG metrics rather than specific findings related to Beta comparisons. Therefore, it is unclear if their findings directly support the claim that ESG investments lead to a lower Beta. Research by Friede et al. Friede et al. (2015) aggregates evidence that ESG portfolios can have varied financial performance, but does not conclusively state they exhibit lower Beta. The study outlines that ESG investments sometimes offer no significant advantage in risk-adjusted returns, suggesting that their correlation with lower risks is not consistent across the board.The findings by Rahman and Lau (Rahman & Lau, 2023), which discuss how ESG-rated securities tend to present lower risk levels compared to non-ESG counterparts, might support the claim indirectly. However, specific Beta analysis was not conducted in their study, making direct support for the claim tenuous.Sim and Kim Sim & Kim (2022) focus on the impact of ESG fund labeling on performance and flows, indicating that renamed funds may perform better, but again do not establish a direct link to lower Beta values. Ielasi et al. Ielasi et al. (2018) found that sustainability-themed mutual funds generally exhibit a market Beta lower than one, though they did not provide a clear distinction between ESG and non-ESG funds in terms of sensitivity. This nuanced finding suggests an inconclusiveness in how ESG funds are characterized against traditional funds. Duuren et al. Duuren et al. (2015) found that ESG information is used to manage risks in investments but do not offer a direct examination of Beta values relative to conventional funds. The studies cited by Mizuno et al. Mizuno et al. (2021) and Curtis et al. Curtis et al. (2021) pertain more to the broader context of socially responsible investing and the operation of ESG funds respectively, without statistically grounded discussions on Beta. Additionally, study conducted by Cosma et al. checks for various risk-adjusted metrics vs performance during crises (COVID-19 and Ukraine-Russia war) for funds based on SFDR classification but omitts the Beta indicator. Because of the incosistent findings the study aims to verify the following hyphothesis:

Hypothesis 2. Funds that promote ESG (article 8, SFDR Regulation) and funds that have sustainable investment as its objective (article 9, SFDR Regulation) achieve lower Beta 6 months than funds that do not consider ESG criteria (article 6, SFDR Regulation).

2.2 Burden of regulations

Additionally, Caceres et al. emphasize that managing ESG risks can elevate operational and compliance costs for funds focused on sustainability. The complexities involved in aligning investments with ESG criteria often lead to increased scrutiny and resource allocation, which can inflate operational expenditures Caceres (2024). Initial cash flows required for conforming to sustainability standards can be significant, altering the overall cost structure of these funds. Niblock adds that effective ESG investment analysis necessitates thorough data collection, performance metrics, and increased transparency in reporting, which further raises costs. Firms must invest in advanced reporting capabilities that surpass conventional requirements to meet these ESG standards (Niblock, 2024). Ilyas et al. note that firms with robust ESG performance characteristics may require more sophisticated governance practices and stakeholder engagement strategies, which can result in heightened transactional costs, including those associated with hiring specialized personnel and managing ongoing stakeholder communication (Ilyas et al., 2022). On the contrary, research by Curtis et al. indicates that while ESG funds may require additional engagement in ESG principles, they can execute their strategies efficiently without significantly increasing costs or sacrificing returns, suggesting a more nuanced view (Curtis et al., 2021). This perspective challenges the overarching notion that ESG investments inherently lead to higher operational costs, although it is acknowledged that the operational challenges tied to ESG frameworks can still impose additional expenses. Li further contributes to this discourse by stating that strong ESG performance is often correlated with heightened expectations from investors and the necessity for comprehensive risk management frameworks, which might introduce additional costs for funds aiming for high ESG standards (Li, 2024). The findings are incosient across the board thus the following hyphotesis is being tested:

Hypothesis 3. Funds that promote ESG (article 8, SFDR Regulation) and funds that have sustainable investment as its objective (article 9, SFDR Regulation) have higher costs than funds that do not consider ESG criteria (article 6, SFDR Regulation).

2.3 Smaller investment universe

Another important implication for ESG funds is that because of the exclusion criteria they have smaller investment universe. Benson et al. provide insights into the performance characteristics of socially responsible investment (SRI) funds, noting that while these funds may align with certain ethical principles, they often do not generate superior returns relative to their conventional counterparts. Their study emphasizes that despite similarities in performance, the returns produced by SRI funds - including those categorized as Article 8 and 9 - are derived through different portfolio exposures, indicating a divergence in alpha generation compared to traditional funds Benson et al. (2006). Further supporting this hypothesis, Bello's research on socially responsible investing illustrates that socially screened portfolios, including those classified as Article 8 and 9 funds, often exhibit comparable performance metrics but do not significantly outperform conventional funds like those classified under Article 6. Bello's analysis finds that Jensen's alpha is negative for conventional funds and not significantly different from zero for socially responsible funds, suggesting a lower capability for excess return generation in ESG-focused strategies (Bello, 2005). This implies that the additional criteria applied to Article 8 and 9 funds may limit their potential to achieve higher alpha. Because the research has been done before implementation of classification of SFDR the study aims to verify it with fresh available data by testing the following hypothesis:

Hypothesis 4: Funds that promote ESG (article 8, SFDR Regulation) and funds that have sustainable investment as its objective (article 9, SFDR Regulation) achieve lower Alpha over 3 years than funds that do not consider ESG criteria (article 6, SFDR Regulation) because of smaller investment universe.

3 | DATA AND METHODOLOGY

The data set used in this study contains various data on risk-return, performance, SFDR classification and costs of 4779 equity funds from 21 European Markets. The markets, in alphabetical order include: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Lichtenstein, Luxembourg, Netherlands, Norway,

Poland, Portugal, Slovenia, Spain, Swede, Switzerland, United Kingdom. They were chosen based on availability of data with accordance to European SFDR regulation (Cremasco & Boni, 2022). Gathered date points include: Beta, Sharpe Ratio 6 months, Treynor Ratio 6 months, Information Ratio 6 months, Total Return 1 Year, Total Return 3 Year, Expense Ratio, Sortino Ratio 6 months, Alpha Ratio 3 years, Jensen Alpha Ratio 6 months, Total Assets Under Management US\$ (Millions). All the data was downloaded from Bloomberg Terminal on 3rd February 2025.

For the purpose of this study classification based on category (Blend, Value or Growth) is omitted due to sample size. All data points were calculated by Bloomberg and no further adjustments to them were done. This approach is supported by wide use of the data provided by Bloomberg in academia and business.

The analyses presented in the study cover period during which SFDR has been in place. Data for Performance 5 Years was gathered as well, however it was decided to be not included as it would consist of time period during which SFDR was not incorporated. The classification of SFDR funds is based as of date of extraction. Because of this, it is not possible to identify the exact moments when each fund got it label according to SFDR articles.

The methods used in the study were previously known in the literature related to the subject. Tiwari et al. (2024) highlight the use of OLS in examining mutual fund advisors' attitudes towards ESG funds based on financial performance. Their findings indicate that positive historical returns enhance advisors' perceptions of ESG investments, ultimately influencing their investment intentions. This study implies that OLS can effectively correlate ESG scores with observed performance outcomes. Ielasi et al. (2018) employ a CAPM-based model followed by OLS regression to understand the performance of sustainability-themed funds versus traditional funds. This approach allows for a rigorous examination of whether ESG integration impacts financial returns while controlling for market factors. Another method used is One-Way ANNOVA which also has been used with addition of descriptive statistics by Cosma et al. (2023). Because the study groups the fund for ESG (article 8 and 9, binary index 1) and non-ESG funds (article 6, binary index 0), logit model with SFDR being the explained

variable has been used. Ammann et al. (2018) utilized the logit model to analyse how certain factors, such as ESG ratings, fund size, and expense ratios, influence the likelihood of high performance among mutual funds. They found that higher ESG ratings positively correlated with the probability of achieving favorable returns. The study effectively illustrates how conditions associated with ESG performance impact financial outcomes. Tampakoudis et al. (2023) investigated how mutual funds with varying ESG scores performed during the COVID-19 pandemic, utilizing data envelopment analysis and a logit model. The findings revealed that funds with higher ESG scores had a significantly higher likelihood of exhibiting robust financial performance during the pandemic, showcasing the effectiveness of the logit model to ascertain performance indicators related to ESG factors.

It is important to note that the risk-return metrics including: Beta, Sharpe, Treynor, Information Ratio, Sortino and Jensen Alpha are representing results for 6 past months prior to 3rd February 2025. In the past 6 months to this date the most important events driving performance in equity funds were: early-august global equity sell-off (weak U.S. labor data, disappointing tech earnings, and an unexpected rate hike by the Bank of Japan spooked markets, The S&P 500 dropped ~10% intraday on August 5, and the MSCI World slid ~8.5%, before rebounding later in the month), Fed's September rate cut (Persistent cooling inflation (~2.5%) led the Fed to deliver its first cut since 2020. The ECB and BoE also signalled easing. Risk appetite surged - MSCI World jumped ~2.4%, Emerging Markets +6.7% - boosting equity funds globally), Donald Trump Wins 2024 U.S. Presidential Election on November 5, 2024 (Markets initially surged due to expectations of pro-business policies, but volatility followed due to uncertainty over trade, foreign policy, and climate regulation, ESG/SRI funds underperformed amid fears of regulatory rollback and reduced green investment incentives), late-January to early-February 2025: Indian market crash (global trade tensions, rising U.S. interest rates, strong dollar, and domestic macro uncertainties triggered a sudden sell-off. The Sensex plunged over 1,000 points in a single day by late February, dragging down Asia-focused equity funds.

3.1 | Sample characteristics

The sample used has been cleaned out according to the below-mentioned restrictions, which in authors view's represent actual state of the industry. The raw sample included 12274 equity funds from 29 European markets. Final sample consists of 21 European markets. The markets that were omitted in alphabetical order are: Bulgaria (6), Croatia (1), Cyprus (1), Hungary (41), Latvia (3), Malta (12), Romania (1) and Slovakia (1).

Another important restriction was removal of all funds with Assets Under Management (AUM) of less than 5 US$. This assumption is based on current literature which indicates that smaller funds exhibit stronger risk-adjusted returns compared to their larger counterparts. For instance, Reuter and Zitzewitz found that an increase in size correlates with deteriorating performance due to higher trading costs and decreased agility in investments (Cosma et al., 2023). Another confirmation of this effect is a negative relationship between fund size and performance, particularly in equity mutual funds, covered in this study, where returns tend to decline with increasing size found by Becker et al., 2022. Other studies also demonstrate that smaller mutual funds can actively manage their portfolios, allowing for a better alignment with evolving market conditions and superior performance compared to larger funds, which may employ a more rigid investment approach. Because of this additional 515 funds, with AUM of less than 5 US$ has been removed.

All funds for which there were missing data point on at least 1 out of the 13 categories were removed in the process of data cleaning. Further analysis indicated that there are leverage points for the following: Alpha 3 Year (1 observation) and for Treynor Ratio (17 observations). The final sample consist out of 4779 equity funds listed on 21 European markets.
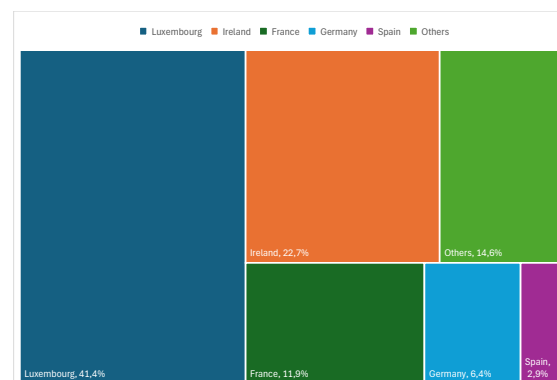
Figure 1: Mutual funds by domicile. Others: 2.5% Austria; 2.5% Sweden; 2.4% United Kingdom, 1.4% Belgium; 1.2% Finland.

The dynamics of the market indicate a growing trend for fund managers to adjust their strategies to fit the ESG narrative. Cremasco and Boni highlight that many funds are reclassifying themselves under the SFDR to capture the investor appetite for ESG-compliant products (Cremasco & Boni, 2022). As a result, one of the biggest accusations of the SFDR regulation is that fund managers are using it as a marketing tool because there is more funds that promote ESG factors (article 8) and incorporate them (article 9) than funds that do not consider ESG criteria (article 6). The data set after cleaning is showing the same trend which is a confirmation that the current market structure has been properly reflected in the analyzed sample as shown in Figure 2.
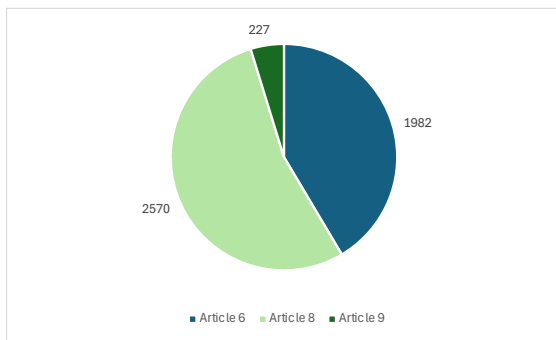

Figure 2: Mutual funds by SFDR classification.

4 | RESULTS

4.1 | Descriptive analysis: characteristics of equity funds

Table 1 shows descriptive statistics of the analyzed sample. Funds classified as art. 6 SFDR are showed as 0 and funds classified as art. 8 and art. 9 SFDR are showed as 1. The following descriptive statistics are presented: mean, std. error mean, 95% CI mean lower bond, 95% CI upper bond, median, mode, standard deviation, variance, range, minimum value, maximum value, skewness, std. error skewness, kurtosis, std. error kurtosis. For these presented data points include: SFDR classification, Beta 6 months, Treynor 6 months, Information Ratio 6 months, Total return 1 Year, Total return 3 Year, Expense Ratio, Sortino 6 months, Alpha 3 Year, Jensen Alpha 6 months, Total Assets Under Management US$.

Looking at the data we can observe that in terms of mean they for 1s are smaller for Sharpe 6 months, Treynor 6 months, Information Ratio 6 months, Total Return 1 Year, Total Return 3 Year, Sortino 6 months, Alpha 3 Year, Jensen Alpha 6 months and AUM. On the other hand, they are bigger for Beta 6 months and expense ratio. Results of mean are clearly undermining favor of 1 over 0 meaning, that ESG funds are achieving worse risk-adjusted returns and are more expensive. Almost identical conclusion can be drawn from analyzing median and mode.

However, when looking at standard deviation we observe that for 1 the values are smaller for Beta 6 months, Sharpe 6 months, Treynor 6 months, Total Return 1 Year, Total return 3 Year, Expense ratio, Sortino 6 months and Total Assets Under Management US$. Additionally, they are higher for 1 for Alpha 3 Yeara and Jensen Alpha 6 months. This leads to a conclusion that funds classified as 1 are much more similar within the group than funds that do not consider ESG (0).

For each of the examined data points distributions and data boxes have been presented. Most of the data presented is qualifying to have normal distribution (Sharpe 6 months, Jensen Alpha 6 months, Total Return 1 Year, Total Return 3 Year, Information Ratio, Sortino 6 months, Alpha 3 Years). The distributions are very similar between groups (1 vs 0) confirming comparability. To verify the normal distribution of the observations Jarque-Ber tests has been ran. For all the data null hypothesis stating that the distribution is normal has been rejected.

4.2 | Correlations between chosen data

The interrelationships among various performance metrics such as Beta, Sharpe Ratio, Jensen Alpha, Total Returns, Information Ratio, and Sortino Ratio are critical in analysing investment portfolios and risk-adjusted performance. Table 2 presents correlation of the same data points (exempt for SFDR). Multiple correlations at 1% significance are observed between data points. Beta, which represents systematic risk, has shown correlations with risk-adjusted performance measures like the Sharpe and Sortino ratios. Specifically, Duanmu et al. demonstrated that portfolios managed with a focus on Beta can yield better risk-adjusted returns compared to conventional strategies based purely on traditional performance metrics such as alpha and its t-statistic (Duanmu et al., 2018). This suggests that

Beta's role transcends mere risk identification; it also contributes to optimizing returns when combined with measures like the Sharpe Ratio, an index often used to assess the performance of an investment by adjusting for its risk (Widarto et al., 2022).

Table 1 Descriptive analysis of the gathered sample

Descriptives

	SFDR Classification	Beta 6M	Sharpe 6M	Treynor 6M	Inf Ratio 6M	Tot Ret 1Y	Tot Ret 3Y	Expense Ratio	Sortino 6M	Alpha 3Y	J Alpha 6M	Tot Asset US$ (M)
N	0	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982
	1	2797	2797	2797	2797	2797	2797	2797	2797	2797	2797	2797
Missing	0	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
Mean	0	0.730	0.789	0.227	−0.208	16.1	20.0	1.06	0.762	−0.0858	2.08	1065
	1	0.731	0.663	0.191	−0.327	14.4	15.4	1.29	0.639	−0.196	0.404	837
Std. error mean	0	0.0180	0.0202	0.0238	0.0195	0.248	0.474	0.0188	0.0195	0.00710	0.209	102
	1	0.0101	0.0156	0.0162	0.0166	0.169	0.375	0.0139	0.0151	0.00697	0.200	32.7
95% CI mean lower bound	0	0.695	0.749	0.180	−0.246	15.6	19.0	1.02	0.724	−0.0997	1.67	865
	1	0.711	0.633	0.159	−0.359	14.1	14.7	1.26	0.609	−0.210	0.0115	772
95% CI mean upper bound	0	0.765	0.829	0.274	−0.170	16.6	20.9	1.10	0.800	−0.0718	2.49	1265
	1	0.750	0.694	0.223	−0.294	14.7	16.1	1.32	0.668	−0.182	0.797	901
Median	0	0.814	0.740	0.138	−0.0900	15.0	20.2	0.830	0.692	−0.0350	0.587	172
	1	0.840	0.640	0.109	−0.216	13.9	16.5	1.48	0.600	−0.134	−0.173	270
Mode	0	1.00	1.11	0.0830	−0.0380	9.38 [a]	−1.24 [a]	0.300	0.679 [a]	−0.00700	−0.103 [a]	5.52 [a]
	1	1.00	0.325	0.0690	−0.689 [a]	7.36 [a]	24.6	1.80	0.607	−0.0560	−6.72 [a]	655
Standard deviation	0	0.799	0.901	1.06	0.867	11.1	21.1	0.839	0.866	0.316	9.30	4539
	1	0.532	0.827	0.858	0.877	8.94	19.8	0.733	0.796	0.368	10.6	1730
Variance	0	0.639	0.811	1.12	0.753	122	444	0.703	0.750	0.0999	86.4	2.06e+7
	1	0.283	0.684	0.736	0.769	79.9	392	0.537	0.634	0.136	112	2.99e+6
Range	0	38.2	6.62	32.4	21.8	146	278	4.42	6.47	4.22	123	115687
	1	14.8	8.54	32.9	9.47	113	264	8.00	8.42	4.72	194	25496
Minimum	0	−13.1	−1.97	−18.7	−11.3	−23.1	−47.7	0.00	−1.79	−2.65	−40.8	5.10
	1	−12.9	−2.57	−18.1	−4.03	−25.3	−61.7	0.00	−2.12	−3.32	−51.3	5.16
Maximum	0	25.1	4.65	13.6	10.5	123	230	4.42	4.68	1.58	82.5	115692
	1	1.92	5.97	14.8	5.44	88.2	203	8.00	6.30	1.39	143	25501
Skewness	0	8.22	0.174	−2.23	0.0458	1.18	0.628	0.684	0.312	−0.949	1.81	16.2
	1	−11.6	0.441	1.66	0.0524	0.844	0.255	0.143	0.612	−1.21	3.54	5.69
Std. error skewness	0	0.0550	0.0550	0.0550	0.0550	0.0550	0.0550	0.0550	0.0550	0.0550	0.0550	0.0550
	1	0.0463	0.0463	0.0463	0.0463	0.0463	0.0463	0.0463	0.0463	0.0463	0.0463	0.0463
Kurtosis	0	532	0.601	127	34.3	7.88	5.77	−0.302	0.719	7.05	11.2	346
	1	219	2.34	162	2.68	6.31	3.41	1.59	2.59	5.70	38.7	48.2
Std. error kurtosis	0	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110
	1	0.0925	0.0925	0.0925	0.0925	0.0925	0.0925	0.0925	0.0925	0.0925	0.0925	0.0925

Note. The CI of the mean assumes sample means follow a t-distribution with N - 1 degrees of freedom

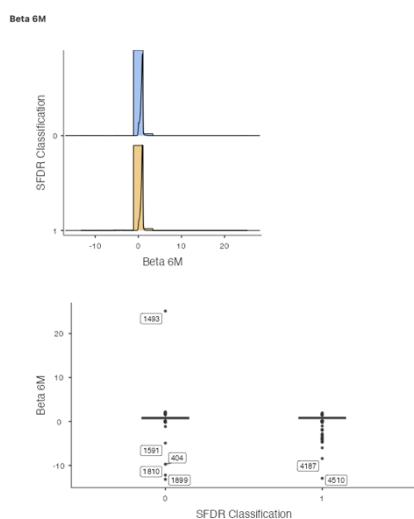Figure 3: Distribution of Beta 6 months & box plot

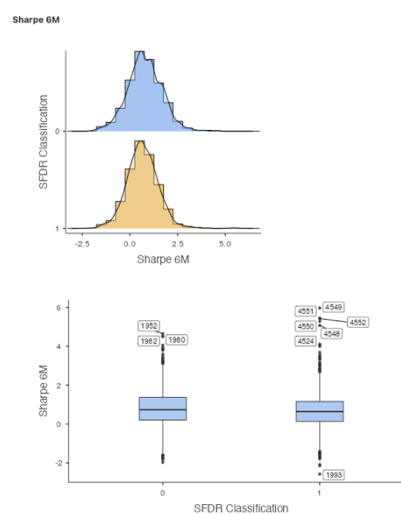Figure 4: Distribution of Sharpe 6 months & box plot
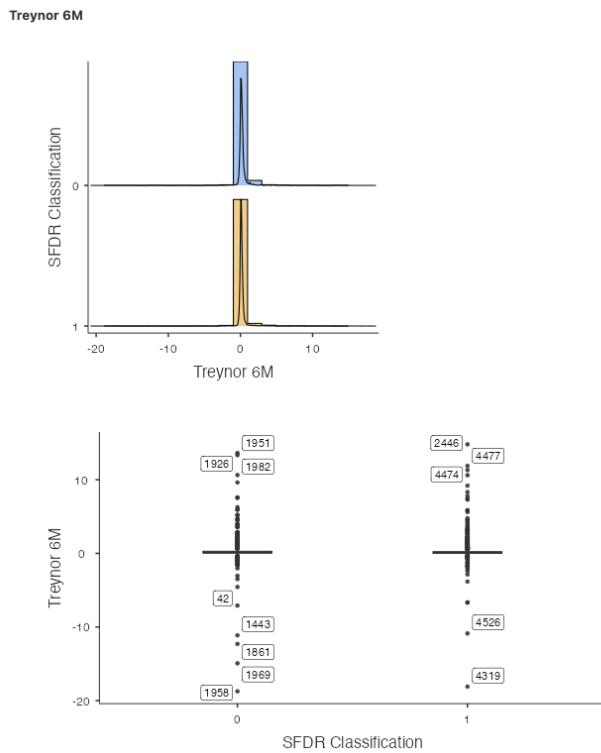
Figure 5: Treynor 6 months & box plot

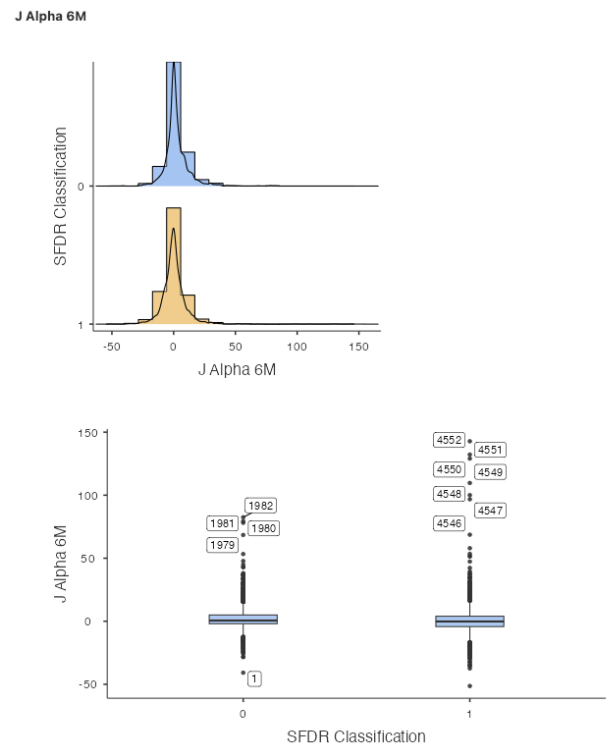Figure 6: Jansen Alpha 6 months & box plot
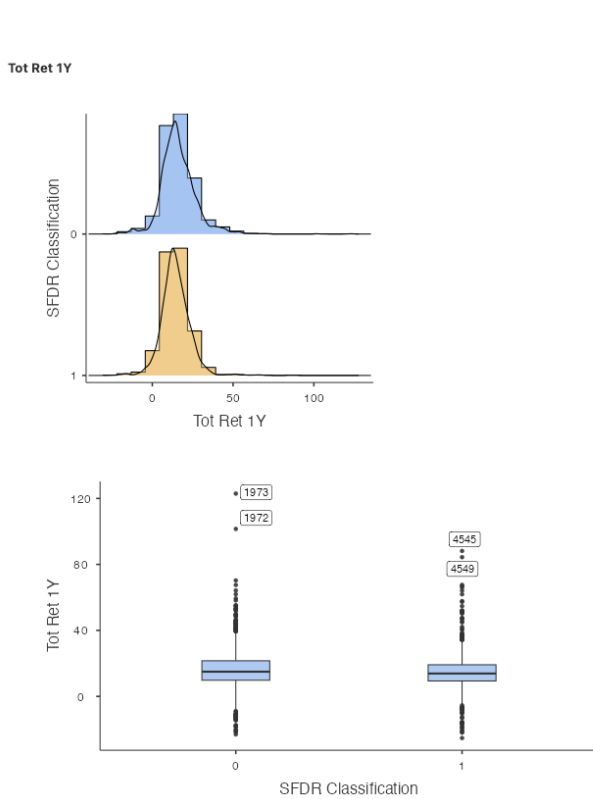

Figure 7: Total Return 1 Year & box plot
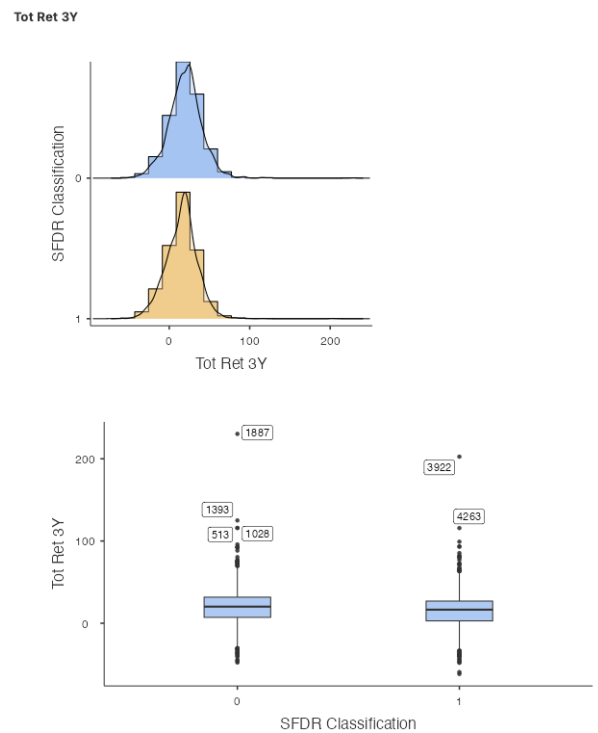

Figure 8: Total Return 3 Year & box plot
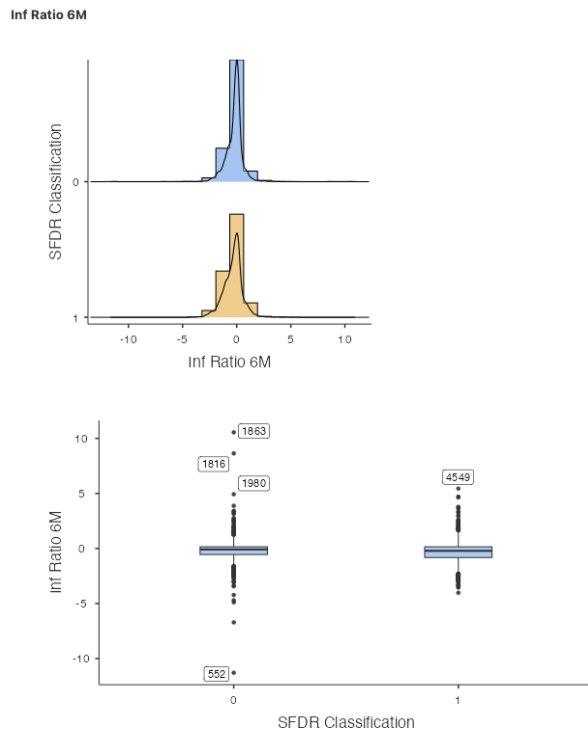
Figure 9: Information Ratio 6 months & box plot
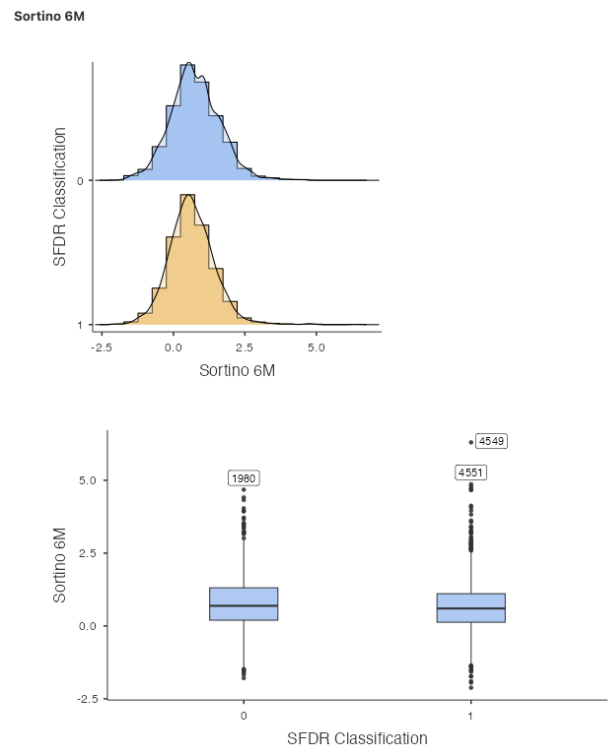

Figure 10: Sortino Ratio 6 months & box plot

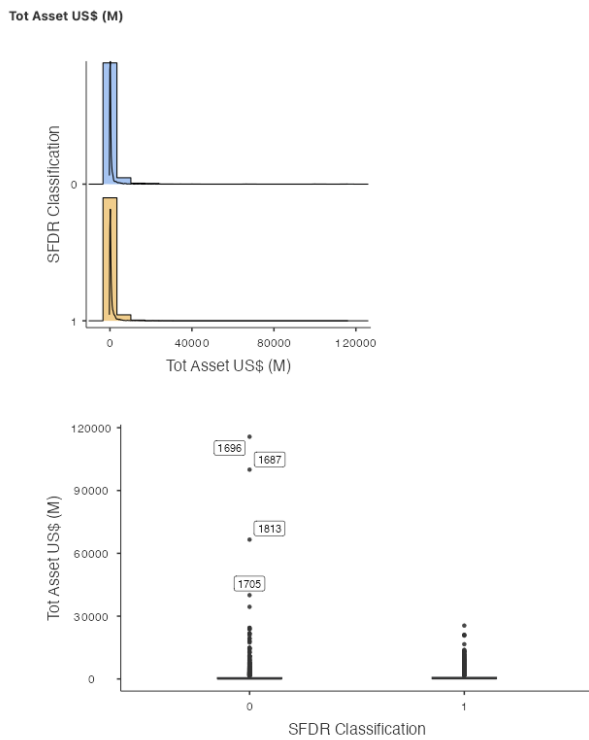Figure 11: Total Assets US$ (M) & box plot

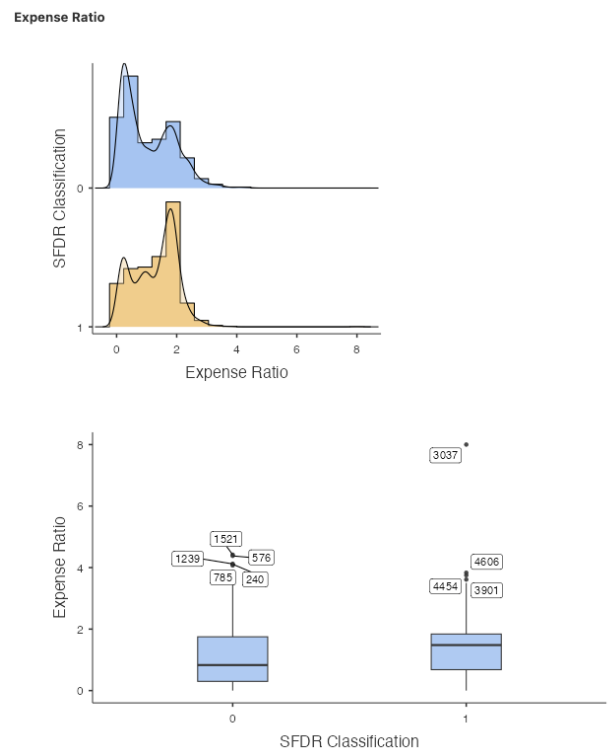

Figure 12: Expense Ratio & box plot
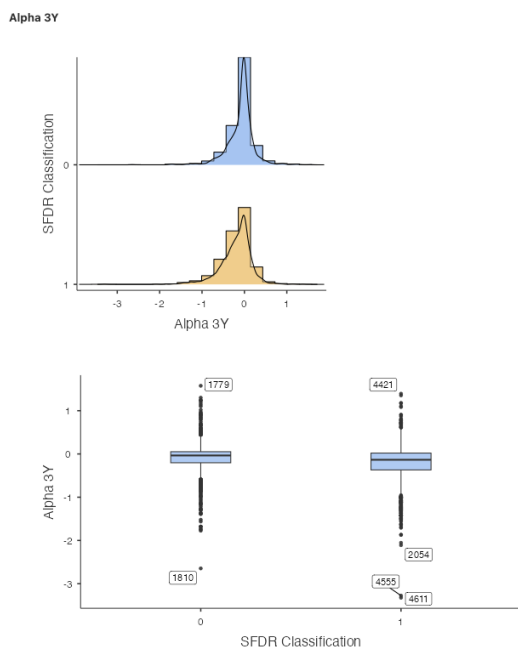
Figure 13: Alpha 3 Year & box plot

Table 2 Correlation matrix of gathered sample

Correlation Matrix

Correlation Matrix

		Beta 6M	Sharpe 6M	Treynor 6M	Inf Ratio 6M	Tot Ret 1Y	Tot Ret 3Y	Expense Ratio	Sortino 6M	Alpha 3Y	J Alpha 6M	Tot Asset US$ (M)
Beta 6M	Pearson's r	—										
	df	—										
	p-value	—										
Sharpe 6M	Pearson's r	−0.007	—									
	df	4777	—									
	p-value	0.617	—									
Treynor 6M	Pearson's r	−0.069	0.291	—								
	df	4777	4777	—								
	p-value	<.001	<.001	—								
Inf Ratio 6M	Pearson's r	−0.008	0.304	0.109	—							
	df	4777	4777	4777	—							
	p-value	0.560	<.001	<.001	—							
Tot Ret 1Y	Pearson's r	0.070	0.719	0.208	0.323	—						
	df	4777	4777	4777	4777	—						
	p-value	<.001	<.001	<.001	<.001	—						
Tot Ret 3Y	Pearson's r	0.025	0.439	0.112	0.167	0.519	—					
	df	4777	4777	4777	4777	4777	—					
	p-value	0.081	<.001	<.001	<.001	<.001	—					
Expense Ratio	Pearson's r	−0.089	−0.091	0.032	−0.159	−0.163	−0.211	—				
	df	4777	4777	4777	4777	4777	4777	—				
	p-value	<.001	<.001	0.025	<.001	<.001	<.001	—				
Sortino 6M	Pearson's r	−0.006	0.994	0.289	0.307	0.721	0.417	−0.092	—			
	df	4777	4777	4777	4777	4777	4777	4777	—			
	p-value	0.704	<.001	<.001	<.001	<.001	<.001	<.001	—			
Alpha 3Y	Pearson's r	0.078	0.123	0.057	0.352	0.238	0.462	−0.273	0.115	—		
	df	4777	4777	4777	4777	4777	4777	4777	4777	—		
	p-value	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	—		
J Alpha 6M	Pearson's r	−0.121	0.602	0.317	0.690	0.533	0.262	−0.076	0.602	0.302	—	
	df	4777	4777	4777	4777	4777	4777	4777	4777	4777	—	
	p-value	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	—	
Tot Asset US$ (M)	Pearson's r	0.011	0.096	0.007	0.052	0.121	0.138	−0.122	0.090	0.078	0.069	—
	df	4777	4777	4777	4777	4777	4777	4777	4777	4777	4777	—
	p-value	0.464	<.001	0.642	<.001	<.001	<.001	<.001	<.001	<.001	<.001	—

The relationship between the Sharpe Ratio and other performance indicators like Jensen Alpha and Information Ratio also deserves attention. The Information Ratio, which assesses the risk-adjusted excess return of an investment relative to a benchmark, is often influenced by the returns indicated by Jensen Alpha. Coşkun and Zor found that contextual factors can significantly influence Sharpe and Alpha metrics, suggesting an intricate web of dependencies among these performance measures (COŞKUN & Zor, 2022). Furthermore, research by Jeng et al. highlights that portfolios with diverse assets can result in increases in the Sharpe Ratio, particularly involving Shariah-compliant stocks, further supporting the claim of performance interdependence within varying portfolios (Jeng et al., 2020).

In terms of longer-term performance, Total Return in both 1-Year and 3-Year time frames has a proven correlation with risk metrics such as the Sortino and Sharpe Ratios. As noted by Widarto et al., incorporating diversified assets into a portfolio can enhance both returns and the Sharpe Ratio, suggesting a direct link between strategic asset allocation and performance outcomes (Widarto et al., 2022). Additionally, the Sortino Ratio, which focuses specifically on downside risk rather than total volatility, has been particularly favored among risk-averse investors. This aligns with findings by the authors of another study, who noted that the Sortino and Sharpe ratios reflect different risk attitudes, thereby influencing their correlation with metrics like Jensen Alpha depending on the prevailing investment environment (Sendi, 2020).

4.3 Results of Hypothesis 1

Figure 14 represents results of One-Way ANNOVA where SFDR classification is a grouping variable. This analysis revealed statistically significant differences (1% significance) among the two groups for: Sharpe 6 motnhs, Information Ratio 6 months, Total return 1 Year, Total return 3 Year, Expense ratio, Sortino 6 months Alpha 3 Year, Jensen Alpha 6 months and Total AUM US\$ (5% significance). After descriptive statistics this is another example of confirmation that the groups do differ and have statistical importance thus Hypothesis 1 cannot be rejected for (1b), (1d), (1e), (1f), (1g), (1h), (1i), (1j).

For 1(a) and (1k) it is rejected (Beta and Total Assets Under Management US\$.

One-Way ANOVA

One-Way ANOVA (Welch's)

	F	df1	df2	p
Beta 6M	9.14e−4	1	3198	0.976
Sharpe 6M	24.22	1	4035	<.001
Treynor 6M	1.58	1	3686	0.208
Inf Ratio 6M	21.54	1	4294	<.001
Tot Ret 1Y	33.28	1	3681	<.001
Tot Ret 3Y	57.58	1	4099	<.001
Expense Ratio	94.99	1	3897	<.001
Sortino 6M	25.03	1	4038	<.001
Alpha 3Y	122.97	1	4606	<.001
J Alpha 6M	33.65	1	4566	<.001
Tot Asset US\$ (M)	4.55	1	2392	0.033

Figure 14: One-Way ANOVE for SFDR as a grouping variable.

4.4 Results of Hypothesis 2

To verify Hyphotesis 1 Ordinary Least Square with heterosekdascity-robust standard errors model has been ran where Beta 6 months is the explained variable.

```
Model 1: OLS, using observations 1-4779
Dependent variable: Beta6M
Heteroskedasticity-robust standard errors, variant HC1

                  coefficient   std. error   t-ratio   p-value
  const            0.678028     0.0358120    18.93     3.88e-77  ***
  SFDRClassificati~ 0.0208581   0.0206617    1.010     0.3128
  Sharpe6M         0.0221172    0.115294     0.1918    0.8479
  Treynor6M        -0.0159286   0.0104856    -1.519    0.1288
  InfRatio6M       0.0912684    0.0242226    3.768     0.0002    ***
  TotRet1Y         0.0127710    0.00152852   8.355     8.48e-17  ***
  TotRet3Y         -0.00282614  0.000903671  -3.127    0.0018    ***
  ExpenseRatio     -0.0389459   0.0140177    -2.778    0.0055    ***
  Sortino6M        0.0203536    0.114743     0.1774    0.8592
  Alpha3Y          0.223866     0.115827     1.933     0.0533    *
  JAlpha6M         -0.0226199   0.00332890   -6.795    1.22e-11  ***
  TotAssetUSM      -4.45200e-07 1.12183e-06  -0.3969   0.6915

  Mean dependent var  0.730302     S.D. dependent var   0.656252
  Sum squared resid   1919.702     S.E. of regression   0.634592
  R-squared           0.067076     Adjusted R-squared   0.064924
  F(11, 4767)         29.16521     P-value(F)           4.69e-60
  Log-likelihood      -4601.737    Akaike criterion     9227.474
  Schwarz criterion   9305.138     Hannan-Quinn         9254.756
```

Figure 15: Ordinary Least Squares with Heteroskedasticity- robust standard errors.

Based on the outcome of the model, significant explonatory variables include: Information ratio 6 months, Total return 1 Year, Total return 3 Year, Expense Ratio, Jansen Alpha 6 months. Classification of SFDR has not been found statisticaly important thus H_0 is rejected.

4.5 Results of Hypothesis 3 and 4

In order to test hypothesis 2 Binary Model Logit with robust standard errors has been used for SFDR as an explanatory variable. The statistically

important explanatory variables are Expense ratio (z=6.462) and Alpha 3 Year (z= -6.195).

```
Model 2: Logit, using observations 1-4779
Dependent variable: SFDRClassification
QML standard errors

                 coefficient   std. error        z          slope
  -----------------------------------------------------------------
  const          0.000668673   0.0946489     0.007065
  Beta6M         0.0507042     0.0636456     0.7967      0.0122717
  Sharpe6M       0.539632      0.372673      1.448       0.130605
  Treynor6M      0.00709777    0.0339885     0.2088      0.00171785
  InfRatio6M     0.0657472     0.0495318     1.327       0.0159125
  TotRet1Y      -0.000286340   0.00489773   -0.05846    -6.93018e-05
  TotRet3Y      -0.00234418    0.00203624   -1.151      -0.000567353
  ExpenseRatio   0.280998      0.0434839     6.462       0.0680089
  Sortino6M     -0.627686      0.383910     -1.635      -0.151916
  Alpha3Y       -0.722747      0.116675     -6.195      -0.174924
  JAlpha6M      -0.00718269    0.00564521   -1.272      -0.00173840
  TotAssetUSM   -4.74270e-06   7.84987e-06  -0.6042     -1.14786e-06

  Mean dependent var    0.585269    S.D. dependent var     0.492727
  McFadden R-squared    0.029497    Adjusted R-squared     0.025796
  Log-likelihood       -3147.067    Akaike criterion       6318.133
  Schwarz criterion     6395.797    Hannan-Quinn           6345.416

  Number of cases 'correctly predicted' = 2930 (61.3%)
  f(beta'x) at mean of independent vars = 0.242
  Likelihood ratio test: Chi-square(11) = 191.298 [0.0000]
```

Figure 16: Binary logit model with robust errors where SFDR classification is explanatory variable

The conclusions are as follows: if a fund is classified as 1 there is higher probability of having higher Expense ratio and if a fund is classified as 1 there is lower probability of achieving higher Alpha 3 Year. Taking into consideration the results H_0 for Hypothesis 3 cannot be rejected thus ESG funds are more expensive than traditional funds. Another conclusion of this test is that funds who integrate ESG factors into its investment processes have obtained lower Alpha 3 year over the analyzed period and as a result H_0 for hypothesis 4 cannot be rejected as well.

5 | Discussion

The findings of this study are questioning the overall positive effects of additional process of gathering information by investors and by using them achieving greater risk-adjusted returns. However, few important characteristics arise. Based on the descriptive statistics it is noticed in all presented metrics that funds that consider ESG (article 8, SFDR Regulation) and have sustainability objectives (article 9, SFDR Regulation) have smaller results over funds that do not consider ESG criteria (article 6, SFDR Regulation) which in understanding risk-adjusted metrics is seen negatively. These include: smaller for Sharpe 6 months, Treynor 6 months, Information Ratio 6 months, Total Return 1 Year, Total Return 3 Year, Sortino 6 months, Alpha 3 Year, Jensen Alpha 6 months and AUM. Additionally, ESG funds are more expensive. On the positive note it has been proven that the variance withing ESG funds is smaller than within the rest. Despite the worse risk-adjusted metrics over analyzed period investor were

left with more like for like funds which is especially important from risk management point of view. This takeaway is allowing to draw a conclusion that the price for worse results is reflected in higher consistency of the funds withing the group. The root cause of this phenomenon can be explained by the fact that after cutting off companies with unfavorable ESG metrics the consistency of returns within each fund improves.

Analysis of One-Way ANNOVA confirmed that almost all of the analyzed metrics, expect for Treynor Ratio 6 months and Total Assets Under Management US$ were statistically different between group 1 and 0 which is another confirmation of notable differences between those 2 groups. The same conclusion as drawn in paragraph 1 of this section can be drawn.

When looking specifically at how those 2 groups are with relation to Beta 6 months, OLS has proven the indifference between SFDR classification and its impact on the analyzed metric. Investors were not achieving any benefits with regards to violatility (Beta 6 months) when considered SFDR classification H_0 (1a) was rejected.

Hypothesis 3 which was tested by Logit Model proven statistical importance with regards to expense ratio and Alpha 3 Year. If a fund is classified as 1 it has a higher probability of having higher expense ratio (by 0.0680089) than funds being classified as 0.

Lastly, Hypothesis 4 has been tested by the same Logit Model and the outcome is following: If a fund is classified as 1 it has a higher probability of having lower Alpha 3 Year (by -0.174924) than funds being classified as 0.

The overall results are partially confirmed by other studies in this field. Funds that do cosnier ESG factors have wider regulatory oligations to fulfill being very often incosistent which is only adding up to the already demanding process (Cosma et al. 2023). However, this can lead to a positive effects in the long term because ESG funds can offset these higher costs over time, potentially leading to economies of scale (Hartzmark & Sussman, 2019). The results of this study regarding higher costs of ESG funds are in line with other available literature sources and is yet another example of the high entry barrier for market players when it comes to considering broading ESG funds offer to clients.

With regards to risk-adjusted metrics tested in this study the results are mostly inconclusive except for the Alpha 3 Year. The markets in the analyzed period were very violatile and funds that integrate ESG factors have its limitations on controversional sectors such as coal minning, controversional weapon or fossil fuels. Exlusion of these sectors in time of good investement returns could lead to achieving lower Alpha over the analyzed period. Additional angle on this matter can be raised based on the avilable investment universe. More exluded companies means smaller investment universe and less opportunities to diversify between specificc sector group by having smaller group of companies to choose from. This puts more pressure on every investment made because it has higher share in the available group.

Clear confirmation of analyzing Beta based on SFDR funds has not been found in the literature, however there are indirect claims that supports validity of testing the hypothesis X in the study. Rahman and Lau (Rahman & Lau, 2023) were discussing how ESG-rated securities tend to exhibit lower risk levels with comparision to counterparts that did not consider ESG metrics which could lead to a conclusion that entities which are doing more in terms of ESG should be more safe and in effect less violatile than others (investors have less risks to worry about). Analyse of Beta between group 1 and 0 done in the study confirmed that it is not statistically important.

It has been confirmed that after crisis happening such as the COVID-19 and Ukraine-Russia War funds classified as article 8 and 9 were outperforming traditional funds (Cosma et. al 2023). In this study longer terms were considered (1 and 3 year performance) and no evidence of this was found. With regards to risk-adjusted metrics tested in this study the results are mostly inconclusive except for the Alpha 3 Year. The markets in the analyzed period were violatile and funds that integrate ESG factors have its limitations on some sectors such as coal minning, controversional weapon or fossil fuels. Exlusion of these sectors in time of good investement returns could lead to achieving lower Alpha over the analyzed period. Additional angle on this matter can be raised based on the avilable investment universe. More exluded companies means smaller investment universe and less opportunities to diversify between specificc sector group by having smaller group of companies to

choose from. This self restriction is making it more difficult to generate Alpha over choosen benchmark. Reason for this can be that it puts more pressure on every investment made because it has higher share in the available group as a percentage.

6 | Conlcusions

This study builds on the findings found in the literature with regards to ESG fund performance and risk-adjusted metrics and explores phenomena that have been vividly debated over the years. The originality of the research presented can be found in the significant data sample which to the best of the authors knowledge, previously has been analyzed on much smaller data sets. Additional factor for originality comes from the time frame of the research. The coverage has allowed to assess the SFDR regulation functioning in a longer term and focus only on the time during which it has been in place contrary to most of the other research done in the field. Key findings of the study have been as follows: article 8 and article 9 funds exhibits more consistency within group that funds that do not consider ESG criteria (article 6). Arguments raised in the literature regarding lower volatility measured by Beta have not been confirmed by the study. Once again, regulatory burden of ESG fund has been confirmed and is reflected via higher costs of these products. Raised arguments about economies of scale dictated by longer term of the implementation of SFDR has not found confirmation in the study as well. Because of the exclusion and harder to pass criteria for ESG investments being part of ESG funds, these products exhibited lower Alpha over the 3 years. Reason for this can be found in smaller investment universe because of the excluded by ESG funds companies from specific sectors it appears that the excluded sectors exhibited more volatility and could support traditional funds in times when these assets performed well. Huge in the analyzed time frame played geopolitics and uncertainty of the markets especially with regards to the choosing of Donal J. Trump as a president of the US which caused a backlash of perception of ESG funds in this country. Even though Europe still seems to stay to its core when it comes to ESG agenda, there is evidence of some companies operating on the European market loosening its previously strict approach which previously been dictated by fear of greenwashing. Example of this may include reclassification of investment in companies developing nuclear power from non-investable to

investable. Europe has faced also serios allegation of its bureaucratic system and as shown in the Draghi report has been losing its competitive advantages over the US. Indirect result of this report has led to introduction of Omnibus which, in its current form, takes off the pressure of ESG reporting from mid and small companies in Europe. This political move has shaken huge institutional investor approach to its ESG agenda which is seen negatively from a perspective of reaching a non-emission economy by 2050. The research confirmed that changes are needed with regards to the SFDR because investors care mostly about financial performance and as it has been shown did not achieve statistically important better results except for more consistency within them which can be seen positively from risk management perspective. On top of that they are burdened with paying more for it and achieving lower Alpha. On the other note, because the agenda for sustainability goals is planned for longer period and companies need time to develop and carry out necessary investments its possible that the full effects has not been visible just yet.

This study has important implications for equity asset & fund managers, retail & institutional investors, insures, regulating bodies & agencies and policymakers. The SFDR in its current form is not allowing to fully distinct funds that have sustainability objectives over those that do not because it's self-acclaiming. The fact that there is more ESG funds than non-ESG funds is leading to a conclusion that every fund can be ESG-linked if only chosen data is checked. It is the author belief that there should be some minimal requirements for funds to check ESG risks (as these risks will have much more material implications in the long term), but it should not give them the right to claim themselves as ESG compliant. With regards to huge investments needed to transform the economy investors should have much clearer definition of what exactly is sustainable investment which currently described in article 2 p.17 is giving almost the same amount of freedom as article 8 and is not standardized. Moreover, they should be encouraged to invest in them by reliable and solid risk-adjusted returns which currently, as shown, is not the case. The results of the study have indirectly confirmed stated above. The EU has announced changes to the SFDR taking into considerations robust feedback it received from market participants, but time will tell if these changes resolve the current issues.

The study is not free from some limitations which had to be incorporated to ensure comparability and sufficient sample size as the goal was to look broadly on the market. The sample includes all funds classified as equity by Bloomberg. It is possible that some of them in a small portion contains also debt instruments. Categorization by category of equity fund such as blend, growth and value has been omitted. The classification of geographic location of the assets were not distinct as well (eg. US equity, European equity, Asia, EMEA). Again, for the purpose of comparability the: currency, fx hedging effects, accumulating or distributing, active or passive has not been differenced as well. In the process of data cleaning initial sample size decreased over 50% due to lack of data for chosen data points. Because there is much smaller amount of article 9 funds compared to article 8 and 6 it has been decided to group them in 2 groups where first group included ESG funds (article 8 and article 9) and second group consisted of non-ESG funds (article 6). Specific time frame of the research might also impact the overall results. It was also not possible to determinate when exactly each fund got it label so its possible that funds in the analysis had been compliant with specific article for different amount of time. Structural problem comes from the fact that each fund is using its own definitions and thus considering different ESG metrics to assess its compliance with the regulation. Further research in the field could explore more granular view on the funds and classify equity funds by sectors or geographic markets. It would be also worth looking at the specific criteria each fund uses to claim themselves as article 8 and article 9 compliant and check which of them are the most common and what is its materiality on generated results. There is also critical need for research focusing on specific environmental, social and governance metrics which are driving the most positive or negative performance and risk-return. The overall approach of introducing regulation and then thinking about sufficient data needed to assess ESG risks should be rethinked again. Growing pile of ESG regulation which very often is contradictory to previous regulations build frustration among market participants and is only increasing costs for asset & fund managers and clients who are ultimately the one paying for the strict regime.

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