

Finding Meaning in Financial Sustainability:

An Empirical Study of ESG Ratings and Performance of Mutual Funds

An Honors Thesis for the Department of Economics

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Introduction

Numerous metrics are used to evaluate the financial quality of investments, but since the early 2000s, investors have become increasingly interested in examining the nonfinancial aspects and impacts of their investments. The mindset of social consciousness influences where people choose to invest their money. The concept of Socially Responsible Investing (SRI) has been present since the 1970s and over the past 20 years has transformed and renamed with a new name: Environmental, Social, Governance (ESG.) While originally SRI focused concerns primarily on which companies manufactured weapons of war and which ones had poor environmental records, the scope of investor's ethical concerns in the era of ESG has increased to include factors like a company's carbon emissions, the percentage of women and people of color in corporate leadership positions, treatment of employees, where the raw materials are sourced for the manufacturing of products, and closer examinations of ethical and legal controversies companies have been involved in.

Overall, ESG refers to a framework of criteria that investors use to evaluate the sustainability and societal impacts of a company. Pressure from individuals has resulted in firms disclosing more about the metrics related to ESG. Which in turn, led to the emergence of rating agencies with the goal of quantitatively measure how firms handle ESG related matters so that investors can take ESG ratings into consideration when constructing their portfolios. The rise of concern as to the social issues that investments impact especially troubles young investors, but the trend has taken hold worldwide (Hale 2016).

ESG has dramatically increased in popularity in recent years. It is now so ubiquitous that an estimated one in three dollars managed by financial professionals is ESG-related (Wolf 2022). These assets have seen a 40% growth in the past two years and they currently account for at least

\$41 trillion of global assets (Kishan 2022). ESG debt has also expanded, with more than \$1.6 trillion now in sustainable-linked bonds. ESG focused mutual funds and ETFs grew by 53% in 2021 to \$2.7 trillion (Kishan 2022).

Along with the popularity has come significant backlash confronting the shortcomings of ESG. In order to match investor's desire for high ESG standards, asset managers eagerly attempt to frame their funds so that investors will perceive them as socially conscious even when arguably they are not, which leads to “greenwashing.” Greenwashing is when a company exaggerates the environmentally friendly nature of their products. Although this term refers to the environmental pillar, it is also commonly used to describe the tendency to overstate social and governance pillars, as well. Mutual funds in particular are greenwashed, with many asset managers claiming their holdings are aligned with ESG principals.

Their ability to get away with greenwashing indicates that there's a serious lack of consensus of what constitutes "ESG Principals," particularly in the United States. Driven by concern of potential damage to GDP due to climate risk, regulatory institutions, NGOs, and concerned investors have pushed for more policies to enforce disclosures relating to ESG, and subsequently to create a comprehensive way of vetting ESG criteria. In March of 2021, the European Union succeeded in crafting and adopting a regulatory framework titled the "Sustainable Finance Disclosure Regulation" (SFDR) that prevents greenwashing and increases transparency around sustainability claims made by financial market participants. The United States has policies in the making from the SEC aimed at increasing disclosure on emissions from corporations and forcing asset managers to reveal more specifically the impact of their assets, but overall, they will be less stringent than the SFDR.

Currently in the United States, ESG scores are generated by rating platforms where analysts evaluate corporate disclosures, conduct management interviews, and review publicly available information about an organization to provide an objective rating of the organization's performance. They attempt to meet the demands of investors who are eager to use their investment strategies to mitigate risk associated with ESG factors. Surveys show that 88% of investors use these ESG ratings when investing in ESG (Tayan 2022). This dependence has resulted in a lot of money spent on these rating agencies, where spending increased in 2022 from \$200 million to \$500 million, showing that rating agencies have increased demand for their product (Christenen 2022).

ESG rating systems have the goal of quantifiably measuring the ESG metrics disclosed. This is a tricky business due to the fact that there lacks an agreed upon level of disclosure to meet, so rating agencies have to attempt to assess companies with different criteria, which inherently brings bias. The prevalence of these rating systems comes with questions of their validity due to the nature of subjectivity and discrepancies in disclosures due to political foundations. A key part of the discourse of ESG what kind of information ESG ratings actually provide, and whether or not funds that have higher ESG ratings lead to a higher financial performance. This leads to the question I will answer in this thesis: Do mutual fund's environmental, social, and governance rating scores lead to higher return-based financial metrics? And beyond that, how does the correlation differ when analyzing funds based in the EU versus the United States?

Scholars and independent assessments disagree about whether or not ESG oriented funds generate higher returns. Some find no tradeoff in ESG vs. Non-ESG (e.g., Milonas et. al., 2022).

Some find that ESG pillars correlate to higher returns in certain sectors, but not overall.¹ Other papers have assessed how time period plays a role, and that corporate socially responsible investments have low returns now, but less long-term risk (Bannier et. al., 2019).

Taking into consideration environmental, social and governance factors in investment decisions essentially isolates the non-financial factors that influence fund performance (Christensen et al. 2022). Without keeping this in mind, ESG aggregates three seemingly unrelated topics. However, socially concerned individuals have hopes that ESG means they are achieving their social contribution, specifically as people are more concerned about the future of the environment. In a survey conducted by OECD, they found that social or moral considerations drove 77% of investor decisions to invest in ESG. 14% due to a desire to mitigate climate risk, and 6% as a desire for alpha (Boffo and Patalano 2020). Investors opt into ESG investing for inconsistent reasons and have different intended results.

This thesis provides new findings that analyze and assess the question of how company's ESG ratings correlate to financial performance. It empirically assesses the correlation between ESG ratings of mutual funds and performance, while drawing conclusions about the difference in the correlation between two major players with different rules: the U.S. and the EU. ESG has great potential to shift the mindset of individuals and institutions about the need to take the environmental and social needs of humanity into consideration in their goal setting and business practices.

¹ Beslom and Lake (2021) find that governance metrics have more of an impact in the financial sector, environmental factors are more correlated to energy and materials, and social is associated with consumer discretionary sectors.

Climate change is considered by many as the biggest threat to humanity today. It's imperative that we use every economic tool available to solve the issues that humanity, including businesses and investors in business, has caused. ESG offers a glimmer of hope.

In order to answer the questions regarding its effectiveness, I have empirically assessed the correlation between ESG ratings and financial returns using ratings from Morningstar based upon Sustainalytics ESG risk assessments. My results indicate weaker correlations between ratings and performance in the U.S. and stronger correlations in the E.U., and whether or not highly rated ESG funds outperform low rated ones depends on the performance metric assessed. Additionally, I review aspects of the ESG world such as relevant policy structures that must be understood to analyze why these results might occur. The sections are as follows: Section 1 discusses the ESG screening methods and discusses how ESG ratings are calculated. Section 2 covers the existing regulatory frameworks. Section 3 outlines the data collection and empirical methodology. Section 4 discusses the key findings and policy implications. Section 5 suggests conclusions based on the data and its analysis and suggests fruitful areas for further research.

Background

1.1 Screening methods

ESG investing is broken down into three categories (Hale 2022):

- ESG exclusion
- Limiting ESG risk
- Seeking ESG opportunities

Exclusion: this is the most basic approach. It applies an exclusionary framework where funds omit harmful industries (such as weaponry, gambling, animal testing, etc.) from investors' portfolios.

Limiting ESG risk means attempting to avoid reduced revenues due to climate change or possible stock value loss due to controversy by specifically screening for ESG criteria when making investment decisions. In practice, one could use these ESG guidelines to actively pick a variety of investments across different sectors that score well, and that have less of a negative impact than conventional investments. This might also include positively screening for certain industries in an attempt to mitigate ESG risk.

Seeking ESG opportunities: Funds that seek ESG opportunities look for the leaders in industries and select those holdings based on which entities have the more sustainable practices.

Beyond these approaches, some investors who want more of a direct impact practice active ownership by becoming shareholders in public companies. Since publicly traded companies are required to have annual shareholder meetings, investors can vote for their desired ESG outcomes, which has been proven to be a meaningful approach to enact change (Dikoli et. al. 2022).

Impact investing often gets lumped into ESG, in which investors still anticipates an above-market return, but only choose funds that intentionally align specifically with their goals. While the lines between ESG and impact investing are fuzzy, impact investing specifically attempts to generate positive good with their investments. Beyond that, some investors might choose to use ESG criteria to invest in social oriented causes just out of the goodness of their hearts without expecting a premium financial return (Boffo and Patalano 2020).

Investors can also engage in sustainable investments by purchasing green bonds offered in the U.S. by State and local governments. Bonds finance or refinance capital improvement projects and green bonds are ones specifically focused on environmental, water or clean energy projects (US EPA 2023). The guiding principle is that ESG funds are believed to generate higher returns than their counterparts because they focus on promoting durability in their holdings and, in turn, reducing long-term risks. But this is not holistically agreed upon. There are three main viewpoints on the correlation between ESG benefits and financial performance proposed by Auer and Schuhmacher (2016).

First, the mantra “doing good while doing well” encompasses the main idea, suggesting that investing in social benefits brings economic value to the investor.

Second, “doing good but not well” asserts that favoring investments focused on social benefits means if more resources are redirected from fundamental fiduciary goals, profits are reduced.

Third, some perceive that social investments neither add nor take away value because social responsibility cannot be accurately priced.

Investors have different perspectives on the benefits of each individual pillar. Some investors perceive that having a high governance rating will lead to higher returns because of the fact that it’s better managed, likely has less controversies, and therefore has better capacity to lead companies to their financial goals (van Duuren et al 2016). Environmental and social impacts are perceived to have more ambiguous effects on the financial outcomes of firms. Some investors fear focusing on environmentally friendly companies lead to less economic value (Hassani and Bahini 2022).

There are also simply clearer guidelines for evaluating governance than the other two pillars (Christensen et al 2022). Some believe that firms that put more of an emphasis on these components are distracted from their main fiduciary goals, and therefore forgo returns. Others perceive environmental components to be important towards mitigating risk, as investing in environmentally sustainable solutions will ultimately reduce risk in the long term as the climate starts to change and resources become increasingly scarce.

1.2 Rating Systems

The concern individual and institutional investors have about the social impact of their investments has led to a growing demand for fund managers to disclose metrics related to environmental, social and governance pillars. The environmental pillar encompasses factors related to climate change such as a company's carbon emissions, or exposure to harm from climate-related regulations, natural capital, and waste generation. The social pillar focuses on human capital, including employment practices and safety, conflicts with local communities, human rights, and product liabilities. Lastly, the governance pillar makes up factors related to corporate oversight, composition of board directors and shareholder rights. All of these pillars also encompass opportunities related to future incorporation of environmental, social and governance related factors (Tayan 2022).

On the investor side, there needs to be an easy way to digest the information. This is where the rating agencies come into play. Their main role is to bridge the gap between the disclosures firms are putting out and investor interpretation of that information. The rating agencies screen for risks and opportunities; they generate investment ideas; and they determine engagement opportunities (Christensen 2021).

The largest rating agencies in the space are Bloomberg, Thomas Reuters FTSE, MSCI and Sustainalytics. There are a reported 150 agencies providing ratings, and over 160 products issued related to ESG assets (Hawley 2017). Sustainalytics, owned by Morningstar and the focus of this paper, rates 14,000 companies worldwide (Tricks 2022). Each of them has slightly different methodologies from one another.

Morningstar aggregates Sustainalytics' data on firms to create ratings for mutual funds based on the holdings' risk assessments. It is a prominent player in the financial services sector, and offers readily available information on fund metrics, including sustainability insights. This is why it has been selected to supply data for the subsequent analysis.

The ratings of mutual funds are based on Sustainalytics's ratings which is a risk assessment seeking to analyze how much risk a firm face. These assessments are based on three building blocks. The following paragraph will outline the methodology provided in Sustainalytics's ESG Risk Rating Methodology Abstract (2021). First, corporate governance plays a large role in dictating the presumed ESG risk of a firm. Unmanaged risk contributes to 20% of the unmanaged risk source of the company "Material ESG issues" is then considered, which consists of issues pertaining to ESG makeup and this forms the building blocks of the methodology. An example of this might be Human Capital, with factors such as employee recruitment, development, diversity, engagement, and labor relations. Another example might be Occupational Health and Safety which would have a different set of guiding principles. Material ESG issues get omitted from assessment if they are irrelevant to the business model. Finally, idiosyncratic issues are assessed which are unpredictable or unexpected sources of risk. Sustainalytics's analysts analyze exposure risks are assessed by looking at the structured external data (things like CO₂ emissions), company reporting, and third-party research. These scores get

updated on a yearly basis. Manageable risk consists of input variables such as assessments of company policies, management systems, and certifications, as well as output focused outcomes which would be things like CO₂ intensity and controversies. Event indicators also get assessed which are events categorized as a 1-5 with 1 being a low environmental impact and 5 being high.

Morningstar aggregates these elements into their mutual fund ratings. ESG ratings are symbolled by having an associated number of globes, where a fund can have 1-5 globes. It uses a “bottom up” approach which assess the ratings given by Sustainalytics, and then the ratings are assigned based on how the fund compares to others in the same Morningstar Global Category (Barr et. al., 2022). First, the qualified holdings are determined, which include fixed income instruments, commodities, real estate, and alternatives (excludes cash and derivatives). Next, a portfolio level score is assigned, and it is either a portfolio corporate score or sovereign score depending on the makeup of a fund (67% of assets have to be either equity for a corporate or 67% debt for sovereign classification). Historical scores are then combined. This takes the 12 most recent months of corporate/sovereign scores, with highest weight being put on most recent portfolio decisions. An aggregate portfolio corporate/sovereign sustainability rating is then assigned based on the historical score rankings within all funds of a Morningstar Global Category. The best 10% have the lowest risk with a score of 5, next 22.5% score of 4, next 35% is 3, next 22.5% is 2, and the worst 10% is assigned a 1. Finally, a Morningstar Sustainability Rating is assigned with high ratings representing lower risk relative to a fund peer group. Morningstar Sustainability Ratings get issued on a monthly basis (Barr et al 2021).

1.3 Critique of rating systems

There have been several academic studies conducted on the differences between the rating systems and the subsequent impact on ESG outcomes. In these papers, oftentimes a statistic comparing the correlation between credit rating agencies and ESG rating agencies get utilized, where credit ratings have a correlation of 99% between agencies, while ESG ratings agencies have a correlation of just over 50% (Posner 2022). For example, in 2018 FTSE ranked Tesla as one of the last ranking automotive companies, while MSCI ranked it at the top, and Sustainalytics put it in the middle (Abhayawansa and Tyagi 2021). Understanding the concerns around the rating agencies is an important element to grasp when seeking to get a full picture of ESG investing.

A paper from MIT Sloan Sustainability School by Berg, Köbel and Rigobon (2019) titled “Aggregate Confusion: The Divergence of ESG Ratings,” analyzed the causes of divergence in rating systems. The authors attribute the divergence to three differing factors in methodology: scope, measurement, and weight. Scope, implying the sheer number of factors being analyzed; measurement meaning the metrics used to measure the factors; and weight representing the various level of importance assessed for each factor. The authors concluded that the measurement element is what creates the great divergence in ratings.

A report done by IOSCO in 2021 also highlighted the main drivers in differences between rating agencies’ methodologies. It explains how data gets utilized in different ways: raw, aggregated (such as the case for mutual funds), processed to make usable, or even estimated at times (Board of IOSCO 2021). Oftentimes a lack of reporting incentivizes raters to use industry averages, which confounds results. The key performance indicators for ESG criteria are not agreed upon, thus resulting in discrepancies between thousands of data points (Board of

IOSCO 2021). These rating discrepancies are important to keep in mind when thinking about the spending that goes into the rating agencies by asset managers and investors.

Christensen et. al (2022) found similar findings in their paper “Why is Corporate Virtue in the Eye of the Beholder?” The authors assessed the impact on firm level disclosure and agreement between rating agencies. They found that the system of ratings as a whole is very biased and subjective, and that divergence in ratings can sometimes be attributed to past scores impacting future ones. Meaning, companies with lower ratings in the past are more likely to continue to rate poorly, or if they rate poorly in one category, that’s likely to impact their scores in other areas (Christensen et. al 2022). This highlights the subjectivity nature of ESG ratings, and given they differ so much, it’s unclear what their benefit actually is. In their paper, they sought to bridge the gap between disclosure and ratings and hypothesized that increased disclosure would lower rating divergence. This was not the case. Instead, increased company disclosure made rating agencies disagree more, as there are no standard measurement systems of the information being disclosed (Christensen et al 2022). This has critical policy implications and should be considered when thinking about the true impact of disclosure policies, which has become a political focus as interest in ESG starts to rise.

SECTION 2: Regulatory frameworks

2.1 Greenwashing and Policies

ESG funds brought in \$1.8 billion in management fee revenue last year which indicates the strong incentive that asset managers have to claim their fund is an ESG fund (Uyeda 2023). Empirical evidence further shows that higher ESG fund ratings are linked to high expense ratios (van Duuren et al. 2016). This financial incentive leads to asset managers overstating the ESG

qualities of their funds—greenwashing, as described before on page 4. A study conducted on investors by PWC found that 9 out of 10 of participants in a survey wanted to see more ESG products available, with 78% saying they'd be willing to pay higher management fees. In contrast, less than half of asset managers said they have plans to launch new ESG funds. Instead, they are planning on converting existing products to be ESG-oriented which would allow them to capture fees with only minor tweaks to their existing strategy (Stanton 2022).

Consequently, ESG funds are under the gun. They will receive enormous backlash if they do not achieve their intended goals, and the market as a whole will suffer. Because of this, people have begun questioning the role and purpose of ESG as a whole.

The perceptions of the benefits of ESG and socially responsible investing takes very different shapes in Europe than it does in the United States. A survey of institutional investors geared towards understanding the motives of investing in ESG learned that European investors are historically more optimistic about the outcomes of socially responsible investing (van Duuren et al, 2016). Backlash towards ESG disproportionately occurs in the U.S. compared to in the EU, which can be attributed to the way that social issues get particularly polarized in the United States' political climate (Sorkin et. al, 2023).

The European Union has traditionally been more proactive when it comes to environmental policies, and this shows up in their policies around ESG. Their Sustainable Financial Disclosure Regulation (SFDR) plan is important to understand the backdrop of ESG investing in Europe versus in the U.S. Enacted in March of 2021, the SFDR has two main requirements: disclosure of adverse sustainability impacts, and quantification of social benefits (Flynn and Booth, 2021). The SFDR works in conjunction with the EU Taxonomy Regulation

and the Low Carbon Benchmarks Regulation, which provide a more robust framework to measure said benefits and impacts.

There are three main Articles within the SFDR that pertain to ESG mutual funds. Article 6 defines funds without a sustainability scope or ESG risk consideration in the investment process. Funds in this class are required to disclose their ESG metrics, but they are not required to have ESG as an element in their scope. Article 8 outlines regulations for funds that promote environmental or social characteristics while including ESG risks and good governance practices. These funds might consist of different approaches to ESG such as exclusion, ESG integration, best in class, and thematic. Article 9 funds have specifically targeted sustainable goals as their objective. Funds classified as Articles 8 and 9 are reported to comprise 22% of all European funds (Weirich et. al.). Morningstar conducted their own analysis to discern the percentage of their funds that would qualify as an article 9 fund and only found 3% to have specific goals integrated into their portfolio (Bioy et al., 2023).

The EU Taxonomy is employed to determine the minimum criteria for “environmentally sustainable economic activities,” which in turn defines which article funds fall into. Currently, the EU Taxonomy guidelines pertain to the environment. The environmental objectives were listed as: climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, protection of healthy ecosystems (Pettingale et. al 2022). Funds must meet a baseline of these standards while not negatively impacting another area to classify as Article 8 or 9.

While SFDR offers more meaningful guidelines, asset managers have different interpretations of the regulations which results in very different approaches when it comes to integrating ESG frameworks. There are aspects that still need to be worked through in its

implementation. Paces (2021) discussed the implications of the EU Taxonomy and its potential profound effect and explains that first and foremost, the EU Taxonomy will curb greenwashing by creating disclosure standards. The fact that stricter regulations exist limiting greenwashing, this will eliminate the ambiguity of investors choosing between actual sustainable investments and greenwashed investments, which will push for those funds being offered to reach the demand present.

This was proven due to the reduction in ESG assets under management after the first phase of the new plan. After the new regulations in 2020, the Global Sustainable Investment Alliance reported that European ESG assets declined by \$2 trillion, which shows the importance of these regulations in limiting greenwashed funds to enter the market (Quinson 2021). Understanding the foundation of these frameworks is important, as it relates to the effectiveness of funds with higher ratings to actually see out their goals. Additionally, it helps give a better idea of the quality of ESG funds being offered to investors in each country.

Financial regulators have attempted to construct regulations around ESG given its surge in recent years, however the fact that climate finance regulations fail to exist in the U.S. Congress has hindered the success of potential policies. The Securities and Exchange Commission (SEC) attempted to take a stand on ESG issues in March of 2022 by passing tighter regulations that specifically include ESG issues. The new regulations had three pillars with the goal of addressing ESG from three different standpoints: corporate issuers, investment advisers and companies. From a company issuer standpoint, the new regulation was going to tighten disclosure policies on emissions that firms were directly responsible for (Scope 1 and 2) as well as indirect emissions (Scope 3). Companies would be required to deliver information about their

climate-related risks in their registration statements and annual reports, along with other climate related financial metrics in audited financial statements (SEC 2022).

The element relating to investment agencies would require investment advisers to provide additional information about their ESG practices by enhancing disclosure of ESG issues. Funds would be required to be more specific about ESG strategies in fund's prospectuses and reports ("Proposed SEC Climate Disclosure Rule" 2023). Mutual funds relating to ESG would fall into one of three categories: impact, integration, and focus. Focus and impact reflect a higher degree of attention to ESG than integration. Integration essentially treats ESG as any other strategy, and it is not a core focus of the fund. Impact is specifically geared towards making changes related to ESG issues. Under this proposed regulation, integration funds would have to prove that they integrate ESG strategies, while impact funds would have to summarize achievements and specific impacts made (SEC 2022).

Previous to this ruling, the most up to date structure regulations for mutual funds included the "Name Rule," which basically operated under the assumption that the names of mutual funds are very important in advertising their objectives. The original name rule declared that a fund which name consists of a type of security, industry or a particular geographic region must hold 80% of its portfolio consistent with that designation (Curtis et. al., 2021). So, if they declared themselves as a European Equity fund, 80% of their assets must be held in equity holdings in Europe. However, this name rule excluded strategic goals of the fund in the ruling. A fund could classify itself as "growth" and not technically have 80% of their assets in "growth" stocks. This is partially because there are not standard definitions to what would classify as growth. The new regulation proposed in March of 2022 would include strategic claims in the 80% which has strong implications for ESG, as if they claimed to be ESG oriented, then 80% of

their holdings would have to be aligned with that (Wolinsky 2022). ESG integration funds would not be able to use ESG in their name, while funds that have an ESG focus would have to abide by the 80% rule.

In conjunction with the Security and Exchange Commission (SEC) regulations, the United States Department of Labor (DOL) put forth an ambiguous agenda that addresses ESG. In 2020, DOL created a ruling stating that only fiduciary goals should be considered when making investment decisions regarding funds subject to the Employment Retirement Income Security Act (ERISA) such as 401ks. 401ks are some of the largest holders of mutual funds, yet ESG funds are rarely included in their investments (Curtis et. al., 2021). It was deemed unconstitutional for DOL to promote ESG factors related to ERISA due to the fact that that permitting consideration of non-financial factors would be unlawful, as the ERISA's fiduciary's sole purpose is to manage retirement plans and thus are prohibited to consider nonpecuniary elements (Uyeda 2023). In 2021, the DOL proposed an amendment to their original goals which actually encouraged financial advisers to take into account ESG matters. This was not put into the final draft, and instead mention of ESG was buried in the body of the text (Uyeda 2023).

The lack of Congressional support remains to be a main issue for getting stricter laws or policies in place for ESG regulations. The ambitious ESG plan was proposed in March of 2022, but has been put on hold due to pending comments from the West Virginia vs. EPA Supreme Court case regarding the Clean Power Plan that would have significant impacts on regulations around climate policies. This demonstrates the nature of ESG as it stands in the U.S.: it is entirely voluntary and not part of any official governmental policy at the Federal level.² It is something that holds potential and could benefit from federal support.

² At the state and local levels within the U.S., residents and taxpayers are calling upon lawmakers to pay attention to ESG. Some states, such as California and Illinois, have things like a Sustainable Investing Act which mandates

2.3 Problems with disclosure policies

Hassani and Bahini (2022) discuss that, although well-intentioned, disclosure policies do not necessarily get rid of information asymmetry. Their paper outlines both costs and benefits to disclosure policies. More disclosure can lower the cost of capital and be economically efficient because there's less competition in the sense that firms are more specific in what they are delivering. It also increases ESG awareness among investors and facilitates better corporate governance and more efficient investments. Disclosure from one firm can also bring about disclosure from other's and influence transparency (Hassani and Bahini 2022). However, they also provide an important discussion on the shortcomings of disclosure policies. This includes the fact that ultimately disclosure policies will not drive of companies to change their behavior (Hassani and Bahini 2022). Disclosing how many carbon emissions Exxon releases will not stop them from producing oil. This is an important theme to remember when thinking about the goals of a concept like ESG, as people hope that it will make a difference in how companies are operated from an environmental standpoint.

Christensen et. al (2022) also discuss the impact of disclosure policies and uncover the fact that increased disclosure does not rectify information asymmetry. Additionally, it becomes harder for smaller firms to comply with disclosure policies than larger ones, which means higher ratings are typically given to ones that are able to meet the disclosure demands. While this paper specifically analyzed the policies on the firm level, their influences can be aggregated to have similar implications for mutual funds. Where without a uniform framework, such as the EU

public and government agencies to implement sustainable investment policies. Along with this, there are industry standards such as the Global Reporting Initiative (GRI) and Sustainability Accounting Standards Board (SASB) among others which aim to take control over where federal government is lacking.

Taxonomy which gives instructions on what is deemed environmentally sustainable, then the added element of disclosures gives room for more subjectivity.

SECTION 3: Methodology

3.1 Data

This study uses data from Morningstar based on Sustainalytics risk assessments. Morningstar is the overarching company that owns Sustainalytics ESG Risk Assessment platform that assesses ESG scores on the firm level, and then Morningstar creates an ESG rating for a mutual fund based on the firm's risk ratings. The risk assessments are done on a yearly basis, and Morningstar's aggregate scores are calculated on a quarterly basis to account for the potential change in holdings that might change their overall score.

Two separate samples were collected for the data from the U.S. versus the EU. In order to discern what makes a European mutual fund versus an American one, the domiciled country was used, as that indicates what kind of regulatory backdrops govern the funds. For the European data set, the Irish website was used as Ireland is a big hub for investor activities in terms of there being many mutual funds domiciled in Ireland and are subsequently offered to investors throughout the EU. Funds domiciled in Ireland are a part of UCITS (Undertaking for Collective Investment in Transferable Securities) directive which is an EU directive governing mutual funds and ETFs. The UCITS directive allows for mutual funds to be traded throughout other countries in the EU without double taxation and has special treaties for persons in other countries, though UCITS is subjected to European legislation like the SFDR making it pertinent for this study. Similarly, funds domiciled in the U.S. offer withheld taxation to U.S. investors, while taxing dividends up to 30% for non-US residents (PwC 2023). U.S. domiciled funds are subject to U.S. policies, which again is the area of focus for this paper.

Using the investor screening tool on the Irish Morningstar website allows setting filter specifications for the funds. 100 funds of each ESG rating level in each sector specification were selected. There are 11 sectors: Basic Materials, Consumer Services, Consumer Cyclical, Consumer Defensive, Healthcare, Industrials, Real Estate, Technology, and Utilities. This totaled a sample of 4,623 mutual funds in the European sample.

For the U.S. sample, the service provided looks a bit different which resulted in a slightly different data collection method and a smaller sample size. The U.S. sample was collected by randomly selecting 100 funds of each ESG rating rank, and subsequently assigning sectors based on which sector had the most allocated holdings. This totaled 500 funds for the U.S. sample. The smaller size was due to the additional screening for sector allocation which was used for fixed effects in the regression model. Robustness checks were performed using Morningstar Category fixed effects, which addresses the mission of the mutual fund and is used when generating sustainability ratings.

3.2 Explanation performance metrics used.

The main variable of interest consisted of those capturing ESG ratings. These were either an ESG score of 1, 2, 3, 4 or 5 (correlating to the globe association given by Morningstar) which were used as dummy variables due to their discreteness. ESG score of 1 was omitted to eliminate multicollinearity, and as such all coefficients of the dummies are in respect to ESG 1.

Sharpe Ratio:

Following a similar methodology conducted by Auer and Schuhmacher (2016) I used the Sharpe Ratio as one of the main performance metrics of risk. The formula measures the return of the portfolio minus the risk-free rate of return (which measures what an investor should expect to

return given an investment with no risk, such as a government bond), divided by the standard deviation of the funds' returns which captures the risk of the fund.

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

A Sharpe Ratio of over 1 is said to be “good” -- which implies that an investment is generating higher returns than market rate given risk, however the level of risk also must be considered, as it is possible investments take on unnecessary risk and then are portrayed to have a higher Sharpe Ratio. That being said, it is commonly used as a performance metric in conjunction with other ones and has been used in previous studies (Auer and Schuhmacher 2016, Milonas et. al 2022, and Das et. al 2018) which allows for these findings to be easily comparable to previous studies.

For the European sample, the mean Sharpe Ratio is 0.29 (see Figure 1 and Appendix for summary statistics). When breaking down the statistics by ESG ranking, mutual funds with a rating of 1 have a higher mean ratio of 0.39, while the other rating levels' mean ratios hover between 0.27-0.29. The minimum Ratio is -0.86 and maximum is 1.96.

For US mutual funds, the overall mean of Sharpe Ratio is slightly lower, being 0.27. ESG funds with a rating of 4 has the highest average Sharpe ratio of 0.32, followed by ESG score 1 with a mean of 0.29. ESG 5 has a mean of 0.22. The minimum Ratio is -0.83 and the maximum is 1.73 (See Figure 1).

While the Sharpe Ratio gives a good general metric for fund performance, it is best used in conjunction with other performance metrics. One of the biggest issues with the Sharpe Ratio is that it assumes that the returns are normally distributed, which might not be the case if there are outliers or skewness in returns.

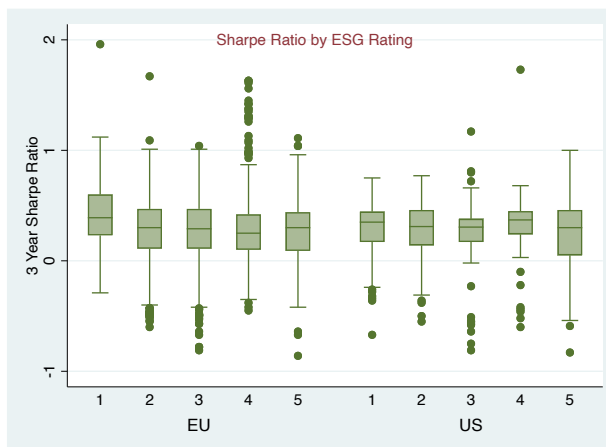


Figure 1: Shows distribution of Sharpe Ratio across regions does not yield significant patterns, though there is a general trend of Sharpe Ratio declining for higher ratings in EU.

Returns:

Due to the ambiguity that sometimes accompanies the Sharpe Ratio, other performance metrics based on returns alone were analyzed. The Year-To-Date Return (YTD Return) measures the fund's performance for the year (2022) and takes into account dividends, capital gains and losses. Specifically, it captures how much a fund has changed over the course of the year. In that sense, it gives a good measure of the raw amount of money that a fund has generated. It can be found by taking the net asset value (NAV) at the end of the year minus the NAV at the beginning of the year, plus any distributions and then dividing by the NAV at the beginning of the year.

The formula is as follows:

$$\text{YTD Return} = (\text{NAV}_1 - \text{NAV}_0 + \text{Dist}) / \text{NAV}_0$$

For the European set, the overall mean YTD Return is 4.725% and it has a standard deviation of 4.78, indicating that it varies quite a bit compared to the mean. The mean YTD for funds with a rating of 1 is 4.48%. For funds with a rating of 2 it is 4.69%, for 3 it is lower at

3.96%. 4 globe rated funds have a mean of 4.82%, and 5 rated funds have the highest YTD Return of 5.82% (See Figure 2).

For the American data set, the mean is 4.13% with a standard deviation of 3.771 showing that the funds from the US have less of a variance in their YTD Returns than European funds. The YTD Return for firms with a rating of 1 is 4.41%, for rating 2 it is 3.99%, for rating 3 it is again the lowest at 3.67%. Ratings of 4 have the highest mean of 4.49%, and ratings of 5 have a mean of 4.11%, which is lower than funds with a rating of 1 (see Figure 2). The YTD Return only captures the past year, so other measures showing performance over longer periods of time is also important to get a full picture of performance.

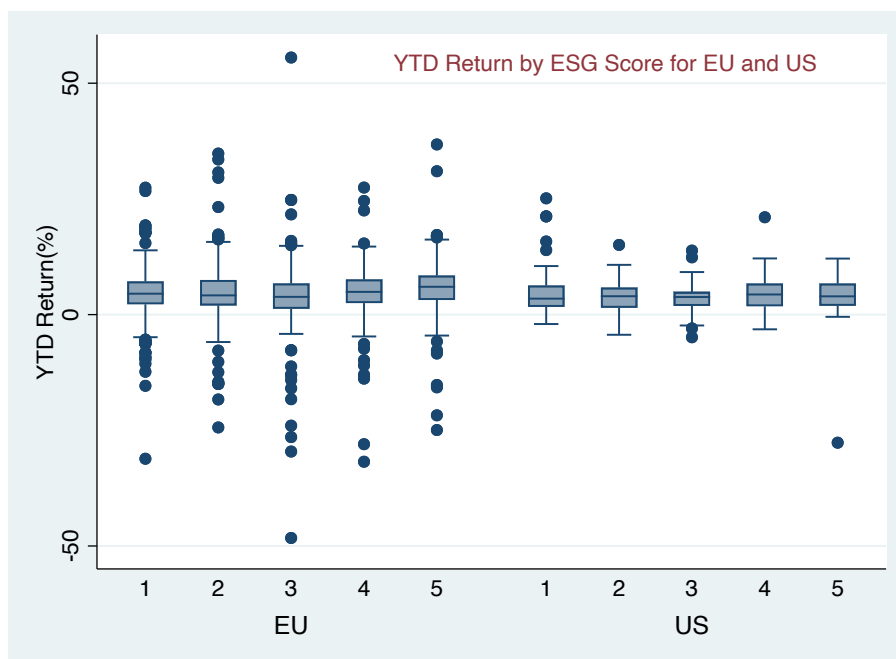


Figure 2: Shows distribution of YTD Returns per ESG score in EU and in the U.S. The U.S. has a much smaller spread than in the EU. Slight trend towards higher ESG scores in EU indicating higher YTD Returns.

In order to get an understanding of a firm's return over longer periods of time, annualized returns are used which calculate the average return over a period of time. These are interesting to

look at as it gives a slightly different perspective on a fund's performance. However, these are not the main variable of interest as the model used was a cross-sectional regression rather than a time series, and the absence of the ESG ratings in previous years might skew these results.

Nevertheless, they were used as an additional analysis to get an understanding of the performance of these funds (See Appendix II for summary statistics of these variables).

Additional performance metrics were assessed, including 3-year beta, 3-year alpha, and 3-year r-squared (See Table 1 and 2).

<i>Table 1: Summary Statistics</i>				
American Funds				
<i>Variable: Observations</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
Standard Deviation	19.809	7.335	2.61	48.13
3-year alpha	0.195	0.195	3.973	-19.79
3-year beta	1.024	0.274	-0.14	2.34
3-year r-squared	81.397	19.419	0.47	99.67
YTD Return	4.134	3.771	-27.68	25.13
European Funds				
Standard Deviation	19.524	19.524	7.01	47.19
3-year alpha	0.143	3.98	-22.06	24.35
3-year beta	0.844	0.844	2.073	2.32
3-year r-squared	84.144	84.144	16.88	99.77
YTD Return	4.769	4.725	4.769	55.55

Control variables:

The size of the fund has been used in previous literature as an important control metric, as that might influence the overall performance metrics. Additionally, the size of a fund has been linked to ESG scores in the sense that funds with more assets have more flexibility to meet necessary regulations (Das et. al 2018). For European Funds the average size fund is 291 million

pounds, or \$362.8 million, with a standard deviation of \$328.89. For American funds the average amount of assets held is \$241 million, with a standard deviation of \$159.98. This was transformed to use the natural log of assets in the model. When using $\ln(\text{assets})$, the mean for European funds was 5.091 with a standard deviation of 1.27. For American $\ln(\text{assets})$, the mean became 6.27, with a standard deviation of 1.89.

Fee level is also an important aspect to consider and is commonly discussed in literature relating to ESGs (Auer and Schuhmacher 2016, Raghunandan and Rajgopal 2022., Curtis et. al. 2021, Uyeda 2023). These studies have discussed how ESG funds are able to charge higher fees due to the effort of adhering to ESG principles. Morningstar provides methodology on the calculation of the fee level in which it explains that the fee level is an easy comparable metric that Morningstar established in order to compare fees between similar funds. The fee level is found by first classifying funds into category groupings and then their net expense ratio (taking into account managerial fees) is ranked against their peers in the category. They are then ranked according to a quintile score such that 0-20% rank is low, 20-40% is below average, 40-60% is average, 60-80% is above average, and 80-100% ranking is high. I generated dummies for each level in order to use these levels in my model. The most common fee level in the American sample of ESG mutual funds was average and high, both at 104 funds. The most common fee level for European ESG funds is Above Average, at 717 funds (see Table 3).

Table 3: Tabulation of Fee Level

European Funds			
Fee Level	Freq.	Percent	Cum.
Above Avg	717	22.89	22.89
Avg	665	21.23	44.13
Below Avg	635	20.27	64.40
High	553	17.66	82.06
Low	562	17.94	100.00
Total	3132	100.00	
American Funds			
Fee Level	Freq.	Percent	Cum.
Above Average	100	20.00	20.00
Average	104	20.80	40.80
Below Average	94	18.80	59.60
High	104	20.80	80.40
Low	98	19.60	100.00
Total	500	100.00	

The style of the fund was included as a means to capture the strategy of the fund which would impact the performance metrics and ESG ratings. The Morningstar Style Box is used to determine the style of a fund which takes into account how much risk is being taken, which subsequently impacts performance. Morningstar constructed a methodology to classify securities against size on the vertical axis and by growth and value along the horizontal axis. The most common style type for European funds in this sample is in the Large Blend category with 1,330 observations (see Tables 5 and 6). The most common style type in the American sample is also Large Blend, at 175 funds. One concern for including this category could be that there's some overlap between what the style variable captures and assets, as the "small value" category has the largest number of assets in holdings. This issue partially gets mitigated by the nature of using natural log of assets, as the standard deviation is much smaller in comparison to the mean, and there's not as wide of discrepancies between the small value and the rest of the styles.

Table 4: Tabulation of style:			
European funds			
Equity Style Box	Freq.	Percent	Cum.
Large Blend	1330	32.28	32.28
Large Growth	880	21.36	53.64
Large Value	595	14.44	68.08
Mid Blend	537	13.03	81.12
Mid Growth	259	6.29	87.40
Mid Value	206	5.00	92.40
Small Blend	79	1.92	94.32
Small Growth	74	1.80	96.12
Small Value	160	3.88	100.00
Total	4120	100.00	
American funds			
Equity Style Box	Freq.	Percent	Cum.
-	62	12.40	12.40
Large Blend	175	35.00	47.40
Large Growth	80	16.00	63.40
Large Value	56	11.20	74.60
Mid Blend	29	5.80	80.40
Mid Growth	20	4.00	84.40
Mid Value	23	4.60	89.00
Small Blend	27	5.40	94.40
Small Growth	16	3.20	97.60
Small Value	12	2.40	100.00
Total	500	100.00	

Sector fixed effects were used in order to control for variation that might occur with investments held in different sectors. Standard errors were clustered by sector in order to capture variation of errors that is due to the groupings of observations.

The general model can be written as:

$$\text{SharpeRatio}_{i,s} = \beta_0 + \beta \text{ESG2}_{i,s} + \beta \text{ESG3}_{i,s} + \beta \text{ESG4}_{i,s} + \beta \text{ESG5}_{i,s} + \beta \ln \text{assets}_{i,s} + \beta \text{FeeLevel}_{i,s} + \beta \text{Style}_{i,s} + \gamma + u_s$$

This model was built upon and used in three different contexts. First, for the European data set, followed by the United States data set, and then with both of them together while using an interaction term to capture country effects. In each sample, first the Sharpe Ratio was assessed,

followed by the YTD Return, Standard Deviation, and then yearly annualized returns. The model including the country interaction term can be written as:

$$\text{SharpeRatio}_{i,s} = \beta_0 + \beta \text{ESG}_{i,s} + \beta \text{Country}_{i,s} + \beta \text{ESG}_{i,s} \times \text{Country}_{i,s} + \beta \text{FeeLevel}_{i,s} + \beta \text{Style}_{i,s} + \beta \ln \text{assets}_{i,s} + \gamma + u_i$$

Section 4: Main Results

European sample findings:

Table 5: Main Findings, EU³

	(1) 3 Year Sharpe Ratio	(2) YTD Return (%)	(3) 3 Year Standard Deviation
ESG = 2	-0.0112 (0.0430)	0.889 (0.901)	-1.486 (1.162)
ESG = 3	-0.0317 (0.0489)	0.683 (0.483)	-0.249 (1.443)
ESG = 4	-0.109 (0.0562)	1.019 (0.877)	0.292 (0.970)
ESG = 5	-0.134*** (0.0271)	1.396 (0.727)	-1.052 (1.543)
Observations	1954	2148	1964
R ²	0.146	0.045	0.136
Mean	0.29	4.75	19.52

Standard errors in parentheses

** $p < 0.05$, *** $p < 0.01$

This table shows the model stated above that depicts the correlation of ESG ratings on the Sharpe Ratio, YTD Return, and the Standard Deviation for European funds. Again, the controls are assets, equity style, fee level, including sector fixed effects and clustered standard errors by sector. These results yield only a significant outcome on Sharpe Ratio with the highest level of ESG score, ESG score of 5. These are in relation to an ESG score of 1, which was omitted from

³ Controls were omitted. See Appendix.

the model. The coefficient for ESG 5 is -0.1345. This negative sign implies that it has a lower risk adjusted return than ESG scores of 1 by a degree of 0.1345. This is a relatively big impact, seeing as the mean Sharpe Ratio is 0.29, and typically Sharpe Ratios do not exceed 2. These results hint to the fact that a higher ESG rating actually leads to *lower* risk adjusted return than lower ESG rated mutual funds.

When using the YTD Return as a performance metric, the significance of the coefficients goes away, though the sign changes are flipped around and the magnitude increases. With each level increase of ESG ratings, the coefficient increases as well, implying that as ratings increase, so do YTD returns. However, these results are not statistically significant and therefore cannot necessarily draw definitive conclusions between ESG ratings and YTD Returns.

The Sharpe Ratio is measured by returns minus risk free rate divided by the standard deviation, and therefore one plausible explanation could be understood by seeing if there is a correlation between ESG scores and the standard deviation. Thus, we used the same model as above, but with standard deviation as the performance metric. There are no significant values when performing this regression, though there remain negative coefficients of the effects of ESG ratings on the standard deviation as we saw when assessing the Sharpe Ratio. This alludes to the fact that higher rated ESG funds correlate to undertaking less risk in their investments.

1-, 3-, 5- and 10-year annualized returns were then additionally analyzed. These results are shown below in Table 6.

Table 6: ESG scores and year (s) annualized, EU Sample.⁴

	(1) 1 Year Annualized (%)	(2) 3 Years Annualized (%)	(3) 5 Years Annualized (%)	(4) 10 Years Annualized (%)
ESG = 2	-3.652 (1.999)	-0.547 (0.756)	-0.707 (0.677)	-0.675 (0.556)
ESG = 3	-1.900 (2.112)	-0.477 (0.965)	-0.575 (1.059)	-0.293 (0.631)
ESG = 4	-3.328 (1.950)	-3.127** (1.080)	-1.436 (1.087)	-1.547** (0.627)
ESG = 5	-3.018 (1.838)	-3.137*** (0.413)	-1.323 (0.820)	-1.559** (0.552)
Observations	2129	1969	1813	981
R2	0.085	0.142	0.136	0.181
Mean	-2.651	2.414	5.061	6.146

** $p < 0.05$, *** $p < 0.01$

Once again, when looking at the returns over the past year, there are opposite results as to the YTD coefficients. 1-year annualized returns are not statistically significant and are negatively correlated to ESG ratings. ESG 2, 4, and 5 all correlated to a reduction in 3 units of returns as compared to ESG scores 1. Despite the lack of significance, this would imply that an ESG score of 1 yields the greatest yearly total average returns. This behavior could be associated with the poor investing nature of 2022, but similar results are gleaned when analyzing 3year average returns.

The 3-year total returns show similar results, although here there are some statistically significant figures to pay attention to. These results are consistent with past findings of a negative coefficient, and especially large figures for the higher ESG ratings. Ratings of 4 and 5 both correlate to a 3.1 less total return than ESG score of 1. This is significant at the 5% and 1%

⁴ Controls were omitted.

level, concluding that as ESG ratings increase, they yield an actual lower 3-year total return metric. This 3-year figure is more comparable to that of the Sharpe Ratio, as it captures the same amount of time and therefore would be subject to the same market conditions over the past 3 years.

These statistics ought to be interpreted cautiously, as with the longer the yearly returns were measured, the smaller the sample size. This also could play a role in the results seen, as the landscape of ESG funds has changed throughout the past 5 years with the SFDR and emerging interest in ESG. There is no significance when analyzing 5-year total returns, but there are the same negative coefficient patterns present. The 10-year annualized coefficients have a smaller magnitude than the 3 coefficients for the 3-year total annualized returns, but it is still negative and significant for ratings of 4 and 5. While these trends give an interesting perspective on the relationship between ESG and performance, a more holistic story could be told if we had the corresponding ESG ratings over the past 10 years. These results are limited by the fact this is a cross sectional analysis rather than a time series regression.

United States Sample Findings:

For U.S. funds, first looking at the regressions utilizing the Sharpe Ratio, we do not see much of an impact in regard to a strong degree of correlation between ESG ratings and the Sharpe Ratio. There are again negative coefficients, as with the European sample, implying that higher ESG ratings lead to lower Sharpe Ratio. With this sample, the magnitude of the coefficient additionally seems to hang around 0, being 0.011 for ESG 5 compared to -0.1345 for European funds. This coefficient is similar to the coefficient of ESG 2 for the European funds,

which was also -0.0112. The coefficient for ESG 4 is just over 0, giving it a positive sign, though the confidence interval encompasses 0 (-0.0488 -- 0.0857).

Table 6: Main Findings, US Sample.

	(1) 3 Year Sharpe Ratio	(2) YTD return (%)	(3) 3 Year Standard Deviation
ESG = 2	-0.0395 (0.0370)	-0.463 (0.320)	-1.349 (1.115)
ESG = 3	-0.0283 (0.0406)	-0.568 (0.377)	-1.729 (0.908)
ESG = 4	0.0185 (0.0302)	-0.771 (0.397)	-0.976 (1.306)
ESG = 5	-0.0113 (0.0371)	-0.956 (0.763)	-3.004** (0.966)
Constant	0.169*** (0.0391)	3.290** (1.060)	20.86*** (0.821)
Observations	435	438	435
R^2	0.105	0.241	0.369
Mean			

Standard errors in parentheses

** $p < 0.05$, *** $p < 0.01$

This time, when assessing the relationship between ESG ratings and YTD return, signs remain negative, while they switched to positive for European funds. None of these ratings conclude a significant correlation between ESG ratings and YTD return, though it's impactful that the sign of the funds is negative for American funds. All of the coefficients are between 0 and -1, and they get increasingly more negative with the higher the rating. The standard deviation has a significant with the ESG 5 funds, having a coefficient of -3.004. This indicates that perhaps the highest level ESG take on less risk and are less volatile than ESG 1 funds.

When assessing the 1, 3 5, 10-year annualized returns, there are some interesting yet, again, ambiguous results.

Table 7: ESG scores and year (s) annualized, US Sample.

	(1)	(2)	(3)	(4)
	total return 1 year	total return 3 year	total return 5 year	total return 10 year
ESG 2	1.024 (1.415)	-1.010 (0.591)	-0.948 (1.046)	-1.458 (0.746)
ESG 3	1.517 (1.237)	-1.077 (0.772)	-0.897 (1.184)	-1.363 (0.880)
ESG 4	2.237 (1.191)	0.197 (0.719)	0.276 (0.792)	-0.925 (0.817)
ESG 5	3.362*** (0.871)	-0.482 (0.721)	0.0684 (0.278)	-1.958 (1.322)
Constant	-9.790*** (1.194)	0.509 (1.207)	1.262** (0.565)	3.642*** (0.836)
Observations	437	431	403	204
R^2	0.231	0.164	0.175	0.326

Standard errors in parentheses

** $p < 0.05$, *** $p < 0.01$

1-year total returns give a positive, significant correlation between ESG score of 5 and total yearly return. The coefficient is 3.362, implying that ESG score of 5 yielded returns 2.57 degrees higher than ESG score of 1. This is the first time we see a high ESG score relating to a positive and significant performance for the U.S. sample. When running the same regression for 3 year and 5-year total returns did not have any significant coefficients. The 5-year total returns coefficients for ESG ratings switched signs again for ESG score of 4 and 5. However, the impact was still relatively small, 0.276 for ESG 4 and 0.068 for ESG 5. These coefficients showed trends of a higher ESG rating correlating to a higher 5-year total return, which might have to do

with the larger market factors at play. 10-year total return coefficient signs flipped around again, this time indicating higher ESG ratings correlating to lower 10-year total returns. Again, this correlation would be better understood if the corresponding ESG ratings could be analyzed for the past 10 years, and there is selection bias in the sample due to the fact that not all funds were around for the past 10 years. Since ESG is such an emerging field and results are expected to be shown over longer periods of time, this distinction is important.

The U.S. sample benefited from having an addition of each individual ESG pillar's score for the American data allowed us to run additional regressions showing the impact of each individual score on these performance metrics. Both performance metrics in question were used to see what the correlation between these independent factors have on the overall performance of the funds.

Table 8: Correlation of pillar scores on YTD Return

	(1) YTD return (%)	(2) YTD return (%)	(3) YTD return (%)
ENV Sustainability Score	-0.796** (0.261)		
SOCIAL Sustainability Score		0.363 (0.315)	
GOVERNANCE Sustainability Score			0.640 (0.399)
Constant	5.612*** (0.684)	-0.452 (3.542)	-1.656 (3.650)
Observations	432	432	432
R^2	0.290	0.247	0.253

Standard errors in parentheses

** $p < 0.05$, *** $p < 0.01$

In this case, a higher individual pillar score reflects a higher risk of that genre. So, a higher environmental score means that the fund is exposed to greater environmental risk. In Table 8, this shows that funds with more risk to environment had a lower YTD Return with a

significant negative coefficient at the 5% significance level. Meanwhile, the social and governance pillars had no significant correlation, though they both had a positive trend, implying more risk to these factors increased the YTD Return.

Table 9: Correlation of pillar scores on Sharpe Ratio

	(1)	(2)	(3)
	3 Year Sharpe Ratio	3 Year Sharpe Ratio	3 Year Sharpe Ratio
ENV Sustainability Score	0.0376*** (0.00944)		
SOCIAL Sustainability Score		0.00450 (0.0210)	
GOVERNANCE Sustainability Score			-0.0165 (0.0169)
Constant	0.00601 (0.0570)	0.113 (0.152)	0.258** (0.0982)
Observations	429	429	429
R^2	0.148	0.110	0.114

Standard errors in parentheses

** $p < 0.05$, *** $p < 0.01$

When using the Sharpe ratio as the performance metric, the results become less conclusive. The higher the governance pillar, the lower the Sharpe ratio, however the coefficient is not significant, and the magnitude is only -.0165, showing not much of a correlation. The social pillar has a positive correlation, but again it is quite small at 0.0045. The environmental pillar again has a positive correlation, but this time the coefficient is 0.0376 and is positive which opposes the previous findings and shows that an *increase* in environmental risk leads to *higher* risk adjusted performance over the past 3 years. Analyzing the correlation on these two metrics deliver contrasting results about the amount of risk exposure each pillar has to the overall performance. This makes sense though, as the overall sample for U.S. funds has gleaned relatively few definitive results about the correlation between ESG ratings and performance.

Combined Samples Outcomes:

Regressions were also run using an interaction term in order to capture whether or not the mutual fund's performance is correlated to the country of origin. The country was multiplied by the ESG dummy values. The results are shown in the tables below.

Table 10: Main Findings, Both Samples

	(1) 3 Year Sharpe Ratio	(2) YTD Return (%)	(3) 3 Year Standard Deviation
2	-0.0283 (0.0475)	0.740 (0.885)	-1.774 (1.141)
3	-0.0312 (0.0539)	0.689 (0.459)	-0.0943 (1.559)
4	-0.112 (0.0566)	0.969 (0.839)	0.389 (0.979)
5	-0.134*** (0.0284)	1.299 (0.678)	-0.979 (1.530)
US	-0.0229 (0.0459)	0.0658 (0.617)	-4.243*** (1.142)
2 # US	-0.000326 (0.0669)	-1.192 (0.598)	0.195 (1.510)
3 # US	-0.00998 (0.0461)	-1.131 (0.644)	-2.516 (1.632)
4 # US	0.143** (0.0518)	-0.918 (0.676)	-0.919 (1.277)
5 # US	0.112*** (0.0296)	-1.499 (0.686)	0.503 (2.144)
Constant	0.146 (0.0679)	2.228*** (0.465)	19.29*** (1.750)
Observations	2389	2586	2255
R ²	0.108	0.050	0.171

Standard errors in parentheses

** $p < 0.05$, *** $p < 0.01$

Here we've combined the sample and see the same trends as before where the ESG ratings have a negative correlation to the Sharpe Ratio. In this regression, ESG ratings of 5 seems to have a strong, significantly negative impact on the Sharpe Ratio compared to ESG score of 1.

An ESG score of 5 leads to a Sharpe Ratio of -0.1337 less than the Sharpe Ratio of ESG 1. In this regression, U.S. is used as the observed variable while European dummy was omitted.

The interaction term yields interesting results. Here we see that ESG scores of 4 and 5 both have a significant and strong correlation with the Sharpe Ratio. ESG 4 funds lead to a Sharpe ratio of 0.143 degrees higher, and ESG 5 slightly lower but still an increase of 0.1123. Implying that the fact that the fund comes from the EU has a more negative and stronger correlation to the performance of the mutual fund given it has a rating of a 4 or 5.

The regression was replicated with the YTD Return, where the outcome is actually reversed. This is consistent with the results found previously which indicate that European funds did better when the YTD return was analyzed. In this case, the interaction term between being a US based fund and ESG 5 rating leads to a lower YTD by -1.498%. The Standard Deviation had a significant negative result for the funds from the U.S. compared to the EU, which was also aligned with previous findings.

The one-year annualized return has similar results as when looking at the Sharpe Ratio (See Table 11). While the overall total returns have a strong negative correlation with ESG ratings compared to ESG 1, the inclusion of the interaction term of being a fund based in the U.S. changes the sign around and results in a significant outcome for ESG scores of 4 and 5. This implies that funds based in the U.S. that have a rating of 4 result in 5.24% increase in 1 year total returns than if it was a European based fund with a rating of 4. ESG 5 and being based in the U.S. correlates to a 4.778% higher total return than European based funds of rating 4. These are important results for assessing our question about the relationship between ESG ratings and performance, and how they differ within different regulatory frameworks. The same trends were found for 3-year annual returns.

Table 11: ESG scores and year (s) annualized, Both samples

	(1)	(2)	(3)	(4)
	1 Year Annualized (%)	3 Years Annualized (%)	5 Years Annualized (%)	10 Years Annualized (%)
ESG = 2	-3.950 (1.973)	-0.764 (0.756)	-0.798 (0.702)	-0.634 (0.544)
ESG = 3	-1.990 (2.181)	-0.534 (1.080)	-0.535 (1.071)	-0.267 (0.619)
ESG =4	-3.573 (1.942)	-3.318** (1.083)	-1.452 (1.104)	-1.525** (0.630)
ESG = 5	-3.254 (1.748)	-3.233*** (0.407)	-1.242 (0.802)	-1.500** (0.512)
US	4.174** (1.777)	0.830 (0.820)	-0.300 (0.608)	0.736 (0.434)
2 # US	4.420 (2.421)	0.557 (1.786)	-0.258 (1.503)	-0.674 (1.454)
3 # US	2.956 (2.257)	0.154 (1.515)	-0.413 (1.242)	-0.952 (0.922)
4 # US	5.240** (1.788)	4.143** (1.599)	1.764 (1.176)	0.721 (1.241)
5 # US	4.777** (1.888)	4.373*** (0.400)	1.558 (0.748)	0.226 (1.554)
Constant	-1.902 (1.690)	-0.678 (1.058)	1.392 (0.969)	2.076*** (0.535)
Observations	2560	2372	2216	1185
R ²	0.115	0.154	0.117	0.191

Standard errors in parentheses: ** $p < 0.05$, *** $p < 0.01$

Robustness Checks

One possible concern with this model could entail the fact that it uses sector fixed effects. The sector classification was a generalization, assigning the sector based on where the fund had its top percentage of holdings. However, a fund might have been invested across a wide range of sectors, relatively evenly with just slightly more holdings associated with one sector over the

other. In order to assess the implications of this issue, I ran the same regression but using the Morningstar Global Category as fixed effects instead. I found that the same trends were present when using category fixed effects (see Appendix for these tables). The correlation coefficients between the Sharpe Ratio and ESG ratings in the U.S. remained to be negative with respect to ESG mutual funds rated 1 and were not significant (for ESG rating 5, coefficient was -0.0159). The same occurred for the correlation on the YTD Return, where the coefficient for ESG rating 5 was -0.308, and not significant.

The EU sample yielded the same pattern when using category fixed effects, though the coefficients became more significant than before. They were still more negative and growing in magnitude with the higher ESG ratings. ESG rating 5 had a correlation coefficient to the Sharpe Ratio of -0.185. When looking at the YTD Return, positive coefficients were again found, where an ESG score of 5 had a statistically significant coefficient of 1.032. This resembles the findings in the original model, though had a stronger significance factor under this model.

However, when analyzing the two data sets together and an interaction term was used to capture the effects of the domiciled country, the regression had errors due to multicollinearity. This is likely due to the fact that there's a link between the Morningstar Global Category and the country the fund originates from. While the multicollinearity factor results in inconclusive findings, the signs and magnitudes of the coefficients were again similar to that of the original model, where ESG 5 funds from the U.S. saw a positive correlation compared to ESG 5 funds from EU for the Sharpe Ratio. The opposite was true when the YTD Return metric was utilized, which again aligns with the original model.

SECTION 5: Discussion

These findings offer interesting insights into the nature of ESG ratings and performance, while prompting questions about the difference between the ESG landscape in the EU and the U.S. I had originally hypothesized that ESG funds in the EU would have a stronger correlation to higher returns than in the U.S. due to the fact that the EU has stricter guidelines on disclosures which differentiate what gets classified as ESG. The trends in my data showed stronger correlations in the EU data set, though not typically in the direction I thought. This brings up questions about why there would be a negative correlation on the Sharpe Ratio and positive for YTD Return. Additionally, while there were few significant correlations in the U.S. sample, the U.S. sample and ESG funds rated 4 and 5 did outperform EU funds rated 4 and 5 when analyzing the Sharpe Ratio.

Despite 2022 having overall poor market conditions, the asset flows to ESG mutual funds increased in Europe at the beginning of the year which might be linked to the positive YTD Return correlation. Conventional funds experienced -\$85.2 billion outflows, while ESG products saw \$24.3 inflows (Glow 2022). This would mean that the net asset value at the beginning of 2022 would be larger for funds with higher ESG ratings, and then therefore lead to a higher overall YTD Returns for the European sample. In general, however, it is important to keep in mind that 2022 might have had anomalies that would've affected these performance statistics.

Another factor of note is the comparison of the Sharpe Ratio and the standard deviation, both of which saw a negative correlation to higher rated ESG funds. This could be attributed to the theory of ESG as a whole, which is that sustainable funds will see benefits long term because it mitigates long term risks. Climate change impacts will be seen more greatly in years to come, and the nature of sustainable investments means that they are resilient in the long run by having

less risk exposure. It's possible that the higher ESG funds in this sample have less risk, shown by the standard deviation, but this has not yet translated into higher returns when compared to funds with more ESG risk exposure.

While some of these same patterns can be attributed to the findings of the U.S. model, there were less significant coefficients across the models. I predicted this outcome to some degree due to the fact that the regulatory body of mutual funds in the U.S. is less stringent than that in the EU, and overtime, ESG funds' investment strategies in the U.S. are more likely to resemble conventional ones (Baily and Gnabo 2022). Additionally, with the lack of disclosures and accurate metrics to compare ESG factors in the U.S., this means that it's harder to discern ESG funds from conventional ones in the U.S., which would mean there's little empirical difference in performance if they were inherently not that different from one another.

While my findings' trends have meaningful implications, there are also some limitations to the model. Firstly, there's an issue of the nature of a cross sectional model which does not capture as full of a story as a time series or panel regression would. This was limited due to the availability of historical ESG scores which would have been necessary in order to perform a more robust regression. Without that, it lends conclusions about only a specific point in time, which doesn't necessarily capture the whole landscape of ESG over, say, the past five years, which would be an interesting and impactful study as well. However, this study still is able to capture the results at a time when regulatory frameworks are in flux and the market is experiencing turmoil.

Another possible limitation present that led to the Bannier et. al (2019) paper is that of reverse causality. They argue that previous studies assessing ESG ratings and performance neglect the aspect of reverse causality which is due to the fact that more financially savvy funds

have the ability to pay the resources needed to generate ESG disclosures and thus be rated more highly. While we did not necessarily see this trend, they argue that there might be a relationship between ESG scores and performance that is misrepresented in the model. A more robust study could be conducted assessing the different relationships at play. They also cite the issue with ESG ratings as a whole as an issue confounding result of empirical studies such as this one.

The ratings themselves and the ESG framework as a whole lends itself to shortcomings. In the U.S, disclosure policies for funds are currently being developed and are in limbo which means that some funds willingly disclosing ESG metrics while others do not have the incentive to. This might create some dissonance in those being perceived as ESG funds rated highly with conventional funds. Fund managers are eagerly finding ways to switch their asset holdings to be slightly more aligned with ESG standards, and without the necessary regulations in place, this likely leads to many highly rated sustainable funds susceptible to greenwashing. In Europe, there's stricter regulations about what constitutes an ESG fund thanks to the SFDR and EU Taxonomy guidelines. This is important to keep in mind, as the regulatory frameworks between the two countries play a role in the outcomes of financial performance.

While there's historically vast disagreement between empirical studies assessing the correlation between ESG factors and performance (Friede et. al 2015), my findings align with similar studies of a similar nature. Auer and Schuhmacher found that overall, regardless of region, active selection for ESG attributes do not result in better outcomes than investing in passive markets. Additionally, they found that while in the U.S. or in Asia-Pacific markets investors can anticipate similar returns, European investors pay more of a price for prioritizing social factors (Auer and Schumacher 2020). This aligns with my findings that performance of

higher rated ESG in the U.S. seemed to be less negatively correlated to performance metrics than European funds of the same rating.

Milonas et. al (2022) found no statistically significant difference between ESG and non-ESG funds, although ESG funds had slightly higher returns. This is also similar to my findings, wherein total returns seemed to improve with higher ratings as compared to returns of lower rated ESG funds. They also conclude that the true benefits of investing in ESG minded funds are more associated to investor's demands and priorities. This goes to the question of the true role of ESG and where it is most important. Bailey and Gnabo (2022) found that, while more socially responsible mutual funds (SRMF) underperformed compared to conventional funds, they also had a greater resilience during times of climate risk. This is similar to Das et. al (2018), wherein they find that SRMF underperformed normally, but then had better outcomes during the Great Recession. This shows that the theory of ESG has merit.

The model presented in this thesis gives a basic understanding of the raw ESG rating correlated to performance. There are other studies that have found more positive findings, in an NYU survey of the literature on ESG they found that 33% of studies of this kind found a positive relationship, 26% found a neutral one, 28% mixed, and 14% negative (Whelan et. al. 2021). The general trends of the research in this study could be considered in the mixed category, as when looking at the Sharpe Ratio there are negative trends, but higher rated ESG funds receive higher yearly returns, and U.S. based funds generate higher 3-year annualized returns. Whalen et. al. also asserts that those analyzing risk adjusted metrics seem to have more positive outcomes. These findings align with the theory of ESG, which is that prioritizing these principals will offer an extra safeguard against market risks by having best practices in place to be more durable to things like a changing climate or risks associated with corruption.

Additionally, the data presented in this study are for mutual funds and taken without any portfolio construction. Hübel and Sholz (2019) assessed how ESG exposure relates to risks and finds that portfolios can be constructed and achieve the same risk adjusted performance as conventional funds. However, they use a more nuanced approach to assess ESG exposure rather than using just the ESG ratings (Hubel and Sholz 2019).

This study is specifically assessing the correlation of Morningstar's ratings on performance. Many investors turn to Morningstar for investing needs, and thus this provides information to answer the question many investors who are curious about ESG are faced with: will investing in higher rated ESG mutual funds lead to higher returns?

While a negative relationship was found, this must be taken in conjunction with other principals that are intrinsic to the ESG debate. Firstly, the Sharpe Ratio must be taken into account with other performance metrics and does not give the whole story of performance. It depends on the risk-free rate, and the risk incurred by the fund. If one looked at the Sharpe Ratio in this case, they would see a negative trend and assume that higher ESG funds do not perform as well. However, when looking at the total returns and YTD returns, a slightly different story is gleaned in which the results become more ambiguous.

This is where investor preferences come into play, as part of the benefit from ESG is that it meets the investor's needs of being socially aware (Milonas et. al. 2022). There's an added benefit to ESG which is that by investing in an ESG 5 rated fund, the investor might be making some kind of statement about their values with their money. The issue with this is that not everyone cares about the impact of their investments, and in the U.S. without stricter regulations dictating what gets constituted as a fund meeting ESG criteria, then there's no guarantee that the funds are meeting the objectives that they set out to (Baily and Gnabo 2022).

While disclosure policies alone do not necessarily lead to increased financial performance, they inherently increase the transparency of the management of the fund and therefore ensures that at least investor's preferences are being met. The strategy of the fund dictates whether there's an exclusionary approach or an active impact approach, and the new SEC disclosures could help shed more light on which funds are underperforming and for what reasons. The ESG umbrella is quite wide, and the way that these ratings are assessed is based on a wide range of criteria that leads to an ESG fund of 5 still including companies like Amazon and Shell because they still might rank better than other holdings in their category that scored worse. However, the scoring might be due to the fact that the fund's holdings are smaller and do not have the financial capacity to do consistent sustainability assessments, and therefore if there's nothing to be rated on, they are rated poorly. Stricter policies around disclosure are a start to enhance the standards of corporate governance.

Conclusion

The research presented in this paper provides a holistic analysis of the landscape of ESG as it stands today. ESG resides in business and financial news' headlines and will continue to present a challenge for policy makers and corporations attempting to meet the concerns of society pertaining to ESG issues. Investors' concerns about the social component to their investments generates demand for ESG rating agencies, such as Morningstar, which quantifiably assesses ESG criteria. These ratings are then taken into account when deciding upon investments. However, ESG investing is still investing, it's not activism, as Morningstar's CFA Jon Hale stated. The question of interest then becomes, what kinds of financial benefits are associated with ESG higher ratings, if any?

ESG as a concept comes with a requirement to ensure that the criteria are being upheld by asset managers. This requires regulatory support government structures. The European Union's framework of the EU Taxonomy working with the SFDR offers a potential for how to govern what constitutes as ESG and enforce disclosures from companies and asset managers which will both improve the robustness of ESG as a whole. While the SEC has disclosure potential policies in the making, in the meantime, institutions could turn to the EU regulatory foundations for ways to improve the dissonance and enforce companies to disclose ESG metrics in order to strengthen assessments by rating agencies. Because of the different regulatory structures that exist between the EU and the U.S., they make for interesting samples of data to draw comparisons between in order to see if there's a change in correlation for ESG ratings and performance.

I initially hypothesized that ESG ratings would have a stronger correlation in Europe due to the more stringent policies that enhance disclosures and, therefore, theoretically they would be more aligned with the "doing good while doing well" mantra. Meanwhile, I expected the results in the U.S. sample to be more ambiguous, as there's less regulations out there differentiating ESG from other assets.

I found that there was a weak, negative correlation between highly rated ESG funds and the Sharpe Ratio and YTD Returns in the U.S. sample. The European sample had mixed results when looking at different metrics, where there was a negative correlation between ESG 5 funds and the Sharpe Ratio, and a positive correlation with highly rated sustainable funds and the YTD Returns. These are likely due to the nature of the changing in disclosure policies, where more assets went into ESG funds than conventional ones at the beginning of 2022, which was why we

saw a positive correlation when the YTD Return was analyzed. The nature of the weak and lacking policies in the U.S. likely led to the weak correlation in the data for the U.S. sample.

A key limitation to this study presented is the nature of a cross-sectional analysis. A panel study would have been more impactful here in which ratings were gathered for an extended period of time rather than just at one fixed point. This would give a better understanding of the long-term trends of ESG ratings. It would also be meaningful to conduct similar studies including more than just two regions of the United States and Europe, as there's likely more to be learned from other nations. Additionally, future studies could be conducted expanding off of Bannier et. al (2019) and the notion of reverse causality, wherein better performing firms might subsequently be correlated with higher ESG ratings.

This result was not all together unexpected, as it aligns with the literature on the topic. These results have implications on the true nature and use for ESG ratings and go to show that ultimately the ratings are not much use if investors wish to base their investment decisions on mutual funds with 5 globes. However, understanding the nature of greenwashing is important to understand here, as the globes do not tell the whole story. Many 5 globe funds still have major holdings in fossil fuel companies, for example, but maybe just the ones that have renewable commitments. The rating systems are inherently biased as there are not uniform forms of measurement for these metrics, and what constitutes "good" is also inherently subjective. ESG ratings could be more beneficial if investors use them to guide the sorts of principals that they specifically are looking for (Abhayawansa and Tyagi 2021).

As ESG continues to emerge in the coming years, caution should be taken with the way that investors utilize these rating systems. ESG as a concept should not be disregarded, but it must be reworked in order to see the full benefits of the framework that it offers.

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Appendix

Mean of Sharpe Ratio by ESG Rating (EU Sample)

Mean Sharpe Ratio per Rating, Europe funds	Mean
ESG 1	0.39
ESG 2	0.27
ESG 3	0.29
ESG 4	0.28
ESG 5	0.27
Total	0.29

Mean of YTD Return by ESG Rating (US Sample)

Mean Sharpe Ratio per Rating, U.S. funds	Mean
ESG 1	0.29
ESG 2	0.25
ESG 3	0.23
ESG 4	0.32
ESG 5	0.22
Total	0.27

Mean of YTD Return by ESG Rating (EU Sample)

YTD By ESG Rating, European Funds	Mean
ESG 1	4.48
ESG 2	4.69
ESG 3	3.96
ESG 4	4.82
ESG 5	5.82

Table 4:

YTD By ESG Rating, American Funds	Mean
ESG 1	4.41
ESG 2	3.99
ESG 3	3.67
ESG 4	4.49
ESG 5	4.11

Main Regression model:

$$\text{SharpeRatio}_{i,s} = \beta_0 + \beta \text{ESG2}_{i,s} + \beta \text{ESG3}_{i,s} + \beta \text{ESG4}_{i,s} + \beta \text{ESG5}_{i,s} + \beta \text{lnassets}_{i,s} + \beta \text{FeeLevel}_{i,s} + \beta \text{Style}_{i,s} + \gamma + u_{i,s}$$

	(1) Sharpe Ratio	(2) Sharpe Ratio	(3) Sharpe Ratio with Controls
ESG Rating = 2	-0.118*** (0.0160)	-0.0902 (0.0454)	-0.0112 (0.0430)
ESG Rating = 3	-0.105*** (0.0157)	-0.0649 (0.0442)	-0.0317 (0.0489)
ESG Rating = 4	-0.115*** (0.0164)	-0.0853 (0.0504)	-0.109 (0.0562)
ESG Rating = 5	-0.125*** (0.0166)	-0.101*** (0.0232)	-0.134*** (0.0271)
Large Growth			0.0645 (0.0411)
Large Value			0.0559 (0.0752)
Mid Blend			0.0237 (0.0722)
Mid Growth			0.101 (0.0891)
Mid Value			0.0813 (0.0851)
Small Blend			0.0403 (0.112)
Small Growth			0.0242 (0.188)
Small Value			-0.384** (0.169)
avg			0.0213 (0.0162)
belowAvg			0.0194 (0.0235)
high			-0.0346

			(0.0156)
low			0.0587 (0.0265)
lnassets			0.0343*** (0.0103)
Constant	0.390*** (0.0128)	0.363*** (0.0299)	0.0964 (0.0779)
Observations	3869	3869	1954
R ²	0.018	0.013	0.146
Fixed Effects	NO	YES	YES
Standard errors in parentheses			
** $p < 0.05$, *** $p < 0.01$			

$$YTDReturn_{i,s} = \beta_0 + \beta ESG2_{i,s} + \beta ESG3_{i,s} + \beta ESG4_{i,s} + \beta ESG5_{i,s} + \beta lnassets_{i,s} + \beta FeeLevel_{i,s} + \beta Style_{i,s} + \gamma + u_{is}$$

	(1) YTD Return	(2) YTD Return	(3) YTD Return
ESG2	0.209 (0.250)	0.828 (0.653)	0.889 (0.901)
ESG3	-0.523** (0.247)	0.257 (0.390)	0.683 (0.483)
ESG4	0.339 (0.257)	0.472 (0.564)	1.019 (0.877)
ESG5	1.332*** (0.259)	1.158 (0.534)	1.396 (0.727)
Large Growth			0.324 (0.731)
Large Value			1.678 (1.030)
Mid Blend			1.377 (0.867)
Mid Growth			0.633 (1.395)
Mid Value			0.958 (0.764)
Small Blend			1.873** (0.706)

Small Growth			0.795 (0.682)
Small Value			0.980 (1.118)
avg			-0.559 (0.421)
belowAvg			0.0376 (0.284)
high			-0.0307 (0.209)
low			-0.863** (0.291)
lnassets			0.274** (0.0891)
_cons	4.483*** (0.199)	4.156*** (0.352)	1.962*** (0.583)
<i>N</i>	4251	4251	2148
<i>R</i> ²	0.017	0.008	0.045
Fixed Effects	NO	YES	YES
Standard errors in parentheses			
** $p < 0.05$, *** $p < 0.01$			

Robustness checks:

$$YTDReturn_{i,c} = \beta_0 + \beta ESG2_{i,c} + \beta ESG3_{i,c} + \beta ESG4_{i,c} + \beta ESG5_{i,c} + \beta lnassets_{i,c} + \beta FeeLevel_{i,c} + \beta Style_{i,c} + \gamma + u_{ic}$$

	(1) 3 Year Sharpe Ratio	(2) YTD Return (%)	(3) 3 Year Standard Deviation
1	0 (.)	0 (.)	0 (.)
2	-0.0907*** (0.0313)	0.429 (0.460)	0.530 (0.891)
3	-0.0923*** (0.0209)	0.536 (0.454)	0.299 (0.875)
4	-0.123*** (0.0300)	0.653 (0.467)	0.361 (0.702)
5	-0.182*** (0.0425)	1.026** (0.401)	0.446 (0.973)
US	Omitted due to multicollinearity		
2 # US	0.0481 (0.0413)	-0.0226 (0.818)	-1.677 (1.057)
3 # US	0.0322 (0.0332)	0.254 (0.912)	-1.705 (1.076)
4 # US	0.101*** (0.0384)	-0.413 (1.090)	-1.594 (1.033)
5 # US	0.158*** (0.0482)	-0.722 (1.252)	-2.547** (1.217)
Constant	0.228***	2.919***	18.23***

	(0.0359)	(0.550)	(0.733)
Observations	2389	2586	2255
R^2	0.103	0.030	0.059
Standard errors in parentheses			
** $p < 0.05$, *** $p < 0.01$			