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Do investors care about ESG when markets turn sour? Evidence from the mutual fund industry during the COVID-19 crisis

MOHAMMED ALBARBARI[I] and MARLENE ROSENBERGER[II]

ABSTRACT

This thesis empirically examines the effect of the sustainability rating on sustainable fund returns and fund flows to gain a better understanding of the motivation underlying sustainable investing. By conducting panel regression analyses as well as Difference in Difference analyses on a selected sample of EU equity funds, we show that under normal market conditions sustainable funds outperform conventional funds. However, during the crisis period we find this effect to vanish. Furthermore, we find high sustainability ratings positively affecting fund flows overall. This trend was interrupted by the COVID-19 crash, as we provide evidence on sustainable funds experiencing fund outflows caused by the exogenous shock. We therefore conclude that sustainable investors are predominately driven by financial rather than by non-pecuniary motivations as they turned away from their investments once markets turned sour and once superior returns could not be achieved through sustainable investment anymore.

Keywords: Sustainable investment, Mutual fund flows, COVID-19 crisis, Sustainability ratings.

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[I] 41961@student.hhs.se

[II] 41934@student.hhs.se

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List of Abbreviations

CAPM	Capital Asset Pricing Model
DiD	Difference in Difference
DJIA	Dow Jones Industrial Average
EMH	Efficient Market Hypothesis
ESG	Environmental, Social, and Governance
EU	European Union
GSIA	Global Sustainable Investment Alliance
HDI	Human Development Index
MPT	Modern Portfolio Theory
SRI	Socially Responsible Investing
TNA	Total Net Assets
WHO	World Health Organization

1. Introduction

The concept of sustainable investment, also known as (socially) responsible or impact investing, has gained increased attention in the past few years. Indeed, sustainable investment soared to an unprecedented $35.3 trillion globally at the start of 2020, compared to $30.7 trillion in 2018 and $22.9 trillion in 2016. This represents a total of 35.9% of total assets under management which has grown to reach $98.4 trillion during the same period, as reported by the Global Sustainable Investment Alliance (GSIA). While there is no consensus on the exact definition of sustainable investment, we adopt the definition of GSIA as "investment approaches that consider environmental, social and governance (ESG) factors in portfolio selection and management" (Global Sustainable Investment Review, 2016-2020).

This rapid growth of ESG incorporation in the financial markets can be explained by three key drivers according to Paredes-Gazquez et al. (2014). The first driver is market pressure which is mainly led by analysts and investors, whether institutional or retail, who have started to view ESG information as fundamental to develop a holistic assessment of business operations and as a way of managing risks and saving costs. The second driver is group pressure exerted by members of the financial market which contribute to a better understanding of ESG issues. Finally, the third driver is institutional pressure exercised by non-members of the financial market such as through regulations. While these drivers are mutually reinforcing, in which they all lead to the development of the other, we argue that market pressure accounts for the largest share of the increased awareness of sustainable investment. Indications are provided by the positive relationship between sustainable investment and financial performance as observed within several studies (Statman, 2000; Renneboog et al., 2008; Friede et al., 2015; Pastor et al., 2017 and 2022). However, the underlying motives for the vast increase in investors' demand can be best observed during phases of economic downturn, such as the recent COVID-19 pandemic which has swept the world in the past two years and served as a catalyst for sustainable development.

On 30 January 2020, the World Health Organization (WHO) declared the novel coronavirus outbreak to be a "public health emergency of international concern" providing advise on how to control this infectious disease and how to interrupt its rapid spread. Despite the public health measures of early identification and isolation of cases, the number of cases increased 12-fold and the number of affected countries quintupled within only 6 weeks. This led the WHO to characterize COVID-19 as a pandemic on 11 March 2020 (WHO Situation Reports 11-51, 2020). Countries around the world encountered a trade-off between health and economic outcomes resulting in different mitigation strategies with China and Sweden being at both ends of social restriction spectrum. Economically, the spread of COVID-19 triggered the most severe global economic crisis and the sharpest contraction of global output in years. The world gross product fell by an estimated 4.3% in 2020, compared to 1.7% during the Great Recession of 2009. Because of the strict lockdown measures, developed countries were hit the hardest with output shrinking by 5.7%, whereas developing countries and least developed countries experienced an output shrinking of 2.5% and 1.3%, respectively. The economies of East Asia, however, expanded by 1% during the same year according to the UN World Economic Situation and Prospects (2021). Furthermore, the stock market crashed between February 20th and April 7th, where major stock indices closed the first quarter of 2020 with high negative performance. For example, the Dow Jones Industrial Average (DJIA) closed at -23% and the S&P500 closed at -20% (Imbert, 2020).

Most academic research on sustainable investment have analyzed the topic from a return point of view (Folger-Laronde et al., 2020; Omura et al., 2021; and Pavlova & de Boyrie, 2022). Yet, literature on the effect of sustainability ratings on fund flows is rare and they almost exclusively focus on domestic U.S. funds (Pastor and Vorstaz, 2020; Albuquerque et al., 2021; and Döttling and Kim, 2022). However, to the best of our knowledge, there exists no study that investigates these effects using EU funds. In fact, Albuquerque et al. (2021) suggested further research on European equity mutual funds “since ESG investing is more prevalent in Europe and actively managed funds are more dominant than in the U.S”. In order to address this gap in the literature, we empirically analyze the effect of sustainability ratings on a selected sample of EU fund returns and fund flows during the COVID-19 crisis. Thereupon, we draw conclusions on investors’ motivations underlying sustainable investment. That is, whether they really care about ESG, thus holding on to their investments even when markets turn sour or whether they are merely financially motivated given the belief that sustainable investment outperforms the market; or whether they are following a trend from which they move away once their return requirements are not met, and uncertainty and volatility increase. In this paper, the Morningstar Sustainability Rating, which was initially published in 2016 and then updated in late 2021, is used to categorize our sample of funds according to a rating from Globe 1 (significant ESG risk) to Globe 5 (negligible ESG risk).

Within our first analysis, we answer the question if high Globe ratings result in superior performance given different market conditions. We found sustainable funds outperforming under normal market conditions and when considering the 6-months and full year average periods after the crash event. However, neither within our multivariate regression analysis, nor within our Difference in Difference (DiD) analysis we found sustainability ratings to have a significantly positive effect on fund returns during the COVID-19 crisis. Precisely, when analyzing the full sample of funds within our panel regressions the effect of Globe ratings on fund returns turned insignificant over the 3-months around the crash event. This is in line with our DiD regressions showing that the COVID-19 outbreak caused no significant change in fund returns when comparing a matched sample of Globe 5 to Globe 1 funds. Therefore, in agreement with previous literature, we conclude that high ESG ratings do not protect investors from financial losses once markets turn sour (Demers et al., 2021; Chiappini et al., 2021; Folger-Laronde et al., 2020).

Based on these initial findings we conduct another set of regression and DiD analyses measuring the effect of Globe ratings on fund flows in order to investigate on investors' motivation underlying sustainable fund investments. As defined by literature, investors can achieve financial utility as well as non-pecuniary utility from investing in sustainable assets (Riedl and Smeets, 2017; Pastor et al., 2021; Hartzmark and Sussman, 2019). Based on their investment motivations, the two groups of investors are expected to behave differently as soon as an exogenous event hits. As investors motivated by non-financial motives are expected to be less sensitive to past returns and tend to be more loyal (Renneboog et al., 2011; Demers et al., 2021), we expect them to remain invested. On the contrary, however, financially motivated investors are expected to divest once sustainable funds cannot outperform, as they mainly rely on past returns when making decisions on their investments (Sirri and Tufano, 1998). While our regression analyses provide evidence of the existence of an underlying trend towards sustainable investments, we find within our DiD analysis that caused by the COVID-19 crash fund flows are significantly negatively impacted by high Morningstar Globe ratings. Precisely, Globe 5 rated funds were suffering from significant fund outflows of 1.8% caused by the COVID-19 breakdown, as a reaction to the crisis event.

By combining both empirical analyses, we interpret our findings as follows: As a high Globe rating does not lead to increased fund returns during the crash period, the underlying motivation for investors who derive financial utility form their sustainable investments diminishes. Indeed, the shock event caused funds being withdrawn from Globe 5 rated funds, indicating that within our selected sample, financial motivations predominate among the investors when choosing sustainable investments.

This paper contributes to existing literature in several ways. First, we are among the first to study the effect of Morningstar Globe ratings on European fund flows in the context of an exogenous event, such as the COVID-19 crisis. Thereby we complement to previous studies by Pastor and Vorsatz (2020) who analyze fund flows of U.S. equity funds during the COVID-19 crisis. Additionally, the researchers find a positive relationship between Globe ratings and fund flows both before and during the crisis and leave open the question whether these inflows are attributed to the crisis itself or to an overall trend. We therefore extend their methodologies by conducting Difference in Difference analyses in order to control for trend effects observed during the pre-crash period. Second, we shed light on sustainable investment as not only a niche investment, but in the context of a market trend form which investors expect excess returns rather than the sole utility from doing something ethically good. Additionally, we provide supportive evidence on the theory of Bialkowski and Starks (2016) who suggest that because of sustainable investment becoming more mainstream, investors might turn out to be less resilient. We do so by claiming that, as shown by the recent market breakdown, the group of investors nowadays are mainly motivated by financial motives and reallocate their funds more easily once uncertainty and market volatility increase and as returns decrease. This questions past findings on sustainable investors being considered more loyal and less affected by past returns (Demers et al., 2021; Renneboog et al., 2011).

The remainder of this paper is structured as follows. Section 2 provides an overview of the recent literature and derives our research question alongside with the hypotheses development. Section 3 describes the sample data used as well as summary statistics while in Section 4 we describe the methodology employed, empirical results and their implications. We conclude with Section 5 within which we discuss our results in addition to the limitations of this paper and derive suggestions for further research.

2. Literature Review and Hypotheses Development

The purpose of this section is to provide theoretical background information and to gather previous research results on the relevant topics based on which we develop the hypotheses to be tested empirically within this paper. The section begins with an overview on the main theories of investors behavior related to our research topic. Thereafter, we present the results of current literature on investors' motivation underlying sustainable investments. We continue describing research results on both performance and fund flows of sustainable investments compared to conventional investments, during economic downturns as well as under normal market conditions.

2.1 Theories of Investor Behavior – From Traditional to Behavioral

Traditional financial theories such as the Modern Portfolio Theory (MPT), the Efficient Market Hypothesis (EMH), and the Capital Asset Pricing Model (CAPM) consider investors as rational and independent beings who will not be able to generate alpha returns from the market (Ahmad, 2021). The MPT, for example, suggests a framework for portfolio optimization which is based on two criteria: First, the expected performance of an investment, and second, investors' attitude towards risk (Fabozzi et al., 2002). It assumes that returns on investment strategies follow a normal distribution. Thus, to determine the optimal allocation of investment holdings in a portfolio, an investor would either minimize the risk for a specific level of expected return and/or maximize the expected return for a specific level of risk (Markowitz, 1952; Kroll et al., 1984). However, despite the plenty of attention the MPT has received since its introduction, several researchers claim that the expected utility fails to adequately explain investor behavior as found by empirical evidence. One example of this is an individual who involves in gambling activities knowing that the probability of wining is extremely small (Pfiffelmann et al., 2016). However, we believe that sustainable investment does not necessarily violate the MPT assumption that investors are risk-averse, rate-of-return-maximizers. This is because, assuming sustainable investment provides similar returns as conventional investments, investors would still be willing to invest in sustainable funds if they show a more resilient reaction to unexpected events for example as found by Pisani and Russo (2021). However, it violates the assumption of making decisions based on the expected risk and return statistics if sustainable investors consider non-pecuniary benefits only. According to Lydenberg (2007, P. 476), investors following the MPT "appear to ignore the benefits of making investments that help create a just and sustainable world".

Similarly, the EMH states that an efficient market is where "prices provide accurate signals for resources allocation" (Fama, 1970, p. 383). That is, prices of securities reflect all information publicly available on individual stocks and the stock market (Fama, 1970; Malkiel, 2003; Economou et al., 2017). The rationale behind the EMH is that since new information arises randomly and spreads quickly, stock prices of tomorrow will reflect only tomorrow's news which are unpredictable. This implies that investors can apply neither technical analyses such as the analysis of past stock prices, nor fundamental analyses such as the analysis of a company's financials to predict future prices. Therefore, investors would not be able to outperform the overall market and achiever higher returns, at least without taking additional risk (Malkiel, 2003). In connection to sustainable investments, those who hold the EMH claim that sustainable investments can never outperform conventional investment. This is because screening portfolios are based on public information and therefore, cannot earn abnormal returns. However, the opposite might also hold as "Socially Responsible Investment's screening processes [might] generate value-relevant information otherwise not available to investors [which may] help fund managers to select securities and consequently generate better risk-adjusted returns than conventional mutual funds" (Renneboog et al., 2008, P.1734). The researchers provide two arguments to explain this outperformance. The first argument is that good social and environmental performance indicate a high managerial quality which, in turn, feeds into better financial performance. The second argument is that employing social and environmental screens makes funds less exposed to incurring high costs in the event of corporate social crises or environmental disasters. Though, as a counter argument, the researchers consider the possibility that conventional investment managers copy the value-relevant information provided by social and environmental screening, leading this outperformance to diminish in the long term (Renneboog et al., 2008).

However, traditional finance theories are never fully applicable to the real world since many investors display irrational behaviors in the marketplace and are thus able to generate superior returns which cannot be explained by theory (Kapoor and Prosad, 2017; Ahmad, 2020). An alternative view on investor behavior is provided through behavioral finance. According to Statman (2008), behavioral finance assumes that investors are not rational, markets are not efficient, investors design portfolios based on the rules of behavioral portfolio theory, and that expected returns cannot be determined by risk only. One of the most prominent theories in behavioral finance research which can explain investor behavior during economic downturns is the Prospect Theory. Kahneman and Tversky (1979) developed the prospect theory as an alternative method to explain individual choices under risky conditions. The theory demonstrates several violations to the expected utility theory which, according to the researchers, is not an adequate descriptive model for explaining individual decision making under risk. One of these violations is the tendency to "overweight outcomes that are considered certain, relative to outcomes which are merely probable" Kahneman and Tversky (1979, P. 265). For example, when given the choice to choose between: Option A) receiving $3000 with certainty, or Option B) receiving $4000 (with a probability of 80%), the majority of people (82%) would choose Option A. On the contrary, when given the choice between: Option C) a sure loss of $3000, or Option D) an 80% risk to lose $4000, the majority of people (92%) would choose option D. The researchers concluded that certain outcomes are overweighted compared to uncertain outcomes and, as a result, the certainty effect contributes to a risk-averse preference for certain gains, rather than probable gains, and to a risk-seeking preference for a probable loss, rather than certain loss. This implies that investors are prone to choose a portfolio with asymmetric performance as the gain in utility for outperforming in bearish markets is larger than the loss in utility for underperforming in bullish markets (Nofsinger and Varma, 2014). In other words, investors tend to prefer protection in economic downturns in exchange for sacrificing some return in normal market conditions.

2.2 Characteristics of European Investors

Investors are not created equally. There are several factors leading investors to behave differently in financial markets. Economic circumstances such as investment objectives and available resources, legal issues such as taxes, and cultural differences are all essential factors by which investors are affected.

Louche and Lydenberg (2006) for example analyze differences between European and U.S. investors' view on sustainable investment. Within their survey they found that while only 40% of U.S. money managers believed that sustainable investment would become a mainstream investment practice, around 84% of the European money managers believed so. Additionally, in their survey on 3,125 individuals in 5 Western European countries, De Bondt (2005) concluded that the average European investor takes a long-term view of life, takes calculated risk, and compared to U.S. investors is more conservative. The survey aimed at understanding the link between culture and investment by targeting investors in stocks, bonds, or mutual funds. It involved 237 questions on different dimensions such as: demographics, income and wealth, financial expertise, and personal values.

Not only do investors differ in their perception of ESG and in their view on investments overall, but also in their reaction to the exposure to market risks. Within more recent research, Switzer et al. (2017) conducted a cross-country behavioral study in 10 countries such as the U.S., Canada, Germany, UK, France, Switzerland, Italy, Spain, and the Netherlands. The aim of the study was to investigate the responses of investors to extreme risk. The researchers found that distance, language, and culture impact investor behavior. Specifically, being exposed to higher risk in U.S. and Canada translated into fund outflows from equity mutual funds, exhibiting flight to (perceived) safety behavior. On the contrary, increased risk in both UK and Italy lead investors to allocate funds to mutual funds, exhibiting flight to risk behavior, while in France and Germany risk increases did not have a significant effect on fund flows. Similarly, Lee et al. (2019) examined the reaction of investors to traditional risk measures such as the standard deviation as well as to extreme risk measures such as the percentage of extreme days, weeks, or months over time, by measuring net fund flows. The sample covered 9 European countries which were particularly affected by the global financial crisis, European banking crisis, and European sovereign debt crisis. These countries include individualistic societies such as Belgium, Denmark, Ireland, Sweden, and Norway, as well as collectivistic societies such as Austria, Finland, Greece, and Portugal. The researchers found that investors in individualistic societies display flight to risk behavior where they tend to invest more in the event of risk. In contrast, investors in collectivistic cultures tend to follow herding behavior and are less sensitive to risk variations.

2.3 Motives for ESG Investing

ESG funds have gained considerable popularity in recent years resulting in a significant increase in sustainable funds offered (Benson and Humphrey, 2008). However, there are different theories on which behavioral motive underly Investors' increased interest in and demand for sustainable funds driving up fund flows. This section presents the most common motives for investors to invest in sustainable funds as they have been identified by literature.

Hartzmark and Sussman (2019) identify two main motivations of sustainable investors. On the one hand there is investors, both institutional and retail, who base their choice mainly on financial motives. This group of investors believes in a positive correlation between sustainability and future returns and, therefore, consider sustainable investment as a way for profit maximization. On the other hand there is investors deriving utility from non-pecuniary motivations such as social preferences, social signaling or altruism (Riedl and Smeets, 2017; Pastor et al., 2021; Hartzmark and Sussman, 2019). Those two investor groups differ in their behavior regarding both their assessment of past returns as well as in terms of their expected returns.

First, investors basing their decision on non-financial motives are expected to differentiate from financially motivated investors in terms of their reaction to past returns. Literature vastly tested this relationship by evaluating the flow-performance sensitivities of sustainable investors. Indeed, they could confirm that sustainable investors are less sensitive to an underperformance of sustainable funds compared to conventional funds. I.e., they are less likely to adjust their investment strategy and to withdraw their investments from sustainable funds due to lower performance measures (Bollen, 2007; Benson and Humphrey, 2008; Bialkowski and Starks, 2016). In general, sustainable investors care less about past returns than conventional investors. For example, a 1% decline in monthly returns resulted in a 0.3% decrease in sustainable fund flows compared to up to 0.6% for conventional funds (Renneboog et al., 2011). In addition, Benson and Humphrey (2008) found that sustainable investors are less likely to assess past returns and they focus only little on current returns, while conventional investors factor both short- and long-term performance measures into their investment decision. These studies complement previous findings by Sirri and Tufano (1998), who claim that investors base their investment decision on past returns, without differentiating between individual investor groups. Lastly, Bollen (2007) conducts a more detailed analysis studying the dynamics of fund flows within which he finds sustainable investors' overall fluctuations in cash flows to be less volatile compared to conventional funds. In other words, sustainable investors are willing to accept higher fluctuations in fund returns before trading their positions. He further presents evidence that fund flows into sustainable funds are more sensitive to positive returns. The interpretation of these findings is interesting, as they imply investors' utility from sustainable investments to be especially high when returns are positive. This seems logical as positive returns attract both financially- as well as non-financially motivated investors. However, the sensitivity to negative returns is less strong, implying that sustainable investors overall can be expected to be more loyal compared to the investors in a matched sample of conventional funds.

This relationship does not only hold for fund investments. By studying impact investments in dual-objective Venture Capital funds, Barber et al. (2021) confirms previous findings on fund flows as they found that sustainable investors are willing to sacrifice returns in order to derive non-financial utilities from their investments.

Second, the investor groups differ regarding their return expectations. This theory was analyzed by Pastor et al. (2021) who found evidence that investors with strong ESG preferences are willing to forego higher expected returns as they also derive utility from the holding itself rather than from financial performance or diversification benefits only. Their findings are in line with previous research by Riedl and Smeets (2017) who conducted incentivized experiments within which they linked administrative data to survey responses and behavior to understand the motivations of individual investors in holding sustainable funds. They found that within their sample, sustainable investors have lower return expectations compared to conventional investors and, moreover, are willing to pay higher fund management fees. Vice versa, financially motivated investors have optimistic risk-return expectations or consider sustainable investments as a sound way to diversify their portfolio risk.

Lastly, some sustainable investors might simply be uninformed or do not care about sustainability at all, randomly ending up in one or the other investor group (Hartzmark and Sussman, 2019).

We can therefore conclude that there is consensus within literature showing that financially motivated investors assume ESG to positively impact future returns, thus maximizing their personal wealth or contributing to a successful diversification of portfolio risk. On the other side, investor groups motivated by non-pecuniary motives are willing to sacrifice expected returns and are less sensitive to negative past returns as they derive their utility from non-financial sources, making them more loyal to their investment class. Finally, it needs to be pointed out that investors in most cases cannot be assigned to one or the other group exclusively and might base their investment choice on a mixture of financial and non-financial return expectations (Benson and Humphrey, 2008).

2.4 Sustainable Investment Returns

The two aforementioned motivations for sustainable investment differ mainly with regards to investors' reaction to past returns as well as they depend on the perception of expected returns. Moreover, investors rely on information on past returns when making their investment decision (Sirri and Tufano, 1998). Therefore, it is important to outline how previous research has found sustainable investments to perform, both during normal market conditions as well as during crises. Within this section we first present state-of-the-art literature on sustainable investment returns under normal market conditions. Thereupon, the performance of sustainable investment during time periods of volatile markets and market crises will be evaluated. A summary of literature findings on the performance of sustainable investments is provided in Table 1 at the end of section 2.5.

2.4.1 Sustainable Investment Returns under Normal Market Conditions

The past performance of sustainable investments has been broadly studied in literature. These studies, which cover the main markets and countries around the world, generally benchmark performance measures of sustainable investments against a portfolio of conventional investments. Overall, there is no consensus within literature on whether sustainable investments obtain higher risk-adjusted returns compared to conventional investments or compared to the market in general.

Some studies suggest that sustainable investments outperform conventional investments (e.g., Renneboog et al., 2008; Pastor et al., 2021), while others suggest no performance difference (e.g., Statman, 2000; Hartzmark and Sussman, 2019). Other studies even propose that they tend to underperform (e.g., Girard et al., 2007; Barber et al., 2021). Generally, two methodologies of measuring the performance of sustainable investments have been identified in the literature. The first methodology is to examine sustainable investments on fund level, while the second methodology is to analyze sustainable investments in the individual stocks. The contradictory results, however, persist within both individual firm- and mutual fund levels and over the different time periods considered by related literature.

One example of research that managed to provide an overview on these contradicting results is the meta-analysis on the relationship between ESG strategies and corporate financial performance conducted by Friede et al. (2015). The researchers combined the findings of about 2,200 individual studies of both portfolio-based and non-portfolio-based research from 1970 to 2014. They report that approximately 90% of these studies found a non-negative relationship between ESG and financial performance with more than half of which concluded with a positive relationship. Furthermore, they shed light on three important patterns across regions, asset classes and ESG categories. For example, they suggest that ESG outperformance opportunities exists in North America (42.7% of results are positive) and Emerging Markets (65.4% positive) followed by Asia/Australia (33.3% positive) and Europe (26.1%). A similar pattern of outperformance exists in non-equity (e.g., real estate and bonds) as more than two-thirds of studies displayed significant positive performance in sustainable real estate and bond investments.

To provide a deeper understanding of the context and reasoning behind the lack of consensus in literature, we review studies on sustainable investment performance under normal market conditions based on their findings in the next step.

Positive Return Relationship

One of the first relevant studies within the field was conducted by Statman (2000). He analyzed the performance of the Domini Social Index (an index of sustainable companies) as well as of the Domini Social Equity fund in comparison to the S&P 500 index and conventional funds, respectively, between 1990 and 1998 when sustainable investment approaches were just on the rise. The researcher concluded that both the Domini Social Index as well as the Equity Fund outperformed conventional benchmarks.

On the firm level, later studies broadly confirmed the positive correlation between firms' ESG performance and stock returns. Kempf and Osthoff (2007), for example, used the sustainable investment ratings of Research & Analytics to compare a portfolio of stocks with high ratings to another portfolio of stocks with low ratings over the period of 1992 to 2004. By measuring the performance using Carhart's (1997) four-factor model, the researchers argued that "investors can increase their performance by following a simple trading strategy based on SRI ratings: Buy stocks with high SRI ratings and sell stocks with low SRI ratings". However, to earn such abnormal returns, investors must implement positive screening approach (i.e., choosing companies with high ratings based on a set of criteria) and best-in-class approach (i.e., a positive screening approach where the portfolio is balanced across industries), rather than a negative screening approach (i.e., excluding companies involved in controversial areas such as alcohol and tobacco). Specifically, the researchers found that the best-in-class screening approach leads to the highest alphas of approximately 8.7% annually compared to the positive screening approach which leads to approximately 3.6% annually.

Kempf and Osthoff's findings were supported by Velte (2017) who studied the performance effect of ESG not only as a total but also as a function of the individual components E, S, and G, on the German Prime Standard using 412 firm-years observations between 2010 and 2014. According to the correlation and multivariate regression analysis conducted, ESG had a positive and significant impact on both accounting-based financial performance measured as Return on Asset as well as on market-based performance. Furthermore, comparable to the results reported by Friede et al. (2015), the analysis indicated that the G component had the strongest impact on financial performance compared to the E and S components. Later studies conducted by Pastor et al. (2021 and 2022) confirmed the outperformance of green assets when analyzing U.S. stocks over a longer and more recent period from 2012 to 2020. Contrasting Velte (2017), they claim that sustainable stocks' outperformance is unexpected and is attributable to news about environmental concerns rather than to high expected returns. Since climate concerns have increased dramatically during recent years, investors' demand shifted away from brown towards green assets. This increase in demand is driving up asset prices.

On fund level, Pastor et al. (2017) provide evidence for the positive relationship between an increase in demand and subsequent superior fund returns within their earlier studies both theoretically, by modeling fund turnover in the context of time-varying profit opportunities, as well as empirically by studying equity mutual funds. Their findings confirm previous studies on investors achieving higher risk-adjusted returns when investing into sustainable funds and thus, provide evidence that investors can do financially well while doing socially good (Renneboog et al. 2008). However, their reasoning for SRI funds' outperformance differs. Contradicting to Pastor et al. (2022), they argue that returns are not driven by increased demand but that sustainable investment screens enable fund managers to actively select securities which generate higher returns. Such superior risk-adjusted returns can be achieved as first, a good implementation of ESG in the company signals high managerial skills which then translate into superior performance of the firm, and second, as firms with high ESG scores provide a better protection against downside risks arising from environmental disasters. As the financial markets are undervaluing these potentials, sustainable funds are able to outperform their benchmarks.

Neutral Return Relationship

While Renneboog et al. (2008) provide reasons explaining the outperformance of sustainable funds, their results are not consistent across all markets. Applying their analysis of SRI fund returns on different countries worldwide, they find performance on average and except from countries such as France, Japan, and Sweden risk-adjusted performance not to be statistically different from the performance of conventional funds. Multiple studies across varying time periods could confirm the phenomenon of sustainable funds outperforming turning out to be statistically insignificant when analyzing risk-adjusted returns and when controlling for ESG risk factors (Statman, 2000; Pastor et al., 2022).

Within earlier studies, Hamilton et al. (1993) analyzed monthly returns of sustainable mutual funds for the period from 1981 to 1990 against conventional mutual fund benchmarks. The researchers concluded that sustainable investment funds have an equal performance compared to conventional investments as they do not earn statistically significant excess returns. This result indicates that “investors can expect to lose nothing by investing in socially responsible mutual funds; social responsibility factors have no effect on expected stock returns or companies' cost of capital” Hamilton et al. (1993, P. 66). Their findings are in line with Goldreyer et al. (1999) who compared mutual funds over an extended timeframe between 1981 and 1997. Their results suggest that ESG screening does not have an impact on mutual funds’ investment performance, at least not in a systematic or predictable way. However, we assess these findings critically, as they were conducted over time periods when the demand for and information on sustainable funds was comparably low. Also, the studies comprise a very small sample size of 32 and 49 mutual funds and the researchers limited their analyses to fund which employ social screens only (Hamilton et al., 1993; Goldreyer et al.,1999).

More recent and more comprehensive studies were conducted by Hartzmark and Sussman (2019) who studied the reaction of investors to the introduction of the sustainability rating by Morningstar in 2016. More specifically, the researchers wanted to investigate whether higher-sustainability outperformed lower-sustainability open-ended funds domiciled in the US. They found evidence that mutual fund investors collectively value sustainability, shown by fund inflow into higher-sustainability funds and outflow from lower-sustainability funds. However, despite this positive view on sustainability which might predict future performance, there was no evidence of the outperformance of higher-sustainability funds found.

Negative Return Relationship

Contradicting previous older studies on small fund samples, sustainable funds in the US underperformed conventional ones between 1984 and 2003 (Girard et al., 2007). The researchers argue that this underperformance is attributed to the significant cost they bear for their lack of diversification. Furthermore, they claim sustainable investment fund managers to show poor selectivity (i.e., ability of selecting undervalued securities), net selectivity (i.e., difference between selectivity and diversification costs), and market timing (i.e., ability of money shifting between risky assets and cash to capture gains or minimize losses during bullish and bearish markets, respectively).

In addition to the explanation by Girard et al. (2007), Renneboog et al. (2008) provides another explanation of why sustainable investments may underperform conventional investments. The researchers argue that sustainable investors consider non-financial attributes in their decisions and therefore are willing to accept lower financial performance. These findings are in line with Barber et al. (2021) who examined whether impact investors are willing to sacrifice higher financial returns to achieve non-pecuniary benefits. Their results show that the financial returns of impact investors are 4.7% lower compared to traditional venture capital funds. Moreover, impact investors are willing to accept up to 2.5% to 3.7% lower returns for receiving non-pecuniary utility. Accordingly, studies conducted by Nofsinger and Varma (2014) show that sustainable investment funds slightly underperform conventional investments during normal market conditions by an annualized 0.67% to 0.95%.

Hong and Kacperczyk (2009) took a different approach when studying the investment environment of sin-stocks, defined as stocks of companies involved in the industries of alcohol, tobacco, and gambling. They reported that sin stocks have higher expected returns compared to non-sin stocks. They also found that investors are equally willing to hold sin stocks in comparison to non-sin stocks but, due to social norms, they demand higher compensation for holding sin stocks.

Not only did researchers find evidence of lower performance in the stocks and funds markets, but they also suggested the same to hold in the bond markets. Indeed, Baker et al. (2018) analyzed a sample of 2,100 green US municipal and corporate bonds between 2010 and 2016 to study pricing and ownership patterns. The researchers showed that green bonds tend to be priced at a premium compared to ordinary bonds. In addition, their after-tax yields are approximately 6 basis points below other equivalent bonds. Zerbib (2019) confirmed these findings in an empirical study in which he compared a matched sample of green to non-green bonds issued from 2013 to 2017.

2.4.2 Sustainable Investment Returns during Crises

Within this section we review previous research on the performance of sustainable investments during crises. As relevant literature on the COVID-19 crisis is still rare, we include studies on past crises and phases of high market volatility where we found the contradiction across research to continue to exist. None of the studies considered, however, could confirm a significant negative correlation between ESG and fund performance during market downturns.

According to Nofsinger and Varma (2014), sustainable investment funds slightly underperform conventional investments during normal market conditions, while they tend to outperform by 1.6% to 1.7% during economic downturns. The researchers concluded that the positive alphas during market crises are associated with mutual funds which focus on shareholder advocacy and positive screening rather than negative screening. Their findings, with regards to economic downturns, are consistent with Pisani and Russo (2021) who show that the more sustainable the funds, the better their reaction to unexpected events in terms of both managing risk and realizing returns. They explain their findings by sustainable funds showing higher resilience and the ability to recover more rapidly. Similarly, the findings are in line with Omura et al. (2021) who arrived at the same results but explained the outperformance of sustainable assets during market downturns from a shareholder loyalty perspective. That is, sustainable investments attract loyal shareholders who are more likely to hold on to their investments within volatile market environments. In addition, Pastor and Vorsatz (2020) research fund performance during the COVID-19 crisis. By analyzing a sample of 4,292 U.S. actively managed equity mutual funds they found sustainable funds to outperform conventional ones over a 10-week crisis period, thus confirming previous research.

However, many studies could not confirm those findings and show sustainable funds not to outperform conventional ones in crises. For example, Leite and Cortez (2015) compared the performance of French sustainable investment funds to conventional funds in Europe between 2001 and 2012. The researchers aimed to investigate performance under both crisis and non-crisis periods. They identified three periods of confirmed downtrends in the stock market index. First, the dot-com bubble of the early 2000s, second, the global financial crisis between June 2007 and February 2009. Finally, the third period lasted one year between May 2011 and May 2012 as a result of the euro sovereign debt crisis. The 5-factor model, which incorporates an added local factor into the Carhart's 4-model, was employed to analyze the rather small sample of 40 sustainable funds and 120 characteristics-matched conventional funds. Their results show that sustainable investment funds matched the performance of conventional funds during economic downturn, but significantly underperformed their peers during normal market periods. This significant underperformance was attributed to sustainable funds using negative screening strategies; funds employing positive screening strategies exhibited similar performance across different market conditions. Likewise, Pavlova and de Boyrie (2022) reported in a recent study that there was no significant difference in performance between sustainable investment and the market during the COVID-19 crash in 2020. Furthermore, they did not find any performance difference between funds with lower sustainability ratings and those with higher sustainability ratings, as rated by Morningstar Globe Rating, during the same time-period with alphas being insignificant and negative. Though, lower-rated funds performed better than higher-rated funds before the crash. Splitting funds by different ESG rating methodologies led to the same results. Thus, they conclude that ESG funds did neither outperform a matched sample of conventional funds, nor the market. Similar findings were identified by Demers et al. (2021) and by Chiappini et al. (2021) who independently found that sustainable companies did not witness superior returns during both the first quarter of 2020 and during the full pandemic 2020 year. In conclusion, when summarizing studies on the COVID-19 crisis, there is consensus among literature that high sustainability ratings do not protect investors from financial losses during a severe economic downturn (Folger-Laronde et al., 2020) with Pastor and Vorsatz (2020) being an exception.

2.5 Sustainable Investment Fund Flows

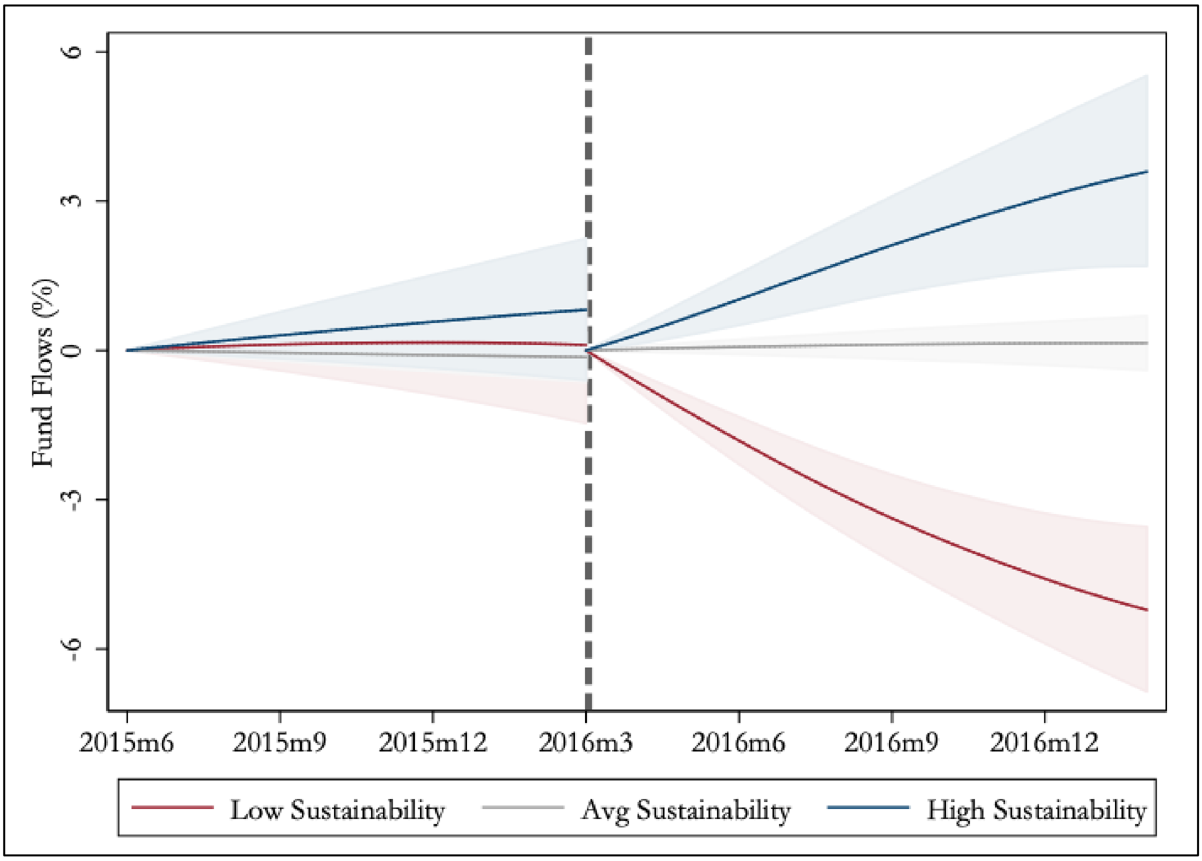
The continuously increasing demand in sustainable investments is reflected by the rapid increase of funds allocated to such investments. According to the Global Sustainable Investment Alliance (GISA), sustainable investment reached $35.3 trillion globally at the beginning of 2020, representing an increase of 15% between 2018-2020 and 55% between 2016-2020. Bollen (2007) studied the behavior of investors in sustainable mutual funds compared to conventional funds between 1991 and 2001. The researcher used the proxy of net fund flows to measure investor activity. He found that the flows into sustainable funds increased each year throughout the research period, while conventional funds experienced large outflows during some parts of the same period. Furthermore, the monthly volatility of fund flows was significantly lower in sustainable funds than in conventional funds. This trend was also observed by Bialkowski and Starks (2016) who reported a constant increase in flows into sustainable funds over their entire sample period from 1999 to 2011.

While a clear trend towards sustainable investments can be observed in the market, especially during recent years, not all sustainable funds are created equally. In 2016, Morningstar introduced the Sustainability Rating for more than 20,000 funds globally to support investors in evaluating their investments based on ESG factors. The funds were ranked on a Globe rating basis where lowest sustainability funds (bottom 10% of all funds) received 1 Globe and highest sustainability funds received 5 Globes (top 10% of all funds)[§]. Studies of Hartzmark and Sussman (2019) provide evidence that the introduction of the Morningstar Sustainability Rating had a significant impact on fund flows for sustainable investment funds. They show that US investors market wide value sustainability by allocating capital towards highly sustainable funds. Low-sustainability funds experienced a net outflow of more than $12 billion, whereas high-sustainability funds witnessed a net inflow of more than $24 billion, as shown in Figure 1. This represents an outflow of about 6% of total fund size and an inflow of 4% of total fund size, respectively. Their findings are consistent with those of Ammann et al. (2019) who concluded that, compared to average-rated funds, high-rated funds had higher net fund flows of between $4 million and $10 million and low-rated funds had lower net fund flows of between $1 million and $5 million during the first year following the introduction of the rating. Therefore, the introduction of an independent sustainability measure from a reputable source which is widely available to investors has reinforced the pre-existing trend towards sustainable investing. Bialkowski and Starks (2016) address the topic from a different point of view. They hypothesize that if nonfinancial information is relevant to investors, sustainable funds are expected to receive higher fund flows compared to conventional funds and found this relation to be true. Moreover, SRI fund flows were not only higher on average but also, they have been positive over the entire sample period.

[§] The Morningstar Sustainability Rating is explained more extensively under Methodology.

Figure1: Fund flows by Morningstar Sustainability rating

This figure shows the cumulative fund flows in percent over time grouped by their Morningstar Sustainability Rating introduced in March 2016. The date of the introduction is market with the black vertical line. (Reference: Hartzmark and Sussman, 2019)



Even though the trend towards sustainable investments has been identified and discussed in previous literature, there is only very few studies conducted on the effect of sustainability on fund flows during times of volatile markets and crises. Bialkowski and Starks (2016) study the effect of four different exogenous shocks on mutual fund flows. Interestingly, within their analyses they differentiate between two environmental catastrophes, the BP oil spill as well as the Fukushima meltdown, and two corporate financial failures, the Enron, Tyco, and Woldcom accounting scandals as well as the global financial crisis. By applying a Difference in Difference analysis, they found that within the environmental crises, SRI funds have received significantly higher fund flows compared to conventional benchmarks. The same holds to be true for the accounting scandals. However, while the financial crisis significantly impacted fund flows negatively, no significant differences in SRI fund flows were found after controlling for overall fund characteristics. Their results contradict former studies of Nofsinger and Varma (2014) who found SRI investments to experience significant growth over the financial crisis.

Finally, Pastor and Vorsatz (2020) analyze fund flows of U.S. equity funds during the COVID-19 crisis. Based on their cross-sectional regressions, the researchers conclude that high Globe rated U.S. funds experience higher fund flows during the crisis indicating that investors consider ESG not only as a nice-to-have benefit but rather as a necessity. Moreover, they found the positive relationship between Globe ratings on fund inflows to also hold during periods before the crisis. Depending on the metrics used, investors’ preference towards sustainable investments was either higher before or during the crisis.

Table 1: Literature summary on fund returns and fund flows

This table provides an overview on the results of related past research and literature on both fund returns and flows under crisis and non-crisis market conditions.

	Market condition	Relationship			Evidence in the literature
Return of Sustainable Funds	Crisis	⊕			Nofsinger and Varma (2014); Pisani and Russo (2021); Omura et al., (2021); Pastor and Vorsatz (2020)
			⊗		Leite and Cortez (2015); Folger-Laronde et al. (2020); Damers et al. (2021); Chiappini et al (2021); Pavlova & de Boyrie (2022).
				⊖	--
	Non-crisis	⊕			David Diltz (1995); Statman (2000); Kempf and Osthoff (2007); Friede et al. (2015); Velte (2017); Pastor et al. (2017, 2021, 2022).
			⊗		Hamilton et al. (1993); David Diltz (1995); Friede et al. (2015); Goldreyer et al. (1999); Hartzmark and Sussman (2019).
				⊖	Girard et al. (2007); Renneboog et al. (2008); Hong and Kacperczyk (2009); Zerbib (2019); Barber et al. (2021).
Flow to Sustainable Funds	Crisis	⊕			Nofsinger and Varma (2014); Pastor and Vorsatz (2020); Albuquerque et al. (2021)
			⊗		Bialkowski and Starks (2016)
				⊖	Döttling and Kim (2022)
	Non-crisis	⊕			Bollen (2007); Bialkowski and Starks (2016); Hartzmark and Sussman (2019); Ammann et al. (2019); Pastor and Vorsatz (2020)

2.6 Hypotheses Development

Based on the findings of previous literature, we now derive our hypotheses on what outcomes to expect from the empirical analysis of our data.

While there is a lack of consensus in previous literature on the performance of sustainable funds relative to their peers', most of the research report a positive relationship between fund returns and their sustainability rating (e.g., Pastor et al., 2017 and 2022; Renneboog et al., 2008; Statman, 2000). Additionally, studies on the COVID-19 crisis report that sustainability criteria have no significant effect on fund returns during the market downturn (Pavlova and de Boyrie, 2022; Demers et al., 2021, and Chiappini et al., 2021) concluding that a positive ESG rating cannot protect investors from financial damages when markets turn sour. We therefore formulate our return hypotheses as follows:

> ***H1-A****: Under normal market conditions, sustainable funds outperform conventional funds*
>
> ***H1-B****: During the COVID-19 crash, sustainable funds do not outperform conventional funds*

Subsequently, we address the behavioral motives of investors for allocating capital towards sustainable funds. As defined by literature, investors can achieve financial utility as well as non-pecuniary utility from investing in sustainable assets (Riedl and Smeets, 2017; Pastor et al., 2021; Hartzmark and Sussman, 2019). In order to address the question of whether investors care about ESG when markets turn sour, we explore if the average investor of our sample is either driven by non-pecuniary motives or by financial motives and thus is expected to turn away during market downturns. Based on their underlying investment motivations the two groups of investors are expected to behave differently as soon as an exogenous event hits. As presented by Renneboog et al. (2011) sustainable investors motivated by non-financial motives are expected to be less sensitive to past returns. Moreover, as this investor group tends to be more loyal (Demers et al., 2021) we expect them to remain invested. On the contrary, however, financially motivated investors mainly rely on past returns when making decisions on their investments (Sirri and Tufano, 1998). Therefore, they are expected to divest once returns of sustainable funds decrease. Thus, conclusions on investors motivations can be drawn from combining the findings on fund returns with an analysis of fund flows. Based on the very few previous studies within the field and on the lack of consistency in previous research, we explore the following two alternative hypotheses in order to find out which type of investor dominates in the European market during the COVID-19 breakdown:

> ***H2-A****: The COVID-19 crash does not cause fund flows being significantly impacted by their Morningstar Globe rating*
>
> ***H2-B****: Caused by the COVID-19 crash fund flows are significantly negatively impacted by high Morningstar Globe ratings*

3. Data

3.1 Sample Selection and Methodology

We obtained survivorship-bias-free data on open-end equity funds aggregated by share classes from the Morningstar Direct database. The assessment of funds in comparison to stocks allows for the direct observation of fund flows. We thus circumvent focusing on individual prices which might be affected by the joint hypotheses problem (Hartzmark and Sussman, 2019).

Our sample covers the time period from February 2019 until end of January 2021, i.e., one year before and after the declaration of the COVID-19 crisis as an international health concern. Precisely, WHO declared COVID-19 to be an international health concern on 30 January 2020. However, as most of the data required for our analysis is reported on a monthly basis only, we for simplicity assign the whole month of January 2020 to the pre-crash period. As January 31 is a non-trading day for most of the funds in our sample we do not expect any significant deviations in the empirical results caused by this assumption.

We reduce our sample in order to achieve homogeneity on two different dimensions: the group of investors and the progress of the pandemic. While COVID-19 was declared an international concern in January 2020, the pandemic evolved differently across the world depending on the location as well as on the respective political measures taken within the country. We therefore focus on European open-end equity funds only for which we can assume a comparable stock market reaction. Hereby, we differentiate from previous research conducted by Pastor and Vorsatz (2020) whose studies refer to U.S. equity funds only. Additionally, we narrow our sample to funds available for sale within the 10 highest ranked European countries according to the Human Development Index (HDI). HDI ranks countries based on their population's life expectancy, education, and per capita income. By choosing funds being sold in countries which are at comparable ranks in these three categories, we aim to reduce bias caused by social and cultural norms as well as by educational background which have been proven to impact fund selection (Renneboog et al, 2011). We hereby differentiate from previous studies (e.g., Bialkowski and Starks, 2016) which analyze fund flows within the overall market. Precisely, data on funds sold in Belgium, Denmark, Finland, Germany, Iceland, Ireland, Netherlands, Norway, Sweden, and Switzerland is included in our sample. A list of the top 50 countries within the HDI ranking is provided in Appendix 1.

To arrive at a set of funds which is comparable over the entire observation period, we excluded all funds with an inception date after January 30, 2019. Additionally, as climate news are perceived differently, depending on the asset's size (Pastor et al, 2022) we exclude funds with a fund size smaller than EUR 5 million. After applying these criteria, our sample consists of 2,294 individual funds.

We categorize funds based on their Morningstar Globe rating. Morningstar's Globe rating is a sustainability rating issued monthly which indicates a fund's exposure to environmental, social and governance risk relative to funds in the same Morningstar category. The rating was first introduced in 2016 and ranks funds on a scale of 1 to 5 Globes, where 1 and 5 Globes are assigned to the 10% of funds with the highest and lowest ESG risk, respectively. The next top and bottom 22.5% receive a 2 and 4 Globe rating, and the remaining 35% in the middle are assigned to a rating of 3 Globes. For our analyses we refer to the fund's ESG rating as of January 2020. This date relates to the month after which the exogeneous shock event, i.e., the official outbreak of COVID-19 took place. As we analyze investors' reaction based on fund flows to shock event, we assume an individual investor to refer to the most recent available ESG rating when making their investment decision. Thus, the Morningstar rating released in January 2020 serves as the natural reference date for investors rebalancing their fund portfolio due to the outbreak of the COVID-19 crisis. To funds for which there was no rating available in January 2020, we have assigned the closest available data point within the observation period. 342 funds were not rated during our observation period, which is why we have excluded them from our sample. In addition, we collect monthly data on fund size measured by total net assets (TNA), monthly net fund flows and fund return as well as fund age at the crash date derived from the respective inception dates. We furthermore calculate annualized volatility as the standard deviation multiplied by the square root over our observation period of 24 months.

Following Berk and Tonks (2007), we calculate monthly fund flows as a percentage of TNA as

$$Flow_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1} * (1+R_{i,t})}{TNA_{i,t-1} * (1+R_{i,t})} \tag{1}$$

assuming cashed-out distributions to be reinvested, where $TNA_{i,t}$ is the fund i's total net asset value in Euro during month t and $R_{i,t}$ is the fund i's return during month t. We hereby differentiate from previous literature (Renneboog et al, 2011; Barber et al, 2005; Bialkowski and Starks, 2016; Ammann et al, 2019; Sirri and Tufano, 1998) as we multiply $TNA_{i,t-1}$ with the current month's return in the denominator instead of only dividing by $TNA_{i,t-1}$. This methodology allows us to circumvent the risk of attributing fund flows caused by internal growth to the measure (Berk and Tonks, 2007). We cap monthly observations of fund flows at the 99^{th} percentile to limit the effect of outliers. Missing single fund flow data points have been estimated using the average difference in $TNA_t - TNA_{t-1}$, vice versa missing single data points in TNA have been reconstructed by adding the months' average fund flow to the previous months' TNA value. For single missing data points where neither TNA nor fund flow data was available, we have assumed a linear relationship.

All funds where data was insufficient for a well-educated reconstruction have been removed from our sample. Thereafter, our final main dataset consists of 1,632 individual open-end equity funds. Additionally, to verify the results of our data in a broader market context, we obtain a second data set of funds domiciled within the entire European Union (EU). This sample is used for our robustness tests, and we applied the same selection criteria and methodologies as described above. The final second dataset consists of 6,546 funds.

3.2 Descriptive Statistics

In Appendix 2 we provide summary statistics for all fund data and fund characteristics of the variables of interest covering the 24 months from February 2019 to end of January 2021. In Appendix 3 we report the cross-correlation of these variables. Table

2 reports summary statistics for funds grouped by Globe rating. On average, we can observe fund outflows for Globe 1 and 2 funds whereas Globe 3, 4 and 5 funds experienced fund inflows over the entire observation period. Additionally, funds with a higher-ESG rating are larger on average, which speaks in favor of the overall trend towards sustainable investments and, moreover, investors' demand for ESG friendly assets (Hong and Kacperczyk, 2009; Renneboog et al, 2008). Furthermore, Morningstar Star ratings, which rate funds' past performance relative to their peers, are lower for Globe 1 and 2 rated-funds compared to Globe 4 and 5 rated-funds. This observation is in line with Globe 1 and 2 rated funds showing slightly lower average returns over the observation period.

Table 2: Mean fund characteristics categorized by Morningstar Globe Rating

This table shows the mean fund characteristics categorized by their Morningstar Globe Rating as of January 2020 over the two-year observation period between February 2019 and January 2021, inclusive. All data is obtained from the Morningstar Direct database and, if applicable, complemented as described in section 3.1. All values are reported in Euro if not stated otherwise.

Globe	**1**		**2**		**3**		**4**		**5**	
Statistic	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
Flow (% of TNA)	155	-0.03	248	-0.09	619	0.11	413	0.44	197	0.60
Return	155	0.11	248	0.11	619	0.11	413	0.13	197	0.13
Size (€m)	155	392.15	248	237.79	619	439.62	413	439.55	197	462.88
Volatility	155	0.18	248	0.20	619	0.19	413	0.18	197	0.19
Star	155	3.00	248	3.00	619	3.21	413	3.29	197	3.27
Age (years)	155	10.98	248	10.08	619	11.03	413	9.72	197	11.67
Alpha (%)	155	7.93	248	6.61	619	7.50	413	10.04	197	9.99

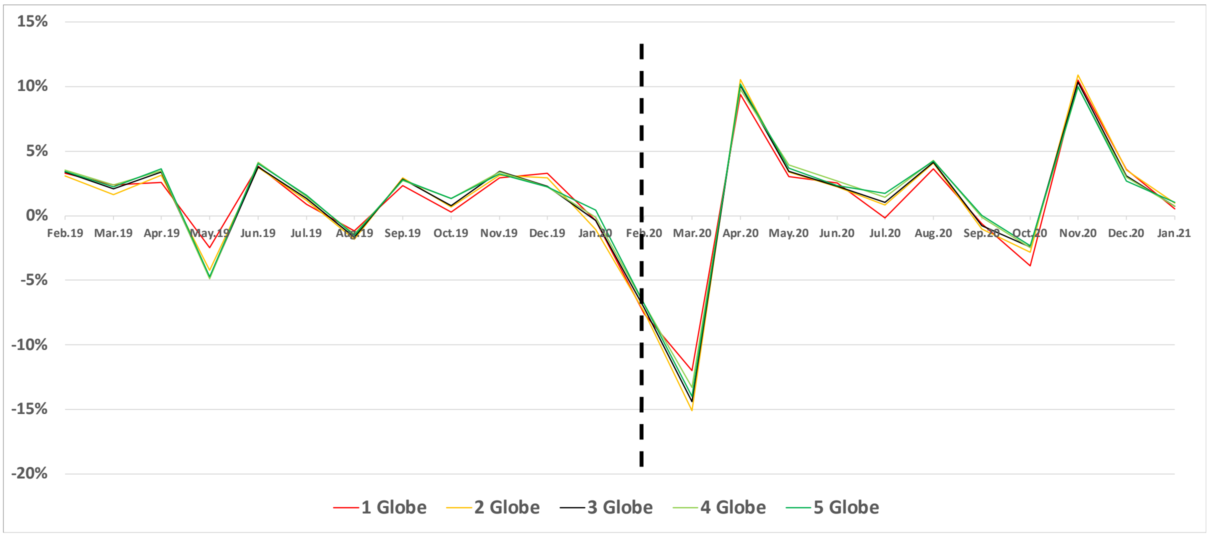
In Appendix 4 we compare the 12-month mean data for mutual funds categorized by Globe rating before and after the crash. Here within, we can observe slight systematic differences for each Globe rating category before and after the COVID-19 crash by comparing mean average data over a 12-month time horizon. Overall, fund flows have been lower in the period after the crash for all globe categories except from Globe 1 rated funds, which have experienced fund inflows post-crash compared to negative fund flows before the crash. Moreover, fund returns have been lower in the post-period across all globe categories along with increased volatilities. Thus, one could argue that the shock event negatively impacted the overall fund market with investors shifting assets away from high-ESG funds towards lower-ranked fund categories.

However, these statistics must be considered carefully, as the COVID-19 crash represents a one-time exogenous shock to the markets followed by a recovery phase rather than a sustained change in overall market conditions. In order to display said market development, Figure 2 provides an overview of fund flows and fund returns over time on a monthly basis where the black vertical line marks the crash date. Regarding monthly returns, displayed in panel A, we can observe all funds being negatively impacted by the crisis. Even before the official declaration of COVID-19 as an international pandemic, funds experienced negative returns with March 2020 marking the lowest point of the crisis where Globe 2 rated-funds have experienced the most negative returns of -15,07%. After March 2020, fund returns recovered and turned positive again overall. However, even though slight differences in fund returns can be observed, we cannot see high ESG-ranked funds systematically outperforming. This conclusion changes when observing monthly fund flows as displayed in panel B. Taking the whole observation period, we can clearly observe Globe 4 and 5 funds experiencing positive fund flows overall, while fund flows for Globe 1 and 2 funds have been mostly negative. This general observation is consistent with our overall summary statistics provided in Table 2, as well as with previous research, which argue that investors appreciate sustainability market wide shown by fund inflows into sustainable funds (Hartzmark and Sussman, 2019; Pastor et al, 2021). However, the reaction of fund flows to the shock event is particularly interesting. After the shock event, we observe significantly higher fund outflows for high-ESG ranked funds. Before returning to their overall trend, Globe 4 and 5 funds realized fund outflows of -1.83% and -0.93%, respectively. In comparison, Globe 1 funds, which have been characterized by fund outflows overall, experience fund inflows of up to +0.35% in March 2020 after the shock event before returning to their long-term average again. Thus, as a reaction to the crash investors seem to reject especially high-ESG funds while allocating money towards funds with low-ESG ratings. This observation contradicts state of the art literature, which claims sustainable investors to be more loyal and less affected by past returns (Bialkowski and Starks, 2016; Benson and Jacquelyn, 2008; Renneboog et al., 2008 and 2011; among others).

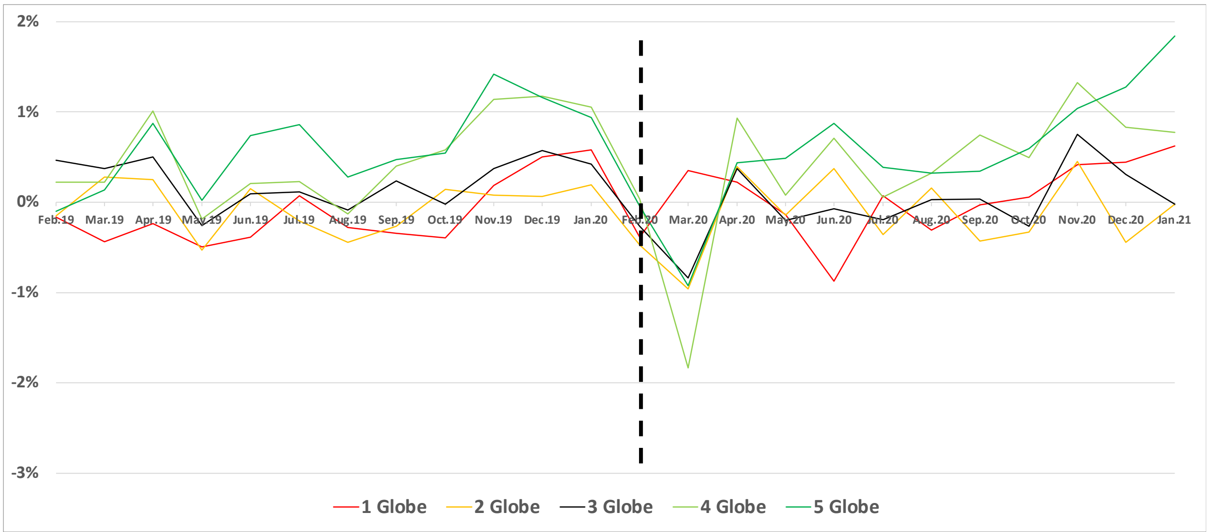
Figure 2: Monthly fund returns and fund flows over time

This figure shows the monthly mean fund returns and fund flows of our sample data over time grouped by their Morningstar Sustainability Rating one year before and after the COVID-19 crash. The date of the declaration of COVID-19 as an international concern is market with the black vertical line. Panel A shows the monthly mean fund returns, panel B shows the monthly mean net fund flows calculated as a percentage of total net assets.

Panel A – Monthly fund returns



Panel B – Monthly net fund flows



4. Empirical Results

In this section we explain the methodologies applied and present the results of our analyses made to test our research hypotheses. First, we analyze the effect of ESG ratings on fund returns using multivariate linear regression as well as Difference in Difference regressions on a matched sample of Globe 1 and Globe 5 rated funds to observe sustainable funds' performance before and during the COVID-19 crash. These results serve as the base for our second analysis within which we test two opposing hypotheses on our data sample. In this second part, we present the results on our analysis of the effect of Morningstar Sustainability ratings on fund flows received through multivariate linear regression analysis and DiD regressions using Propensity Score Matching on a sample of Globe 1 and Globe 5 rated funds. As we want to extract the effect of the COVID-19 breakdown on fund flows while controlling for the overall trend towards ESG investments in order to test our second hypotheses, the results of our DiD analysis are of particular interest and represent the focus of the second part. Finally, we elaborate on the results of our robustness tests.

4.1 Sustainability Rating Effects on Fund Returns

In order to test hypothesis 1 (H1) we evaluate the effect of ESG ratings on fund returns over different intervals before, around, and after the shock event, as well as the direct impact on the crash event on fund returns. In line with previous research conducted over the COVID-19 crisis (Pavlova and de Boyrie, 2022; Demers et al., 2021, and Chiappini et al., 2021) we expect sustainable funds not to outperform during the crisis, while we expect sustainable funds to outperform conventional ones under normal market conditions, i.e., during the periods before the crisis (Pastor et al., 2017 and 2022; Renneboog et al., 2008; Statman, 2000).

4.1.1 Methodology

First, we analyze fund returns over a 3-, 6-, and 12-month time-period before and after the shock event by running the following regression on the returns of fund i:

$$Return_{i,t} = \alpha + \beta_1 * Globe_i + \beta_2 * Controls_{i,t} + \epsilon_{i,t} \quad (2)$$

where $Return_{i,t}$ is the dependent variable and $Globe_i$ the independent variable of interest while $\epsilon_{i,t}$ represents an additive error term. In line with relevant literature (Reuter and Zitzewitz, 2021; Hartzmark and Sussman, 2019; Zhou and Zhou, 2022) we control for the log of fund size, LTM volatility and the log of fund age. As previous literature provide evidence that the Morningstar Star rating, as a measurement of past fund performance, significantly impacts the investment decision we control for Star ratings as well (Reuter and Zitzewitz, 2021; Del Guercio and Tkac, 2008). Similarly, we control for fund flows which have been proven to being positively related to fund returns (Pastor et al, 2017; Wardlaw, 2020).

In addition to our regression analysis, we conduct Difference in Difference regressions on fund returns using propensity score matching to provide evidence on the direct impact of the COVID-19 event on fund returns. Our empirical approach is in line with Zhou and Zhou (2022) who create matched samples of stocks to measure the impact of ESG performance on stock price fluctuations.

Formally, within the Difference in Difference analysis we divide our sample into a treatment group represented by Globe 5 rated-funds and a control group constructed from Globe 1 rated-funds to which we assign the dummy variables 1 and 0, respectively. The two groups of funds were then matched based on their characteristics before the shock event. Following Białkowski and Starks (2016) we first applied the 1:1 nearest neighbor matching method without replacements. Here within, funds in the treatment group were matched with funds in the control group based on their similarity which is measured by propensity scores. These scores were calculated based on logistic regressions of the effect of the shock event on the independent variables. However, this matching procedure resulted in a poor matching quality as covariates remain imbalanced after the matching procedure. Given this poor performance, we applied full matching on the propensity scores which is suggested by literature to yield to more accurate matches (Austin and Stuart, 2015) and which, indeed, led to better results for our sample as shown in Appendix 5. Within full matching the complete sample of both the treatment and the control group are used and each fund therewithin is assigned to a subclass which then receive at least one matched fund from the opposite group (Stuart and Green, 2008; Austin and Stuart, 2015). This means that in each subclass either one fund from the treatment group is matched with one to several funds from the control group or vice versa. Weights are assigned to the funds according to their subclasses, which are then used to calculate a weighted treatment effect.

The shock event did not have a lasting effect on fund returns as investors recover from the disruptions caused by the crisis. Therefore, we consider the 12 months period before the shock event and compare it to the 3 months period after the shock event, after which markets have shown to recover again. We assign dummy variables of 0 and 1 to the two periods, accordingly.

We then run the following regression on fund returns of our samples of fund i at time t:

$$Return_{i,t} = \beta_0 + \beta_1 * did_{i,t} + \beta_2 * Sustainability_{i,t} \tag{3}$$
$$+ \beta_2 * Time_t + \beta_3 * Controls_{i,t} + \in_{i,t}$$

Here, $did_{i,t}$ represents the independent variable of interest and is calculated as $Sustainability_{i,t} * Time_t$ where $Sustainability_{i,t}$ is a dummy variable indicating whether the fund i is rated Globe 5 or Globe 1 at time t and assigns values of 1 and 0, respectively. $Time_t$ separates the pre-crash period from the post-crash period. Data related to the pre-period receive a value of 0 and data related to the post-period a value of 1. As suggested by previous literature we include volatility, log of fund age, Star ratings, log of fund size and monthly fund flows as control variables (Reuter and Zitzewitz, 2021; Hartzmark and Sussman, 2019; Zhou and Zhou, 2022; among others). To account for potential correlations within the subgroups created using propensity score matching, standard errors are double clustered by subgroup and time in our outcome analysis (Austin, 2011).

4.1.2 Empirical Results

Table 3 reports the results of our regression analysis over the different time sections. In line with the lack of consensus among previous literature, we can confirm H1-A as we find that fund returns are significantly positively affected by globe ratings when analyzing longer periods before and after the crash event. This means that higher globe rated funds outperformed conventional ones. However, the results are sensitive to the time-period chosen as the effect turns insignificant when analyzing the 3-months period directly before the COVID-19 crash. While the coefficients are positive for the full year and 6-months periods, the absolute effects are rather small. For instance, an increase in Globe ratings by one resulted in increased returns of between 0.04% and 0.1%. Therefore, our data supports former findings of the outperformance of sustainable funds over conventional ones (Pastor et al., 2022), while our results also support the research conducted by Renneboog et al. (2008) claiming absolute fund returns of sustainable funds not to be statistically different from the performance of conventional funds.

Once we analyze the 3-month period directly before and after the crash coefficients turn insignificant meaning that a higher globe rating is not associated with higher fund returns anymore. This observation is in line with Pastor et al (2022) and Wardlaw (2020) who found the outperformance of green bonds to diminish with increased fund flow pressure and an unexpected increase in climate concerns. As markets react highly sensitive to new information such as the outbreak of COVID-19 in China dated 21 December 2019, already, it seems logical that the market captured the risk of an upcoming international crisis even before the official declaration of such. Thus, our panel regressions can also confirm H1-B as we find that sustainable funds do not outperform conventional ones during the crisis.

Table 3: Linear regression results on fund returns

This table shows the results of our multivariate linear regression analysis on monthly fund returns. Columns (1), (2), and (3) report results for the 12-, 6-, and 3-month period before the crash, while columns (4), (5), and (6) report results for the 3-, 6-, and 12-month period after the crash, respectively. We include additional controls of fund flows, log of size, Morningstar Star Rating, volatility, and log of age. T-statistics are in parentheses and ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Monthly Return					
	-12 to 0	-6 to 0	-3 to 0	0 to 3	0 to 6	0 to 12
	(1)	(2)	(3)	(4)	(5)	(6)
Globe	0.0002*	0.0004***	-0.0001	-0.0003	0.001***	0.001***
	t = 1.655	t = 3.416	t = -0.600	t = -0.757	t = 2.733	t = 3.373
Flow	0.070***	0.060***	0.125***	0.183***	0.188***	0.107***
	t = 8.639	t = 6.598	t = 7.894	t = 6.637	t = 8.007	t = 6.825
log(Size)	0.0005***	0.0003***	0.001***	0.0001	0.0002	0.0002
	t = 5.608	t = 3.154	t = 2.911	t = 0.191	t = 0.825	t = 0.964
Star	0.001***	0.001***	0.001***	0.003***	0.002***	0.001***
	t = 7.398	t = 6.435	t = 4.507	t = 6.512	t = 5.693	t = 5.453
Volatility	-0.032***	-0.015***	-0.009	-0.203***	-0.001	0.065***
	t = -11.876	t = -4.906	t = -1.640	t = -22.152	t = -0.163	t = 12.537
log(Age)	0.0004***	0.0004***	0.001**	0.001***	0.001***	0.001**
	t = 2.666	t = 2.668	t = 2.416	t = 2.623	t = 3.246	t = 2.199
Constant	0.014***	0.009***	0.013***	-0.009***	-0.020***	-0.012***
	t = 15.154	t = 8.702	t = 7.354	t = -3.121	t = -7.678	t = -6.837
Observations	1,632	1,632	1,632	1,632	1,632	1,632
R^2	0.21	0.107	0.068	0.297	0.077	0.126
Adjusted R^2	0.207	0.104	0.065	0.294	0.074	0.123
Note:						*p **p ***p<0.01

In addition to our regression results we measure the direct effect of the COVID-19 shock on fund returns by conducting DiD regression analyses on a matched sample of Globe 5 and Globe 1 rated funds. We show the results of our Difference in Difference analysis in Table 4. As suggested by Pavlova and de Boyrie (2022) and Demers et al. (2021), we find that when comparing a group of Globe 5 rated funds directly to Globe 1 rated funds the shock event does not result in significantly different returns. To be precise, the variable did shows no significance at the 10% level, further confirming that positive sustainability ratings cannot protect investors from financial losses during severe economic downturns (Demers et al., 2021; Chiappini et al., 2021; Folger-Laronde et al., 2020).

Table 4: Difference in Difference regression results on fund returns

This table shows the results for our DiD regression analysis on monthly fund returns. We use the matched sample of Globe-5 rated-funds as the treatment group and of Globe-1 rated-funds as the control group over a period of 12 months before and 3 months after the crash. Column (1) reports results for the simple regression of fund returns on the respective Globe rating and column (2) reports the regression results within which we include various control variables. Sustainability and Time are dummy variables which split the groups and the observation periods while did is the interaction term. Standard errors are double clustered, t-statistics are shown in parentheses and ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Monthly Return	
	(1)	(2)
did	0.012	0.065
	t = 0.035	t = 0.170
Sustainability	-0.289*	0.077
	t = 2.021	t = 0.635
Time	-5.015***	-4.990***
	t = -14.338	t = -13.185
Volatility		-7.971***
		t = -5.912
log(Age)		0.046
		t = 0.975
Star		0.129**
		t = 2.676
log(Size)		0.043
		t = 1.396
Flow		15.849***
		t = 4.767
Constant	1.272***	2.221***
	t = 10.270	t = 5.503
Double clustered standard errors	YES	YES
Observations	3,705	3,705
R^2	0.104	0.123
Adjusted R^2	0.103	0.121
Note:		*p **p ***p<0.01

Overall, we can therefore conclude that while we found sustainable investments outperforming under normal market conditions, high globe ratings do not result in superior performance during economic downturns. Especially within the 3-month period after the crash event, which represents the main observation period of interest in our studies, the effect of Globe ratings on fund returns is insignificant. Thus, our analysis provides first implications on investors behavior. While before the crash sustainable fund investors might be motivated by higher returns, this relationship turns out not to hold during the crisis period. Therefore, such investors are expected to turn away from their investments while investors motivated by societal norms and signaling are expected to not be impacted by negative performance outcomes. We test the two hypotheses on investors' motivation by analyzing fund flows during the crisis in the next section.

4.2 Sustainability Rating Effects on Fund Flows

Within this section, we analyze fund flows as a direct reaction to the COVID-19 shock event in order to investigate whether sustainable investors either follow societal norms and values or a are driven by financial motives. To test this relationship, we set up two different hypotheses. Using our data sample, we are going to approve the one and reject the other in order to derive implications on the average investors' motive behind sustainable investing.

Within H2-A we assume investors to invest in sustainable funds out of non-financial motivations. Precisely, they invest due to social or ethical norms or as they believe in the asset and the underlying value of doing something ethical correct and good. Therefore, these investors are expected to hold on to their investments when markets turn sour, not selling off their funds once a shock hits. In summary: we expect funds with high Globe ratings not to show significantly different fund flows compared to the control group as a reaction to the shock event. Contradicting, within H2-B we assume investors to follow a trend motivated by financial utility expected from the investment. Thus, once the external shock hits and as ESG has no significantly positive effect on fund returns anymore, we expect these investors to turn away from their investment again. This means, we expect the COVID-19 shock to lead to Globe ratings having a significantly negative effect on fund flows.

4.2.1 Methodology

We analyze our sample by applying two different empirical analyses. First, we analyze fund flows over a 3-, 6-, and 12-month time-period before and after the shock event by running the following multivariate linear regression on the fund flows of fund i:

$$Flow_{i,t} = \alpha + \beta_1 * Globe_i + \beta_2 * Controls_{i,t} + \epsilon_{i,t} \tag{4}$$

where *Flow*$_{,i,t}$ is the dependent variable and *Globe*$_i$ the independent variable of interest while $\in_{i,t}$ represents an additive error term. In line with relevant literature (Reuter and Zitzewitz, 2021; Hartzmark and Sussman, 2019; Zhou and Zhou, 2022) we control for returns, the log of fund size, LTM volatility and the log of fund age. Based on the findings of Del Guercio and Tkac (2008) who prove the impact of Morningstar Star ratings on investment decisions, we control for Star ratings as well.

To test our H2 hypotheses it is essential however, to analyze fund flows as a direct reaction to the COVID-19 shock event while controlling for the underlying trend towards sustainable investing as identified within previous research (Hartzmark, 2015; Ammann et al., 2019). Therefore, and in line with related literature (Bialkowski and Starks, 2016; Hartzmark and Sussman, 2019) and extending the methodologies applied by Pastor and Vorsatz (2020), we conduct Difference in Difference regressions using propensity score matching. Thereby, we provide evidence on the immediate impact of the shock event on fund flows from which we derive the behavioral motivation of the average investors behind sustainable investments. Moreover, Skowronski and Carlston (1989) found that people overweight extreme attributes when making judgements which is why the effect is expected to become particularly clear when comparing a matched sample of Globe 5 and Globe 1 rated funds.

Formally, within the DiD regressions we divide our sample into a treatment group represented by Globe 5 rated-funds and a control group constructed from Globe 1 rated-funds to which we assign the dummy variables 1 and 0, respectively. The two groups of funds were then matched based on their characteristics before the shock event. Within the matching procedure we use propensity score matching. Following Białkowski and Starks (2016) we first applied the 1:1 nearest neighbor matching method without replacements. However, this matching procedure resulted in a poor matching quality as covariates remain imbalanced after the matching procedure. Given this poor performance, we applied full matching on the propensity scores as introduced in section 4.1.1 which is suggested by literature to yield to more accurate matching (Austin and Stuart, 2015) and which, indeed, led to better results for our sample as shown in Appendix 6.

As both expected and as previously shown within our descriptive statistics, the shock event did not have a lasting effect on fund flows as investors recover from the disruptions caused by the COVID-19 crash. Therefore, we consider the 12-months period before the shock event and compare it to the 3-months period after the shock event, after which investors have shown to recover again. We assign dummy variables of 0 and 1 to the data of the two periods, accordingly.

We then run the following regression on fund flows of our samples of fund i at time t:

$$Flow_{i,t} = \beta_0 + \beta_1 * did_{i,t} + \beta_2 * Sustainability_{i,t} \quad (5)$$

$$+ \beta_2 * Time_t + \beta_3 * Controls_{i,t} + \in_{i,t}$$

Here, $did_{i,t}$ represents the independent variable of interest and is calculated as $Sustainability_{i,t}$ * $Time_t$ where $Sustainability_{i,t}$ is a dummy variable indicating whether the fund i is rated Globe 5 or Globe 1 at time t and assigns values of 1 and 0, respectively. $Time_t$ separates the pre-crash period from the post-crash period. Data for the pre-period receive a value of 0 and data for the post-period a value of 1. Like within previous literature and in line with our other analyses we include volatility, log of fund age, Star ratings, log of fund size and monthly returns as control variables (Reuter and Zitzewitz, 2021; Hartzmark and Sussman, 2019; Zhou and Zhou, 2022; among others). Standard errors are double clustered along the subgroup and time to provide robust results.

4.2.2 Empirical Results

Table 5 presents the results of our regression on fund flows over the different time intervals before and after the shock event. Here within, we observe fund flows being significantly positively impacted by Globe ratings during all periods before the shock event. However, taking the time-period of 3- and 6 months after the shock event, the coefficients turn insignificant. Only when regressing over the full year after the shock event, fund flows are significantly positively affected by Globe ratings again.

The regression results allow for different interpretations. First, our analysis indicates that during the months directly after the shock event, fund outflows were not significantly driven by Globe ratings which at first sight speaks in favor of H2-A. Additionally, the results show that under normal market conditions, Globe ratings significantly positively impact fund flows, a relationship that holds again once considering the full post-crash year. However, the panel regression does not control for the underlying trend towards sustainable investing which has been identified in previous research (Skowronski and Carlston, 1989; Hartzmark, 2015; Ammann et al., 2019). Therefore, while we can confirm the overall trend towards sustainable investing which seems to have been interrupted by the crisis, we cannot draw profound conclusions on the actual effect of the crash event on fund flows based on the regression analyses. We thus draw our conclusions from the results of our DiD regressions on fund flows which control for the trend effect over time.

Table 5: Linear regression results on fund flows

This table shows the results of our multivariate linear regression analysis on monthly net fund flows. Columns (1), (2), and (3) report results for the 12-, 6-, and 3-month period before the crash, while columns (4), (5), and (6) report results for the 3-, 6-, and 12-month period after the crash, respectively. We include additional controls of fund returns, log of size, Morningstar Star Rating, volatility, and log of age. T-statistics are in parentheses and ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Monthly fund flow as a % of TNA					
	-12 to 0	-6 to 0	-3 to 0	0 to 3	0 to 6	0 to 12
	(1)	(2)	(3)	(4)	(5)	(6)
Globe	0.002***	0.002***	0.002***	-0.001	0.0004	0.001***
	t = 3.962	t = 4.297	t = 3.861	t = -1.337	t = 0.837	t = 2.728
Return	0.213***	0.339***	0.565***	0.461***	0.605***	0.924***
	t = 2.694	t = 3.933	t = 5.084	t = 3.481	t = 6.770	t = 13.132
log(Size)	-0.0003	0.0003	-0.0002	-0.001	-0.001**	-0.001***
	t = -0.755	t = 0.838	t = -0.506	t = -1.230	t = -2.138	t = -3.770
Star	0.001***	0.001**	0.002**	0.001	0.001*	0.0005
	t = 2.769	t = 2.439	t = 2.560	t = 1.630	t = 1.811	t = 1.078
Volatility	-0.021**	-0.022*	-0.009	-0.062***	-0.038***	-0.036***
	t = -1.986	t = -1.951	t = -0.589	t = -3.576	t = -3.211	t = -3.876
log(Age)	-0.007***	-0.006***	-0.008***	-0.003***	-0.003***	-0.004***
	t = -13.013	t = -11.029	t = -10.371	t = -3.361	t = -4.730	t = -8.087
Constant	0.009**	0.004	0.004	0.012**	0.004	0.005*
	t = 2.484	t = 0.973	t = 0.809	t = 2.056	t = 0.990	t = 1.664
Observations	1,632	1,632	1,632	1,632	1,632	1,632
R^2	0.121	0.105	0.098	0.026	0.055	0.151
Adjusted R^2	0.118	0.102	0.095	0.023	0.051	0.148

Note: *p **p ***p<0.01

Table 6 presents the results of our DiD regression analysis on fund flows. The results here within are of particular interest. As the variable did shows, funds categorized as Globe 5 have experienced significant fund outflows caused by the shock event. Precisely, the COVID-19 crash caused fund flows of Globe 5 rated funds to decrease by 1.8% after controlling for relevant variables. Thus, based on the empirical results, we can confirm H2-B by showing that investors turned away from their high Globe rated investments as a reaction to markets turning sour. Thereby, we can conclude that our results provide evidence on investors being predominantly motivated by financial motives or are following a market trend when choosing to invest in high Globe rated equity funds, an investment strategy from which they turn away again once returns vanish and market uncertainty increases. Our results question past findings on sustainable investors being considered more loyal and less affected by past returns (Demers et al., 2021; Renneboog et al., 2011) and provide supportive evidence in favor of the theory of Bialkowski and Starks (2016) who suggest that sustainable investments are becoming more mainstream, leading to investors being less resilient.

Table 6: Difference in Difference regression results on fund flows

This table shows the results for our DiD regression analysis on monthly net fund flows as a percentage of TNA. We use the matched sample of Globe-5 rated-funds as the treatment group and of Globe-1 rated-funds as the control group over a period of 12 months before and 3 months after the crash. Column (1) reports results for the simple regression of fund returns on the respective Globe rating and column (2) reports the regression results within which we include various control variables. Sustainability and Time are dummy variables which split the groups and the observation periods while did is the interaction term. Standard errors are double clustered, t-statistics are shown in parentheses and ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Monthly fund flow as a % of TNA	
	(1)	(2)
did	-0.018***	-0.018***
	t = -3.305	t = -3.322
Sustainability	0.009***	0.009***
	t = 4.468	t = 4.690
Time	0.010*	0.013*
	t = 2.040	t = 2.516
Volatility		-0.050**
		t = -3.254
log(Age)		-0.005***
		t = -6.369
Star		-0.0003
		t = -0.307
log(Size)		-0.001
		t = -1.662
Return		0.001**
		t = 3.087
Constant	-0.003	0.023***
	t = -1.465	t = 4.468
Double clustered standard errors	YES	YES
Observations	5,173	5,173
R^2	0.010	0.039
Adjusted R^2	0.010	0.037
Note:		*p **p ***p<0.01

4.3 Robustness Tests

For all our analyses we have conducted robustness tests within which we alter and adjust variables as described in this section. The tests proof our analyses to be robust.

For our multivariate linear regressions, we test for robustness by altering the control variables. For fund returns we control for fund flows and log of fund size related to the respective period rather than for LTM data. Additionally, we control for LTM volatility only instead of overall volatility over the observed periods. As displayed in Appendix 7, our results are robust. The same methodology applies when testing for robustness within the regression for fund flows. Following the same logic, we control for the fund returns and log of fund size of the respective periods, as well as for LTM volatility and found results to be robust as well, as shown in Appendix 8.

We test the robustness of both of our DiD analyses by altering two different factors. First within the control variables, we control for LTM volatilities instead of overall volatility. Additionally, we alter the dummy variable $Time_t$. The reasoning is as follows: While the crash event was dated January 30, 2020, officially, we can observe fund outflows already in the months before the virus outbreak was declared an international health emergency. As we found indications within our panel regression on fund returns that the markets might have reacted to the shock before the official declaration already, we set the shock date to the outbreak of COVID-19 in China dated December 21, 2019, for our robustness tests. Accordingly, fund data before January 2020 were assigned the dummy variable 0 and 1 for data referring to the months thereafter. Robustness tests on the DiD analysis on fund returns is shown in Appendix 9. Even by altering those factors, the results remain robust. As shown in Appendix 10 our DiD regression results on fund returns are robust as well as Globe 5 rated funds experienced an outflow caused by the shock event of 1.4% higher compared to the Globe 1 rated control group. Moreover, even though the results are significant at the 1% level, the effect is smaller than when choosing January 20, 2020, as the shock date signaling that investors' reaction was stronger once the crisis was spreading over the Globe and reached international significance.

In addition, as we only consider a limited set of data, we test the applicability of our results on the broader market by analyzing a sample of 6,546 open-end equity funds domiciled in the EU. Regarding fund returns as shown in Appendix 11 we find the results of our regression analyses to be robust as we can confirm the significant effect of Globe ratings on fund returns for the periods of 6- and 12-months around the shock event. When taking the period around the crash, our results can be confirmed partly, as fund returns are insignificant for the period directly before the crash while they turn positive again thereafter. However, our results over this time-period are robust within the DiD analysis as the shock event had no significant impact on fund returns when comparing Globe-5 to Globe-1 rated funds as shown in Appendix 12.

Regarding fund flows, the panel regression confirms the overall trend towards sustainable investing to be present in the whole EU market as well. As displayed in Appendix 13, we find globe ratings to have a significantly positive effect on fund flows. The effect is even stronger then in our selected sample as fund flows remain significantly positive over the entire test periods rather than turning insignificant after the crash event. The results of the DiD analysis are shown in Appendix 14. In contrast to the findings of our selected sample, fund flows are not significantly impacted by the shock event on the broader market. The contradiction in those findings reinforce previous studies by Louche and Lydenberg (2006), Switzer et al. (2017) and Lee et al. (2019) who found that investment behavior and assessment of risk differ depending on societal backgrounds such as distance, language, and culture. Therefore, these findings on fund returns derived from our robustness test indicate that in the overall European market a different type of investor might be dominant compared to investors within highly ranked countries as classified by the HDI, and consequently, open up a field for further research.

5. Conclusion

This section summarizes the main findings and implications of our empirical analyses. Moreover, we point out the limitations of our studies and derive suggestions for further research.

Within this thesis, we have analyzed the effect of sustainability ratings on fund returns and fund flows, taking a selected sample of European open-end equity funds. We used the Morningstar Globe rating as a measure for fund sustainability and cover the time-period from February 2019 until end of January 2021. In line with previous research, we conducted multivariate regression analyses as well as Difference in

Difference analyses to derive the motivation behind sustainable investments predominating in our sample from our results.

With regards to fund returns, we find Globe ratings to have a significant positive effect on fund returns under normal market conditions. This means that sustainable investments outperformed conventional ones making them attractive for both financially, as well as non-financially motivated investors. However, around the crisis period this effect vanishes as the coefficients turn insignificant and as sustainable investments could not cushion financial losses caused by the crisis. Form this observation, investors' underlying motives can be derived by investigating the effect of the COVID-19 crash on fund flows. Here within, we find Globe ratings to overall positively affecting fund flows. This speaks in favor of the underlying trend towards sustainable investing. However, once controlling for relevant variables within our DiD analysis we find Globe 5 rated funds to experience significant fund outflows compared to a matched sample of Globe 1 funds as a reaction to the shock event. Therefore, our studies show investors to turn away from high ESG rated funds when markets turn sour. These findings allow us to conclude that investors make their sustainable investment decisions predominantly based on financial motives rather than non-pecuniary motives. Moreover, investor behavior in our sample seems not to be explained by the prospect theory as suggested by Nofsinger and Varma (2014). Instead, investors exhibited flight to safety behavior represented by sustainable funds outflows.

However, investors are not only black and white, meaning that being predominantly motivated by financial motives does not exclude the individual investor to derive non-pecuniary utilities from their investments as well. As our data does not allow us to divide the groups of investors by the degree of their financial versus non-financial motivations underlying sustainable investments, it would be interesting to further investigate on such a relationship by gathering behavioral data on different groups of investors based on surveys, for example. Moreover, we intended to control for effects driven by cultural differences across investors as much as possible. Therefore, our data is limited to funds available for sale within the top 10 European countries as classified by HDI rating. The results of our robustness tests on the full sample of European funds proves the Globe-return relationship to hold while they suggest that the underlying motivations of investors within our selected sample group does not necessarily predominate across the whole European market. Therefore, further research needs to be conducted to answer the question which investor types predominate the overall European and international markets and, moreover, how they differentiate there within. Finally, as we limit our observation period to one year before and after the COVID-19 crash it is up to investigate longer-term market trends as well as to analyze whether the market crisis had a sustainable impact on investors behavior and perception of sustainable investment.

Our findings contribute to existing literature as we are among the first to study the effect of sustainability ratings on European fund flows in the context of COVID-19 crisis. By showing that investors being mainly driven by financial utilities when investing in sustainable funds, while they turn away again once their return expectations cannot be met, we shed light on sustainable investment in the context of a market trend form which investors expect excess returns rather than the sole utility from doing something ethically good. Additionally, we provide supportive evidence on the theory of Bialkowski and Starks (2016) who suggest that sustainable investments becoming more mainstream results in investors turning out to be less resilient. Our findings therefore question the previously popular assumption sustainable investors being considered more loyal and less affected by past returns.

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Appendix

Appendix 1 : Top 50 countries by HDI

This table provides an overview on the top 50 countries worldwide ranked by the Human Development Index. It also includes the country scores on the individual sections, i.e., life expectancy, expected years of schooling, mean years of schooling and gross national income per capita.

HDI rank 2021	Country	Human Development Index (HDI)	Life expectancy at birth (years)	Expected years of schooling	Mean years of schooling	Gross national income (GNI) per capita
1	Switzerland	0.962	84.0	16.5	13.9	66,933
2	Norway	0.961	83.2	18.2	13.0	64,660
3	Iceland	0.959	82.7	19.2	13.8	55,782
4	Hong Kong, China (SAR)	0.952	85.5	17.3	12.2	62,607
5	Australia	0.951	84.5	21.1	12.7	49,238
6	Denmark	0.948	81.4	18.7	13.0	60,365
7	Sweden	0.947	83.0	19.4	12.6	54,489
8	Ireland	0.945	82.0	18.9	11.6	76,169
9	Germany	0.942	80.6	17.0	14.1	54,534
10	Netherlands	0.941	81.7	18.7	12.6	55,979
11	Finland	0.940	82.0	19.1	12.9	49,452
12	Singapore	0.939	82.8	16.5	11.9	90,919
13	Belgium	0.937	81.9	19.6	12.4	52,293
13	New Zealand	0.937	82.5	20.3	12.9	44,057
15	Canada	0.936	82.7	16.4	13.8	46,808
16	Liechtenstein	0.935	83.3	15.2	12.5	146,830
17	Luxembourg	0.930	82.6	14.4	13.0	84,649
18	United Kingdom	0.929	80.7	17.3	13.4	45,225
19	Japan	0.925	84.8	15.2	13.4	42,274
19	Korea (Republic of)	0.925	83.7	16.5	12.5	44,501
21	United States	0.921	77.2	16.3	13.7	64,765
22	Israel	0.919	82.3	16.1	13.3	41,524
23	Malta	0.918	83.8	16.8	12.2	38,884
23	Slovenia	0.918	80.7	17.7	12.8	39,746
25	Austria	0.916	81.6	16.0	12.3	53,619
26	United Arab Emirates	0.911	78.7	15.7	12.7	62,574
27	Spain	0.905	83.0	17.9	10.6	38,354
28	France	0.903	82.5	15.8	11.6	45,937
29	Cyprus	0.896	81.2	15.6	12.4	38,188
30	Italy	0.895	82.9	16.2	10.7	42,840
31	Estonia	0.890	77.1	15.9	13.5	38,048
32	Czechia	0.889	77.7	16.2	12.9	38,745
33	Greece	0.887	80.1	20.0	11.4	29,002
34	Poland	0.876	76.5	16.0	13.2	33,034
35	Bahrain	0.875	78.8	16.3	11.0	39,497
35	Lithuania	0.875	73.7	16.3	13.5	37,931
35	Saudi Arabia	0.875	76.9	16.1	11.3	46,112
38	Portugal	0.866	81.0	16.9	9.6	33,155
39	Latvia	0.863	73.6	16.2	13.3	32,803
40	Andorra	0.858	80.4	13.3	10.6	51,167
40	Croatia	0.858	77.6	15.1	12.2	30,132
42	Chile	0.855	78.9	16.7	10.9	24,563
42	Qatar	0.855	79.3	12.6	10.0	87,134
44	San Marino	0.853	80.9	12.3	10.8	52,654
45	Slovakia	0.848	74.9	14.5	12.9	30,690
46	Hungary	0.846	74.5	15.0	12.2	32,789
47	Argentina	0.842	75.4	17.9	11.1	20,925
48	Türkiye	0.838	76.0	18.3	8.6	31,033
49	Montenegro	0.832	76.3	15.1	12.2	20,839
50	Kuwait	0.831	78.7	15.3	7.3	52,920

Appendix 2 : Summary statistics on mean fund characteristics

This table shows the summary of mean fund characteristics over the two-year observation period between February 2019 and January 2021, inclusive. All data is obtained from the Morningstar Direct database and, if applicable, complemented as described in section 3.1. All values are reported in Euro if not stated otherwise.

Statistic	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Globe	3.15	1.12	1.00	2.00	3.00	4.00	5.00
Flow	0.00	0.02	-0.07	-0.01	0.00	0.01	0.11
Return	0.01	0.01	-0.01	0.01	0.01	0.01	0.05
Size (€m)	407.23	794.24	2.15	45.43	146.63	415.47	10,832.95
Volatility	0.19	0.05	0.03	0.16	0.18	0.21	0.54
Star	3.18	1.03	1.00	3.00	3.00	4.00	5.00
Age (years)	10.63	9.33	1.01	3.17	7.39	15.84	70.74
Alpha (%)	8.35	8.17	-30.25	2.89	8.34	12.24	58.45

Appendix 3 : Correlation Matrix

This table shows the correlation of key fund characteristics which are used throughout the thesis. It includes the Morningstar Globe Rating, fund returns, net fund flows as a percentage of TNA, fund size measured by TNA, Morningstar Star Rating, volatility, and fund age in years.

Variables	Globe	Return	Flow	Size	Star	Volatility	Age
Globe	1.00						
Return	0.13	1.00					
Flow	0.13	0.22	1.00				
Size	0.06	0.09	(0.01)	1.00			
Star	0.10	0.22	0.13	0.17	1.00		
Volatility	(0.05)	0.07	(0.09)	(0.07)	(0.16)	1.00	
Age	0.00	0.03	(0.22)	(0.01)	(0.05)	0.04	1.00

Appendix 4 : Mean fund characteristics before and after the COVID-19 crash

This table shows the summary of mean fund characteristics before and after the COVID-19 crash dated January 30, 2020. Panel A reports the 12-month period before the crash while Panel B reports the 12-month period after the crash. All data is obtained from the Morningstar Direct database and, if applicable, complemented as described in section 3.1. All values are reported in Euro if not stated otherwise.

Panel A: Mean fund characteristics pre COVID-19 shock

Globe	**1**		**2**		**3**		**4**		**5**	
Statistic	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
Flow (% of TNA)	155	-0.11	248	-0.03	619	0.24	413	0.51	197	0.65
Return	155	0.015	248	0.013	619	0.014	413	0.015	197	0.016
Size (€m)	155	378.11	248	248.00	619	439.12	413	419.51	197	435.94
Volatility	155	0.10	248	0.11	619	0.10	413	0.11	197	0.11
Star	155	3.00	248	3.00	619	3.21	413	3.29	197	3.27
Age (years)	155	10.98	248	10.08	619	11.03	413	9.72	197	11.67

Panel B: Mean fund characteristics post COVID-19 shock

Globe	**1**		**2**		**3**		**4**		**5**	
Statistic	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
Flow (% of TNA)	155	0.04	248	-0.14	619	-0.03	413	0.37	197	0.56
Return	155	0.008	248	0.009	619	0.009	413	0.011	197	0.011
Size (€m)	155	406.20	248	227.58	619	440.13	413	459.58	197	489.81
Volatility	155	0.24	248	0.27	619	0.25	413	0.24	197	0.25
Star	155	3.00	248	3.00	619	3.21	413	3.29	197	3.27
Age (years)	155	10.98	248	10.08	619	11.03	413	9.72	197	11.67

Appendix 5 : Matching results for fund return analysis

This table shows the mean fund characteristics of the matched sample of the treatment and the control group as used for our analysis of fund returns after applying the full matching method. Globe 5 represents the treatment group while Globe 1 represents the control group. The mean difference between the two groups is shown in column 4.

	Globe 5	Globe 1	Difference
Size (€m)	589.64	752.64	-0.163
Flow	0.000	0.001	-0.017
Volatility	0.106	0.109	-0.096
Age (years)	13.003	13.181	-0.016
Star	3.241	3.138	0.100

Appendix 6 : Matching results for fund flow analysis

This table shows the mean fund characteristics of the matched sample of the treatment and the control group as used for our analysis of fund flows after applying the full matching method. Globe 5 represents the treatment group while Globe 1 represents the control group. The mean difference between the two groups is shown in column 4.

	Globe 5	Globe 1	Difference
Size (€m)	476.69	375.27	0.12
Return	0.41	-0.22	0.33
Volatility	0.11	0.11	-0.09
Age (years)	11.67	12.56	-0.09
Star	3.27	3.57	-0.29

Appendix 7 : Linear regression on fund returns – robustness test

This table shows the robustness test results for our multivariate linear regression analysis on monthly fund returns. Columns (1), (2), and (3) report results for the 12-, 6-, and 3-month period before the crash, while columns (4), (5), and (6) report results for the 3-, 6-, and 12-month period after the crash, respectively. We alter the control variables to fund flows and log of fund size matching the analyzed period. Additionally, we control for LTM volatility. T-statistics are in parentheses and ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Monthly Return					
	-12 to 0	-6 to 0	-3 to 0	0 to 3	0 to 6	0 to 12
	(1)	(2)	(3)	(4)	(5)	(6)
Globe	0.0004***	0.001***	-0.00001	0.0003	0.001***	0.0004**
	t = 2.978	t = 4.016	t = -0.057	t = 0.643	t = 2.920	t = 1.982
Flow -12 to 0	0.036***					
	t = 5.127					
log(Size -12 to 0)	0.0004***					
	t = 4.208					
Flow -6 to 0		0.041***				
		t = 5.856				
log(Size -6 to 0)		0.0002**				
		t = 1.969				
Flow -3 to 0			0.048***			
			t = 5.023			
log(Size -3 to 0)			0.0003			
			t = 1.591			
Flow 0 to 3				0.054***		
				t = 3.945		
log(Size 0 to 3)				0.0004		
				t = 1.277		
Flow 0 to 6					0.105***	
					t = 7.181	
log(Size 0 to 6)					0.0004	
					t = 1.548	
Flow 0 to 12						0.126***
						t = 10.913
log(Size 0 to 12)						0.0003**
						t = 2.047
Star	0.001***	0.001***	0.001***	0.004***	0.003***	0.001***
	t = 8.920	t = 7.212	t = 5.472	t = 8.738	t = 7.412	t = 5.747
Volatility_LTM	-0.037***	-0.025***	0.001	-0.003	0.150***	0.163***
	t = -8.555	t = -5.376	t = 0.138	t = -0.180	t = 13.197	t = 22.957
log(Age)	0.0003*	0.0004**	0.0004	0.0002	0.0005	0.0004*
	t = 1.810	t = 2.492	t = 1.546	t = 0.432	t = 1.302	t = 1.680
Constant	0.011***	0.008***	0.011***	-0.054***	-0.036***	-0.015***
	t = 12.896	t = 9.411	t = 7.079	t = -17.184	t = -16.388	t = -11.075
Observations	1,632	1,632	1,632	1,632	1,632	1,632
R^2	0.146	0.103	0.042	0.065	0.154	0.301
Adjusted R^2	0.143	0.099	0.039	0.062	0.151	0.298
Note:						*p **p ***p<0.01

Appendix 8 : Linear regression on fund flows – robustness test

This table shows the robustness test results for our multivariate linear regression analysis on monthly net fund flows. Columns (1), (2), and (3) report results for the 12-, 6-, and 3-month period before the crash, while columns (4), (5), and (6) report results for the 3-, 6-, and 12-month period after the crash, respectively. We alter the control variables to fund return and log of fund size matching the analyzed period. Additionally, we control for LTM volatility. T-statistics are in parentheses and ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Monthly fund flow as a % of TNA					
	-12 to 0	-6 to 0	-3 to 0	0 to 3	0 to 6	0 to 12
	(1)	(2)	(3)	(4)	(5)	(6)
Globe	0.002***	0.002***	0.003***	-0.001	0.001	0.001***
	t = 4.224	t = 4.377	t = 4.437	t = -0.859	t = 1.085	t = 3.126
Return -12 to 0	0.451***					
	t = 5.014					
log(Size -12 to 0)	-0.001***					
	t = -3.475					
Return -6 to 0		0.522***				
		t = 5.749				
log(Size -6 to 0)		-0.0001				
		t = -0.201				
Return -3 to 0			0.332***			
			t = 4.940			
log(Size -3 to 0)			-0.0003			
			t = -0.546			
Return 0 to 3				0.165***		
				t = 4.069		
log(Size 0 to 3)				-0.00003		
				t = -0.061		
Return 0 to 6					0.269***	
					t = 7.012	
log(Size 0 to 6)					-0.0001	
					t = -0.360	
Return 0 to 12						0.536***
						t = 11.117
log(Size 0 to 12)						-0.0001
						t = -0.279
Star	0.001***	0.001**	0.002***	0.001	0.001*	0.001
	t = 2.741	t = 2.428	t = 2.935	t = 1.434	t = 1.702	t = 1.603
Volatility_LTM	-0.032**	-0.040**	-0.016	-0.072***	-0.070***	-0.082***
	t = -2.027	t = -2.335	t = -0.723	t = -2.721	t = -3.728	t = -5.030
log(Age)	-0.007***	-0.006***	-0.007***	-0.003***	-0.003***	-0.004***
	t = -12.876	t = -11.072	t = -10.301	t = -3.372	t = -4.838	t = -7.991
Constant	0.008**	0.003	0.003	0.015***	0.009**	0.006**
	t = 2.510	t = 0.858	t = 0.626	t = 2.723	t = 2.540	t = 2.181
Observations	1,632	1,632	1,632	1,632	1,632	1,632
R^2	0.139	0.118	0.097	0.027	0.054	0.121
Adjusted R^2	0.136	0.115	0.094	0.023	0.05	0.118
Note:						*p **p ***p<0.01

Appendix 9 : DiD regression on fund returns – robustness test

This table shows the robustness test results for our DiD regression analysis on monthly fund returns. We use the matched sample of Globe-5 rated-funds as the treatment group and of Globe-1 rated-funds as the control group over a period of 11 months before and 4 months after the crash. Column (1) reports results for the simple regression of fund returns on the respective Globe rating and column (2) reports the regression results within which we include various control variables. Sustainability and Time are dummy variables which split the groups and the observation periods while did is the interaction term. We alter the volatility control to LTM volatility and change the date of the shock event to the end of December 2019. Standard errors are double clustered, t-statistics are shown in parentheses and ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Monthly Return	
	(1)	(2)
did	-0.072	0.009
	t = -0.339	t = 0.038
Sustainability	0.316*	0.178
	t = 2.199	t = 1.435
Time	-3.097***	-3.159***
	t = -14.291	t = -12.915
Volatility		-7.730**
		t = -3.075
log(Age)		0.045
		t = 0.921
Star		0.149***
		t = 3.744
log(Size)		0.111**
		t = 3.113
Flow		18.207***
		t = 5.472
Constant	1.302***	1.122**
	t = 10.701	t = 3.257
Double clustered standard errors	YES	YES
Observations	3,705	3,705
R^2	0.057	0.075
Adjusted R^2	0.056	0.073
Note:		*p **p ***p<0.01

Appendix 10 : DiD regression on fund flows – robustness test

This table shows the robustness test results for our DiD regression analysis on monthly fund flows. We use the matched sample of Globe-5 rated-funds as the treatment group and of Globe-1 rated-funds as the control group over a period of 11 months before and 4 months after the crash. Column (1) reports results for the simple regression of fund returns on the respective Globe rating and column (2) reports the regression results within which we include various control variables. Sustainability and Time are dummy variables which split the groups and the observation periods while did is the interaction term. We alter the volatility control to LTM volatility and change the date of the shock event to the end of December 2019. Standard errors are double clustered, t-statistics are shown in parentheses and ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Monthly fund flow as a % of TNA	
	(1)	(2)
did	-0.014***	-0.014***
	t = -3.477	t = -3.452
Sustainability	0.010***	0.010***
	t = 4.557	t = 4.802
Time	0.012***	0.014***
	t = 3.341	t = 3.763
Volatility		-0.090***
		t = -4.201
log(Age)		-0.006***
		t = -6.496
Star		-0.001
		t = -0.575
log(Size)		-0.001
		t = -1.503
Return		0.001***
		t = 3.517
Constant	-0.005*	0.022***
	t = -2.363	t = 4.667
Double clustered standard errors	YES	YES
Observations	5,173	5,173
R^2	0.011	0.045
Adjusted R^2	0.011	0.044
Note:		*p **p ***p<0.01

Appendix 11 : Linear regression on EU fund returns – robustness test

This table shows the results of our multivariate linear regression analysis on monthly fund returns taking a sample of all funds domiciled in the EU. Columns (1), (2), and (3) report results for the 12-, 6-, and 3-month period before the crash, while columns (4), (5), and (6) report results for the 3-, 6-, and 12-month period after the crash, respectively. We include additional controls of fund flows, log of size, Morningstar Star Rating, volatility, and log of age. T-statistics are in parentheses and ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Monthly Return					
	-12 to 0	-6 to 0	-3 to 0	0 to 3	0 to 6	0 to 12
	(1)	(2)	(3)	(4)	(5)	(6)
Globe	0.001***	0.001***	0.0002	0.003***	0.002***	0.002***
	t = 11.286	t = 8.489	t = 1.385	t = 6.089	t = 7.139	t = 7.474
Flow	0.075***	0.055***	0.117***	0.733***	0.958***	1.206***
	t = 22.740	t = 13.909	t = 17.945	t = 10.882	t = 18.884	t = 30.224
log(Size)	0.0004***	0.0004***	0.001***	-0.0004	-0.001***	-0.001***
	t = 9.743	t = 7.710	t = 7.202	t = -1.259	t = -2.895	t = -6.124
Star	0.001***	0.001***	0.001***	0.002***	0.001***	0.001***
	t = 15.003	t = 10.542	t = 8.353	t = 3.354	t = 3.574	t = 3.417
Volatility	-0.005***	-0.0003	0.001	-0.034***	-0.042***	-0.050***
	t = -6.221	t = -0.271	t = 0.531	t = -5.395	t = -8.971	t = -13.615
log(Age)	0.0003***	0.0003***	0.0004***	-0.004***	-0.004***	-0.004***
	t = 3.682	t = 3.608	t = 2.631	t = -8.278	t = -9.637	t = -13.922
Constant	0.006***	0.004***	0.008***	-0.007**	-0.003	0.005***
	t = 14.502	t = 7.751	t = 10.161	t = -2.286	t = -1.191	t = 2.702
Observations	6,546	6,546	6,546	6,546	6,546	6,546
R2	0.182	0.085	0.079	0.049	0.099	0.194
Adjusted R2	0.181	0.084	0.078	0.048	0.098	0.193

Note: *p**p***p<0.01

Appendix 12 : DiD regression on EU fund returns – robustness test

This table shows the results for our DiD regression analysis on monthly fund returns taking a sample of all funds domiciled in the EU. We use the matched sample of Globe-5 rated-funds as the treatment group and of Globe-1 rated-funds as the control group over a period of 12 months before and 3 months after the crash. Column (1) reports results for the simple regression of fund returns on the respective Globe rating and column (2) reports the regression results within which we include various control variables. Sustainability and Time are dummy variables which split the groups and the observation periods while did is the interaction term. Standard errors are double clustered, t-statistics are shown in parentheses and ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Monthly Return	
	(1)	(2)
did	0.222	0.187
	t = 0.422	t = 0.361
Sustainability	0.221**	0.059
	t = 3.207	t = 0.843
Time	-5.365***	-5.304***
	t = -11.605	t = -11.620
Volatility		-8.684***
		t = -7.297
log(Age)		0.058
		t = 0.944
Star		0.094**
		t = 1.731
log(Size)		0.065**
		t = 1.955
Flow		7.668***
		t = 5.355
Constant	1.315***	2.295***
	t = 22.241	t = 6.307
Double clustered standard errors	YES	YES
Observations	16,080	16,080
R2	0.119	0.130
Adjusted R2	0.118	0.130
Note:		*p**p***p<0.01

Appendix 13 : Linear regression on EU fund flows – robustness test

This table shows the results of our multivariate linear regression analysis on monthly net fund flows taking a sample of all funds domiciled in the EU. Columns (1), (2), and (3) report results for the 12-, 6-, and 3-month period before the crash, while columns (4), (5), and (6) report results for the 3-, 6-, and 12-month period after the crash, respectively. We include additional controls of fund returns, log of size, Morningstar Star Rating, volatility, and log of age. T-statistics are in parentheses and ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively.

	Monthly fund flow as a % of TNA					
	-12 to 0	-6 to 0	-3 to 0	0 to 3	0 to 6	0 to 12
	(1)	(2)	(3)	(4)	(5)	(6)
Globe	0.002***	0.002***	0.003***	0.003***	0.002***	0.002***
	t = 7.233	t = 7.585	t = 6.595	t = 6.089	t = 7.139	t = 7.474
Return	0.464***	0.511***	0.659***	0.733***	0.958***	1.206***
	t = 10.620	t = 11.159	t = 11.436	t = 10.882	t = 18.884	t = 30.224
log(Size)	0.0003	0.0002	0.0001	-0.0004	-0.001***	-0.001***
	t = 1.341	t = 1.035	t = 0.361	t = -1.259	t = -2.895	t = -6.124
Star	0.002***	0.002***	0.002***	0.002***	0.001***	0.001***
	t = 4.931	t = 5.145	t = 4.685	t = 3.354	t = 3.574	t = 3.417
Volatility	-0.028***	-0.027***	-0.033***	-0.034***	-0.042***	-0.050***
	t = -6.888	t = -6.418	t = -6.081	t = -5.395	t = -8.971	t = -13.615
log(Age)	-0.009***	-0.007***	-0.008***	-0.004***	-0.004***	-0.004***
	t = -27.558	t = -20.815	t = -18.186	t = -8.278	t = -9.637	t = -13.922
Constant	0.010***	0.005***	0.007***	-0.007**	-0.003	0.005***
	t = 5.272	t = 2.580	t = 2.965	t = -2.286	t = -1.191	t = 2.702
Observations	6,546	6,546	6,546	6,546	6,546	6,546
R2	0.155	0.115	0.098	0.049	0.099	0.194
Adjusted R2	0.154	0.115	0.097	0.048	0.098	0.193

Note: *p**p***p<0.01

Appendix 14 : DiD regression on EU fund flows – robustness test

This table shows the results for our DiD regression analysis on monthly net fund flows as a percentage of TNA taking a sample of all funds domiciled in the EU. We use the matched sample of Globe-5 rated-funds as the treatment group and of Globe-1 rated-funds as the control group over a period of 12 months before and 3 months after the crash. Column (1) reports results for the simple regression of fund returns on the respective Globe rating and column (2) reports the regression results within which we include various control variables. Sustainability and Time are dummy variables which split the groups and the observation periods while did is the interaction term. Standard errors are double clustered, t-statistics are shown in parentheses and ***, **, and * indicate the statistical significance at the 1%, 5%, and 10% levels, respectively

	Monthly fund flow as a % of TNA	
	(1)	(2)
did	0.002	0.002
	t = 0.918	t = 0.931
Sustainability	0.009***	0.009***
	t = 8.034	t = 8.581
Time	-0.006***	-0.004**
	t = -2.691	t = -1.629
Volatility		-0.045***
		t = -5.063
log(Age)		-0.010***
		t = -6.968
Star		0.001***
		t = 2.260
log(Size)		-0.0002
		t = -0.792
Return		0.001***
		t = 5.937
Constant	-0.0004	0.027***
	t = -0.430	t = 7.940
Double clustered standard errors	YES	YES
Observations	18,905	18,905
R2	0.009	0.054
Adjusted R2	0.009	0.054

Note: *p**p***p<0.01