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Does investor sentiment have a greater impact on European sustainable equity funds?

Analysis through the fund flows of ETFs and equity Mutual funds under the SFDR category Article 8

Mémoire présenté par :

Ghita El KASRI

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Promoteur :

Mathilde FOX

Boulevard Brand Whitlock 6 - 1150 Bruxelles

Abstract

Recent years have witnessed a noticeable surge in ETFs, thanks to their accessibility, low costs and wide exposure allowing diversification. Simultaneously, interest towards sustainable investing driven by ESG as a barometer, increased tremendously across ETFs and mutual funds. According to a recent Morningstar research (January 2024), sustainable ETFs, gathered considerable inflows in the last quarter of 2023, whereas sustainable mutual funds suffered more outflows. ETFs were among the seven of the top 10 inflows into ESG strategies in Europe in Q4'23 and just three of the top ten outflows. Europe holds a prominent position worldwide in sustainable investments, and this is mainly fostered by a solid regulatory framework, whose objective is to allocate investments towards sustainability and ESG transition.

The objective of this thesis is to address the topic of investor sentiment on fund flows, with a particular focus on sustainable flows. We will try to figure out if there is a difference in these funds' reaction to investor sentiment; that is explained by the sustainability of the funds or the type of fund, which is an ETF or a mutual fund. The study is inspired by the works of Amman et al. (2017) and Becker et a. (2022) on sustainable funds flows by focusing on investor sentiment as one of their determinants. On the light of their findings, we attempt to review the impact of investor sentiment on ETFs flows and mutual fund flows and explore if it has greater impact on sustainable flows of ETFs and mutual funds years after the introduction of the SFDR regulation in Europe.

To properly conduct our analysis, we will tackle two categories of equity funds: (1) ETFs and (2) Mutual Funds. Starting from the hypothesis that investor sentiment has an impact on fund flows, we will first try to confirm this assumption, we will also examine if there is a different reaction across each fund type. Finally, we will shift our focus towards sustainability to figure out if equity ETFs and mutual funds classified under Article 8 – 9 are impacted by investor sentiment more than those classified under Article 6 category.

The study will be conducted using a panel data formed from a dataset of European funds. The study period is extended from November 2018 to December 2023 on monthly basis. First, we classify the funds into two categories: ETFs and Mutual funds, then into two sub-categories, one referring to conventional funds and the other one to sustainable funds. Then, we will run several regression models to address our hypothesis. We confirm that investor sentiment impacts flows of ETFs and mutual fund flows as supported in the literature, we also observe that investor sentiment impacts ETFs flows and mutual fund flows differently. Finally, we observe different relationships captured by each sentiment indicator depending on the type of sentiment. In the case of ETFs, we find that investor sentiment has a greater impact on sustainable ETFs flows compared to conventional funds. However, in the case of mutual funds, we observe a similar reaction between conventional funds and sustainable funds, with variabilities in the magnitude of each investor sentiment indicator.

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	des résultats. L'assistance de ChatGpt s'est limitée uniquement à mon utilisation de Python.	

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Fait à .....Bruxelles..... (ville), le 21/05/2024 ..... (date)

Signature Ghita El Kasri 220352 .....[Prénom Nom de l'étudiant(e) et matricule]

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Introduction

In recent years, financial markets have seen a tremendous growth in sustainable funds, including passive funds and active funds, in alignment with investors preferences related to style investing. This paradigm shift has been witnessed increasingly in Europe, which is considered home of the highest number of sustainable funds, due to the EU' efforts to finance the transition towards a sustainable future.

Over the years, we have been able to acknowledge the role of financial markets in financing this transition throughout their continuous innovation in product development, in order to address the demand of investors' with growing awareness about sustainability issues and their individual impact.

Investor sentiment is a fundamental concept in the literature of behavioural finance, and literature has proven that on top of fundamentals, sentiment has a strong impact on asset prices and investors' behaviour. In funds literature, there is a number of factors impacting fund flows and investor sentiment is inarguably one of them.

At the light of the academic findings provided by the literature and the shift in investors' demand towards sustainable investing, this study seeks to investigate if sustainable funds, - including ETFs and active funds- are more or less impacted by investor sentiment. The study period is extended from December 2018 to December 2023. It will be conducted on two samples of ETFs and open-end mutual funds, each one divided into two sub-samples to distinguish between conventional and sustainable ones. Our sustainability criteria are based on the Sustainable Finance Disclosure Regulation classifications (Article 6, Article 8, Article 9), which justifies our choice of Europe as a basic criterion of our geographical focus and fund's domiciliation.

There are several works shedding the light at the impact of sustainability labels on mutual fund investors, using SFDR sustainability labels, or Morningstar Sustainability ratings. This study is therefore inspired by this literature, as well as literature about investor sentiment, complementing both of them by a comparison of ETFs flows and mutual fund flows, with a particular focus on sustainability.

The structure of this thesis is organized as follows: we will first introduce basic concepts of investor sentiment and funds flows, as well as factors impacting them. We will also develop existing literature about ETFs and mutual funds outlining their key characteristics. Additionally, we will explain the principles of sustainable finance, ESG standards and the Sustainable Finance Disclosure Regulation in Europe and the impact of this regulatory framework on shaping investors' demand.

This literature review will enable us to construct a framework to formulate our hypothesis that will serve as a basis for our analysis. We will then describe our data sample and methodology by elaborating on every step of the data treatment and analysis process. Following our data presentation, we will conduct our analysis using panel data regression on one comprehensive sample, then on two sub-samples (conventional funds and sustainable funds) within our two

samples of ETFs and open-end mutual funds, to evaluate the magnitude of the impact of investor sentiment on these funds and establish a comparison between the impact on each category of funds. This process will enable us to answer the following question: Are sustainable funds more impacted by investor sentiment?

The final step of this study consists of discussing our results, linking them with our main hypothesis. We will then conclude whether there is a real significant impact and if this impact has a relationship with investors' strategies. The conclusion of this work summarizes our key findings and their implications in financial markets, it also acknowledges the constraints and limitations in our methodology and data analysis.

I. Literature Review

This section conducts a comprehensive review of key concepts that our research question addresses, including factors impacting fund flows and namely investor sentiment as one of them. We will start by exploring previous works that provided evidence about the impact of investor sentiment on fund flows as a starting point. Therefore, we will delve deeper about studies in the field of fund flows to examine what drives investors' demand. Also, we will highlight the key differences between ETFs and mutual funds to corroborate our hypothesis about the different impact of investor sentiment across flows of ETFs and mutual funds. Finally, we will shift our focus into sustainable investing, by providing key concepts of sustainable investing, ESG standards and SFDR, this, along with comprehensive review of previous works tackling flows of sustainable funds, will help us understand how investors perceive sustainability and incorporate it into their investment decisions. Finally, we will provide an overview of the current state of sustainable investing in Europe, as a starting point for our research question.

1. Investor sentiment

Investor sentiment emanates from an exaggerated belief causing securities prices to diverge from their fundamental values. A positive investor sentiment refers to an optimistic state of the market and this is more specifically reflected in asset prices. Conversely, a negative investor sentiment refers to a pessimistic feeling on the market. (Zhou, 2018)

Fundamental information is not sufficient to provide an absolute explanation of sentiment, however, literature acknowledges the implication of investor sentiment in market volatility and return predictability in the stock market and provides various measures of it. The latter could be categorized into three families: (1) market-based measures, (2) survey-based measures, (3) text and media-based measures. (Zhou, 2018)

1. Market-based measures

Literature encompasses a myriad of works that used investor sentiment for various purposes including return predictability, contagion of investor sentiment, or the pattern of aggregate market returns and volatility.

Early findings by Lee, (Lee et al., 1991) concluded that open-end fund discounts are measures of investor sentiment. They found correlation between the prices of securities on the stock market and the prices open-end funds trading on discount when they are influenced by this sentiment. (Baker & Wurgler, 2006) will use this measure with five other indirect proxies of sentiment to construct their sentiment index, that they will later adjust to macroeconomic impact.

1. Trading volume using the natural logarithm of the New York Stock Exchange (NYSE) turnover ratio of the trading volume.
2. Closed-end discount derived from the difference between the Net Asset Value (NAV) of the closed-end fund shares and their market prices.

3. Initial public offering (IPO) measured by the number of IPOs as well as their first-day returns.
4. Share of equity in new issues using the ratio between total equity and total debt issues
5. Dividend premium.

The Baker & Wurgler Index has been initially used to study stock market overreaction and underreaction and it has proven to capture the sentiment in several events within the 1961-2005 period. In fact, the index has seen historical peaks during major stock crashes and panic episodes, including the 1967 – 1968 growth stocks boom, and during the internet and biotechnology bubble. Later in 2007, Baker & Wurgler provided evidence that mutual fund flows are sensitive to sentiment depending on the fund's category, which means that they depict increased volatility to the index in the case of growth funds and less sensitivity in the case of income funds. (Baker & Wurgler, 2006) (Zhou, 2018)

Another measure is the Chicago Board Options Exchange's volatility index, also known VIX, and it has been widely used among traders to gauge investors' sentiment of fear. This indicator does not cause volatility as opposed to popular beliefs; it is however used for information purposes, because it is forward looking and not based on historical data. The VIX translates investors' expectations on volatility using current prices of options on the S&P 500 Index and therefore gives colour on the implied volatility over the next 30 days (Whaley, 2009).

Similarly to the BW[1] measure, the VIX reached historical peaks during periods of crisis and mania including financial events like the 1987 market crash, and also geopolitical events such as: Kuwait Invasion and the United Nations Attack on Iraq in the 90s. (Whaley, 2009)

The CBOE Put and Call ratio can also be used as a proxy for investor sentiment (Dennis & Mayhew, 2002) (Bandopadhyaya & Jones, s. d.) exhibiting the frequency of trading activity between put options and call options, each one providing respectively a downside and upside protection. A high ratio suggests declining sentiment or bearish market, as investors purchase more puts to protect themselves against potential market declines. Conversely, a low ratio indicates a bullish sentiment, as investors favour call options to take advantage of expected market gains. By observing changes in the put-call ratio, we can observe changes in investor sentiment and market expectations regarding future price movements. (Bandopadhyaya & Jones, 2008)

2. Survey-based measures

Surveys are used to assess investors' expectations and examine how their beliefs are constructed. Despite several issues linked with the consistence of the information that these surveys provide, their formulation, and the audience that they address, they remain a good barometer of the overall state of the market and information flow. (Zhou, 2018)

(Brown & Cliff, 2005) analysis showed that surveys are a relevant measure of investor sentiment as they are able to explain the shift from fundamental value and asset mispricing, they also demonstrate that survey-based measures have a return predictive capacity from one

[1] Baker and Wurgler

to three years. Later, (Greenwood & Shleifer, 2014) also found evidence of the ability of these measures to provide relevant information, as they observed a correlation between these surveys and the past aggregate stock market return.

The numbers of these surveys witnessed a remarkable growth, especially with the development of internet and the increased facility to reach investors and have their answers. However, the most popular measures used in the literature are:

American Association of Individual Investors sentiment index:

This indicator is measured with a weekly survey conducted asking investors questions about their thoughts on the market state in the next 6 months, to finally reflect a result with percentage of bullish investors and bearish investors.

Sentix Investor Confidence Index

The German index Sentix has been widely used in the literature. For instance, (Zwergel & Klein, 2006) used this index to conduct comparative analysis on the behaviour of private investors and institutional investors, as well as their respective ability to predict future returns depending on the quality of information they have. In congruence with the aforementioned observations, (Schmeling, 2007) also provided evidence that the individual investor's behaviour appears to serve as a proxy for noise trading whereas institutional behaviour seems to reveal a smart money attitude.

Other consumer sentiment measures were developed and therefore used in the literature for the same purpose of studying the sentiment and its implications in the stock market. These measures include:

The surveys of consumer sentiment of the University of Michiguan

These surveys were developed in 1946 and have proven their accuracy and how closely they are tied with the course of evolution of the US national economy. For instance, the consumer sentiment index covers three main areas: personal finance including families' wages and income, buying power throughout the assessment of opinions and expectations regarding inflation, interest rates and employment and business environment.[2]

Due to its accuracy, the index of consumer sentiment was included in the Leading Indicator Composite Index of the U.S. Department of Commerce, Bureau of Economic Analysis. Later, it was also included in the complied Composite Leading Indicator of the United States of the OECD.[3]

The Consumer Confidence Index of the Conference Board

This monthly report was created in 1967 and reflects prevailing business conditions and potential developments for upcoming months. It provides a perspective of consumer attitudes and buying intentions, with data available by age, income, and region.[4]

[2] University of Michiguan surveys of consumer official website: https://data.sca.isr.umich.edu/survey-info.php
[3] OECD Archives – An update of the OECD Composite Leading Indicators December 2002
[4] https://www.conference-board.org/timeline/

3. *Text and media based measures*

If market-based measures and survey-based measures provide a forward-looking perspective, text and media-based measures on the other hand provide with real-time data enabling to gauge for investor sentiment and reveal public opinions from diverse sources of information. Several practitioners and academics came to the conclusion that text and media-based measures provide with relevant pieces of information enabling the forecast of stock returns, fund flows and trading volume.

For example, (García, 2013) found that the ability to forecast future stock market returns based on text and media information is more pronounced during periods of recessions. He came to these results using the portion of positive and negative words in the *New York Times*.

In 2015, (Da et al., 2015) constructed a sentiment index called FEARS index standing for Financial and Economic Attitudes Reveals by Search. This index captures the overall market sentiment throughout key words (e.g., "bankruptcy", "recession", "unemployment") used in millions of households' daily research on the Internet. They suggested Internet Search behaviour as a direct measure of investor sentiment and closely examine the impact of the index on asset prices and fund flows.

Consistent with these findings, (Sun et al., 2016) provides empirical evidence that it was possible to forecast the S&P 500 returns in the next half-hour, using the last half-hour text-based information.

Moreover, similar works concluded that there was a strong correlation between the daily closing prices of the Dow Jones Industrial Average and public mood, as assessed using more than 9 million tweets (i.e. posts) of more than 2 million users on Twitter Platform. (J. Bollen et al., 2011)

Consistent with the literature, we demonstrate that market-based and text-media based measures follow the same pattern during the periods of turmoil in which sentiment declines, translating the overall market state, as exhibited in **Erreur ! Source du renvoi introuvable.**, **Erreur ! Source du renvoi introuvable.** and **Erreur ! Source du renvoi introuvable.**

Here, we notice that the VIX reaches abnormally high levels in three historical periods: during the subprime crisis in 2008, COVID-19 in March 2021, and at the Russian invasion of Ukraine in February 2022. These three periods were characterized with weak economic activities or geopolitical threats leading to severe economic consequences and recession is one example of these concerns. Simultaneously, we notice increased concern as well from the perspective of individuals translating more research about recession.

2. Fund Flows

Since we are tackling investor behaviour using fund flows as a proxy for investor preferences, it is very important to scrutinize fund flows and understand their dynamics, as well as the factors influencing them, this will provide a basis to understand later their evolution and understand the dynamics behind the demand for ETFs and mutual funds, and for conventional and

sustainable funds. This will also guide us into constructing our hypotheses and choosing the right control variables to perform our analysis.

In general, in the field of asset management, fund flows are an important barometer for several factors including, macroeconomic climate and investor preference by tracking to which asset class and what funds they are inclined to invest to or divest from.

More concretely, fund flows measure changes in newly purchases or redeemed shares over a certain period[5]. Before delving deeper into the literature, we summarise the factors that are repeatedly mentioned in the literature: performance, fees, Morningstar rating, other ratings (e.g. rating agencies), ESG criteria. (Sirri & Tufano, 1998), (Schmeling, 2007), (Amman et al., 2017), (Fox et al., 2023)

Looking back at the literature, fund flows have been a topic of discussion of many academic since the 90s, particularly in the mutual funds literature. (Warther, 1995) used three hypotheses to explain the relationship between flows of equity funds and stock market returns.

1. Feedback trader hypothesis assumes that investors react to recent information by moving their funds suggesting that there is a feedback effect. Warther (1995) rejects this hypothesis, but the latter will find support in several works later in the 1990s.
2. Price-pressure hypothesis posits that fund flows have an impact on returns due to strong impact of investor sentiment on the market movements. This hypothesis supports the argument of noise traders' influence on the market and suggests that security prices and mutual fund flows move together because of a strong sentiment creating a price-pressure effect.
3. Information response hypothesis just like price-pressure hypothesis assumes a strong correlation between the pattern of fund flows and security prices, however it associates this relationship to an information effect that triggers a response. The outcome in this case will be a simultaneous movement of security prices and fund flows, resulting in a positive correlation between fund performance and security returns, and this will be the result of the market's reaction to new information. (Warther 1995)

(Chevalier & Ellison, 1997) examined the relationship between past performance and fund flows, providing proof of a negative relationship between the two variables.

In the field of behavioural finance, (Barber et al., 2005) outline the influence of fees on the decision-making process. Using an analysis on mutual fund flows, they found no relationship between fund flows and funds operating expenses, but an inverse one between fund flows, commissions, and front-end load fees. However, this does not mean that investors buy low quality funds, in fact, the reason why they are not sensitive to higher operating expense ratios, is that the latter encompass marketing and research costs, that investors see as a proxy of good quality of the fund. This is also consistent with (Sirri & Tufano, 1998) (2002) works, which found that higher fees depict higher marketing efforts, for which investors are willing to pay high fees based on their past positive performance. On a similar note, (Ivković & Weisbenner, 2009) examine the impact of expense ratios by making the distinction between new funds flows

[5] Source : Morningstar (Morningstar, 2023)

and funds outflows leaving funds, they confirm the findings of Sirri & Tufano about investors' insensitivity to operating ratios embedding advertising efforts to attract investors, but they specify that this only applies to new money flowing into funds, and increasing expense ratios could lead investors to redemption decisions as a response to high operating costs.

Additionally, there is a myriad of works in the literature that provided evidence that investors have a return-chasing behaviour, and that the fund performance is a crucial factor in the decision-making process, as they tend to invest more in the best-performing funds.

(Ippolito, 1992) work is one of them, he shows that fund flows are a positive function of past performance using yearly data inflows towards outperforming funds and outflows from underperforming funds. He explains that this is due to a return-chasing behaviour of investors,

(Barber & Odean, 2008) argue that investment decisions are influenced by information and attention, as many investors consider purchasing only stocks that have first caught their attention. They also found that individual investors tend to invest more in fund with positive past returns and use this information to forecast future returns and make a judgement of the quality of the fund, which increases flows of these funds. (Sirri and Tufano 1998) also report similar conclusions about increased investments in funds with the best performance, but they disagree with the idea that these new flows are shifting from underperformers towards outperforms, because investors are sensitive to shifting costs.

For the feedback-trading hypothesis, (Warther, 1995) rejects this theory for mutual funds and reports a negative relationship between returns and subsequent flows using monthly data, but he finds evidence of a positive relationship between fund flows and weekly subsequent returns. On the other hand, (Chau et al., 2011) provides empirical evidence of a prevailing feedback-trading behaviour in the ETFs market, particularly when sentiment is high.

In another study of investor sentiment, (Ben-Rephael et al., 2012) used the Normalized Net Exchange NEIO as a proxy for mutual fund flows from bond funds to equity funds in Israel, they found that NEIO is associated with changes in market returns. Same results were reached by (Jank, 2012) confirming that fund flows and stock prices react simultaneously to financial and macroeconomic information. (Jank, 2012) provides additional evidence of existing relationship with other variables capable of explaining fund flows better than the stock market alone. For example, he found a positive relationship between T-bill rates and inflows into equity funds, in line with (Campbell, 1991) and (Hodrick, 1992) indicating that an increase in T-bill is a sign of low equity premium, making equity more attractive to investors. Conversely, Jank reports a negative relationship between mutual fund flows and consumption-wealth ratio and the default term spread, for two reasons, first they are positively correlated with equity premium, second these two variables hold important pieces of information, as an increase in default term spread is a sign of risky times. Similarly, high consumption-wealth ratio is sign of future turmoil.

Moreover, (Ivković & Weisbenner, 2009) provide another factor impacting fund flows, stemming from investors' psychology, which is tax-motivated trading, they found that investors holding taxable accounts are less prone to sell funds with good past performance, in contrast

they are willing to sell funds that have depreciated in value. They also show that this tax-motivated behaviour has an impact not only on past performance and selling decisions, but also on other variables such as fund turnover, capital gains and the fund's past distribution of returns.

Additional determinants of fund flows in the mutual fund flows literature are the VIX, household inflation expectations, and fund-specific attributes. As mentioned above, the VIX gauges investor sentiment and was used in several works including (Ben-Rephael et al., 2012), confirming a negative relationship between VIX and mutual fund flow, suggesting that when fear increases, fund flows decrease.

Since fund flows are important to understand microeconomic and macroeconomic levels, households' inflation expectations could be used as a proxy to understand investor preference for future investments. If households expect increased inflation in the future, this will give a perspective about their spendings or saving power, as well as their preferences for asset classes. (Kopsch et al., 2015)

Finally, fund specific attributes such as age and size are also determinants of fund flows. (Sirri & Tufano, 1998) research has provided evidence of a positive correlation between investor preferences and flows, and that there is a stronger preference for funds with larger size, as a choice of better quality and more recognizable brands.

Regarding age, (Chevalier & Ellison, 1997) and (Huang et al., 2022) report that the level of flows is lower for older funds. Moreover, Morey (2019) study reports that Morningstar ratings are biased by fund's age, as older funds receive a better rating than younger funds. This will consequently have implications in fund flows since it has been proven more than once that Morningstar star ratings have substantial impact on fund flows.

(Guercio & Tkac, 2008) argue that Morningstar's star ratings are the primary drivers of investors' decisions, and consequently they influence investor fund flow which is the proxy for aggregate net effect of individual fund investor allocation decisions. In their study, they report a change in Morningstar Star rating results in a contemporaneous immediate response from investors. They also report that this impact is in fact independent from other variables and encompasses strong information effect at a low cost.

4. Key differences between ETFs and mutual funds

In order to explore the impact of investor sentiment on fund flows. It is instrumental to first understand the key difference between these types of funds, this could be useful in studying the fund flows of each type and examine if sentiment influences them differently. Understanding these variances sheds the light on how investors perceive these instruments and how is their behaviour reflected in the flows of these funds.

1. Exchange traded funds

Exchange traded funds (ETFs) are popular investment vehicles and the result of financial innovation. They have seen a tremendous growth in the 2000s since they first launch in 1990.

These instruments are index-based and owning them enables investors to gain ownership of a fund or a unit investment trust (Jiang et al., 2010). ETFs do not only track equities, but offer broader exposure to other investment classes, including bonds, commodities, or baskets of assets. (Chen et al., 2017)

One of their major characteristics is that they trade similar to a stocks, as they could be bought or sold on the stock exchange (Tsalikis, 2020). They are highly liquid and offer exposure to different industries or economies at low cost. However, compared to mutual funds, their capital gains could be substantially lower.

ETFs gained in popularity thanks to the advantages they offer to investors in terms of taxes, transparency, low transaction costs, they are also a powerful diversification instrument, enabling idiosyncratic risk mitigation in portfolios (Small et al., 2012; Tsalikis, 2020). One of the reasons why ETFs are different from individual stocks, is the possibility to profit from macroeconomic and thematic trends, enabling investors to prioritize decisions between broader categories rather than stock-specific criteria, and align these choices to a variety of investment strategies accordingly. On top of that, individual stocks bear idiosyncratic risk and market risk, whereas ETFs only give exposure to market risk. (Tsalikis, 2020)

Moreover, ETFs have more transparency compared to any other investment instruments, because ETF providers disclose their ETFs holdings on their official website daily, compared to mutual funds that provide visibility on quarterly basis. (Hill et a. 2015). This is not only beneficial in terms of portfolio construction, but also in terms of sustainability. Investors can investigate ETFs holdings and their respective weights and make their decision accordingly.

But overall, the major advantage of ETFs is their low costs, which increases the competition between assets manager in the ETFs landscape on the one hand, and facilitates access to investors on the other hand (Nguyen et al., 2007). This is because ETFs have very low expense ratios compared to actively managed funds, mutual funds, or hedge funds.

Academic literature saw a notable proliferation of works examining the impact of investor sentiment and ETFs. For instance, (Madura & Richie, 2010) provide empirical evidence that international ETFs experience increased overreaction when investors trade them like stocks due to announcement effects, because of the exposure they give to broad range of stocks. They also put emphasis on behavioural biases such as overconfidence in investors' behaviour.

(Kurov, 2008) and (Chau et al., 2011) also report that ETF investors depict an increased feedback trading behavior in periods of increased sentiment, specifically during the bullish market. They confirm that this trend-chasing behavior is sentiment driven, which they qualify by noise trading.

2. ETFs in Europe

Globally, the U.S is considered as the leader in passive investing, particularly in the ETFs market. Following this American investment trend, Europe ranks second in terms of ETF investing. Exchange traded funds market share has doubled since 2014 few years after the

introduction of the emergence of the first ETFs in Europe in 2000. The segment expanded its share to 27% of the total fund industry. [6]

In 2023, Europe saw investors put their money in commodities ETFs, followed by equity ETFs and bond ETFs. However, the growth in the passive component was mainly witnessed on the bond market as the share of passive AUM grew from 8.27% to 21.72% in 2023. This could be explained by the surging yields that bonds offered in 2023. (Guercio & Tkac, 2008)

The popularity of ETFs worldwide and in Europe is explained by several reasons, including macroeconomic factors. One important factor is the continuous development of financial institutions and their quest to incorporate innovative investment instruments in their strategies. The demand for this type of funds is also stimulated by banks offering these instruments to their clients, contributing therefore to their circulation in the market. Another factor is the effort taken by financial institutions to mitigate or to adjust to the impact of stricter regulatory frameworks, particularly after the global financial crisis of 2008. (Marszk & Lechman, 2024)

From a socio-economic perspective, the evolution the fund management industry including ETFs and mutual funds, is also correlated with the pace of economic development and the industry-specific economic conditions, on a local or international level (Ruiz, 2018), such as inflation rates, interest rates and exchange rates, which can shift investors' preferences from one asset-class to another or from one fund type to another. On top of that, the global economic backdrop is sensitive to macroeconomic events that are poised to have an impact on investors demand as reflected in the mutual fund flows or ETFs shares' turnover (Marszk & Lechman, 2024).

Finally, accounting for the macroeconomic climate, the evolution of the ETFs market in Europe is due to the competitive features that it provides. On the microeconomic level, the factors impacting demand involve regulatory changes, increased financial literacy among invesors, and the overall benefits in terms of accessibility at low tracking-errors, low costs enabling arbitrage practices for investors. The diversity of ETF products is also an important determinant of ETFs flows as it shapes a high demand. Finally, an important component that constitutes an instrumental concept in our study is sentiment derived from psychological motivations and barriers. (Marszk & Lechman, 2024)

3. *Mutual funds*

Prior to the emergence of ETFs, mutual funds were already established in the market since the 1970s. Like ETFs, they also provide an efficient, yet a different way for investors to achieve diversification. This difference lays in their structure. To put it simply, a mutual fund is a pool of money from investors that is placed into portfolios of financial instruments. (Fuchita et al., 2008).

There are two major types of mutual funds (1) closed-end funds and (2) open-end funds. Closed-end funds are similar to individual stock or ETF in trading as it encompasses a limited number of shares that are issued or redeemed only once and traded individually on the market. In this

[6] https://www.morningstar.co.uk/uk/news/246333/are-etfs-taking-over-europe-too.aspx

study we will focus solely on open-end funds, these continue to issue new shares and are therefore priced on the basis of their net asset value (NAV). (Fuchita et al., 2008).

The differences between ETFs and mutual funds could be summarized into 6 key dissimilarities. First, mutual funds are accessible through investment and wealth management companies, they are not reachable via brokerage accounts. Second, mutual funds prices are fixed by the asset managers, whereas ETFs pricing trade like stocks, their priced is either defined by the asset manager on the primary market, or it is determined by the interplay of supply and demand on the secondary market. ETFs are viewed as more transparent because ETF providers disclose the fund's holdings on their website on a daily basis. On the other hand, mutual funds' holdings are disclosed monthly or quarterly. Moreover, ETFs typically have derivatives products based on their shares, like futures and options, which is not the same thing for mutual funds, because they do not provide an exchange-listing feature and they are less liquid. As for tracking errors, they are usually lower for ETFS and higher for mutual funds, because it is much easier to monitor them at the ETF level rather than the mutual funds level. (Marszk & Lechman, 2019) (Marszk & Lechman, 2024). Another important attribute that was provided by the literature is that investors are not allowed to short mutual funds, while they can execute this practice on some ETFs. That way investors can not speculate and benefit from declining prices.

4. Demand for ETFs and mutual funds

Now that we retain the key differences between ETFs and open-end funds, we must ask ourselves the question about investors' preferences. If ETFs offer various advantages and ensure the same diversification benefits as mutual funds, at a cost-efficient way, could they eventually replace mutual funds? A relevant work in the literature attempted to answer this question by analyzing the fund flows of both types of funds. (Agapova, 2011) finds that ETFs could substitute mutual funds but not perfectly. The author puts emphasis on the clientele effect as an explanation of this imperfect substitution. This means that the demand -that is translated into fund flows- is shaped on the basis on clientele needs. ETFs could be an attractive investment instrument to institutional investors for their low transaction costs over the long-term, their tax efficiency and trading flexibility, particularly for risk averse investors. Parallelly, investors who are not sensitive to taxes and find more utility in long-term illiquid investments or short-term investment without commission fees, would potentially prefer mutual funds over ETFs.

As outlined earlier, demand is assessed throughout fund flows. It is therefore judicious to look closely at the determinants of fund flows of ETFs and open-end mutual funds. First, the cost structure is an important component in the organizational structure as highlighted by (Agapova, 2011), and (Tsalikis, 2020)

In the exchange traded funds universe, numerous studies outlined some key factors affecting fund flows. (Elton et al., 2002) reports the importance that investors attach to changes in ETFs' Net Asset Value (NAV). Market regimes and segmentation also plays an important role in the demand for ETFs as outlined by (Boehmer & Boehmer, 2003) and (Chau et al., 2011). Another determinant of demand and therefore for ETFs flows is liquidity, ETFs offer an effective way to trade short term information due to this attribute. Also, when evaluating ETF flows and performance, it is important to acknowledge the impact of fund size. This attribute is also linked

with the cost structure, because smaller funds often require higher expense ratios due to high fixed costs associated with frequent trading. Conversely, as ETFs grow in size this fee constraint is mitigated and they therefore become more competitive, attracting more inflows. (Kalaycıoğlu, 2006)

In addition, as in the case of mutual funds, the performance of individual ETFs, in terms of returns, has a significant impact on ETF flows. The most common hypothesis in the literature explaining this return-flow relationship is the feedback trading hypothesis, according to which investors put or move their money from one ETF to another after taking into account its performance. The most relevant works that illuminated this relationship are from (Shiller, 1994), (Basu et al., 2006), (Kurov, 2008) and (Chau et al., 2011). They all agree that there is a feedback trading behavior in the ETF market, stressing that it is driven by investor sentiment. They also report that this behavior is amplified during bull markets, when investors are very optimistic, and the presence of noise traders is prevalent. In addition to that, these findings of increased sentiment during periods of high optimism are supported by (Yu & Yuan, 2011) who argue that during these periods, the market tends to be less rational.

5. Sustainable investing

Sustainable investing is an emerging decision-making process that replaced the classical theory of Friedman according to which a business is only sustainable if it provides shareholders value. Today, sustainable investing stands for an investment approach that considers environmental, social, and governance (ESG) factors in portfolio selection and management on top of fundamental factors.(Avramov et al., 2022)

ESG standard for "environment, social and governance which are used as determinants for companies' non-financial performance (Galbreath, 2013). Recently, more and more companies are incorporating ESG strategies and incorporate ESG factors in their reporting to provide an overview of their commitment to these strategies. The ESG framework consists of putting in target strategic goals on three key aspects: environment, social and corporate governance. The objective is to be aligned on the UN guidelines in terms of sustainable development to contribute to the sustainable transition. In the next section, we will elaborate further on the theory stipulating positive impact of sustainable practices on demand for sustainable funds, however for the moment, we shall mention that literature has already shed the light on the impact of sustainable practices on the performance of companies as documented by several works. However, other authors in the literature argue that some companies claim to be engaged and committed to ESG standards and responsible behavior, when in fact they are doing so for promotional, social reputation and advertising purposes and this is what we refer to as "greenwashing". (Kaustia & Yu, 2021)

This creates confusion which raises questions about the definition of sustainability and the real ESG profile of a company, and therefore raises investors' concerns about the sustainable investing. However, (Parguel et al., 2011) argue that sustainability ratings from specialized independent agencies may prevent from greenwashing and push firms to persevere in their sustainability practices. They provide experimental evidence that the strong green advertising

of these companies is revealed throughout low rating from external rating specialists, which raises awareness among customers.

The issue with external rating of data providers is the variability in their scoring approaches, in which the perception of materiality is subjective to each agency. Thus, this results in different scores with different weights varying from a data provider to another, creating confusion and lack of consistency in defining the true ESG profile of a company. This could potentially raise concern and questioning from investors. (Escrig-Olmedo et al., 2010)

This lack of transparency is mostly observed in the US, an example of this is the proliferation of green ETFs in the US market to address an increasing demand from investors for environmentally responsible investments, stemming from their concerns about the current state of the climate. These ETFs could be suitable for investors who value responsible investing, to gain exposure to broader markets and benefit from the ETFs advantages and satisfy their ethical preferences. However, the holdings' selection of these ETFs poses concerns and questions about their real sustainable attribute. (D'Ecclesia et al., 2023) investigate this issue and report a poor environmental performance depicted in all the ETFs of their sample ETFs. Similar finding was reported by (Henriques, 2022) in their analysis of 60 mixed energy ETFs. They conclude that these funds exclude the renewable energy ETFs and a great portion of the portfolio to natural gas and oil-based funds.

In a study conducted by (Cremasco & Boni, 2022), the authors report that in 2021, 256 funds were reported by Morningstar Direct for having rebranded their name by incorporating terms related to sustainability such as: ESG, green, Impact or sustainable. This sheds the lights on the greenwashing threats in the Eurozone.

Europe, however, is considered as a leader in sustainability due to its initiatives to strongly contribute to the sustainable development and green transition, and for its regulatory efforts to overcome transparency issues and greenwashing. In March 2021, the European Union adopted the Sustainable Finance Disclosure Regulation (SFDR) to define a proper framework for sustainable investment strategies.

1. *European Union (EU)'s Sustainable Finance Disclosure Regulation (SFDR)*

This regulation aims at increasing transparency and reducing information asymmetry in the investing industry by requiring clear disclosure of positions taken by institutional investors and ensure an alignment with the EU Taxonomy for sustainable activities. (Schütze & Stede, 2024)

In this framework, financial actors required to report on 18 Principles of the Adverse Impact Statement (PAIs) in order to standardize the definition of sustainability and sustainability factors, sustainable investment and sustainable risks. As for individual products, they are obligated to disclose which article of the SFDR – from Article 6 to Article 9 – each of their products complies. (Cremasco & Boni, 2022)

The objective is also to involve finance in sustainable development by deriving its raison d'être from added value from pecuniary to non-pecuniary and engaging it in the green transition and generate a social value.

Article 6 refers to a category of funds who do not have sustainability goals, however, they are obligated to report on sustainability risks. Article 7 refers to a category that puts increased emphasis on enhanced transparency of adverse sustainability impacts at financial product level. Article 8 requires increased and detailed transparency by calling product managers to disclosure on how they achieve ESG performance, and the methodology used to quantify this performance. Finally, Article 9 funds anchor ESG criteria as a central objective that guides their investment selection process. These classifications attempts to make a distinction between financial actors who do not adhere to the sustainability scope and those who intentionally define clear sustainability objectives. (Cremasco & Boni, 2022)

Erreur ! Source du renvoi introuvable. exhibits the articles part of the SFDR regulation.

Despite the effectiveness of the SFDR framework and purpose, literature sheds the lights on some critics addressed to this regulation. Boni et al (2022) criticize the lack of measurement and monitoring consistency of the social and environment contributions of financial actors. They stress the presence of gaps in the framework that defines and measure social impact, the latter involves the achievement of social objectives such as human rights, equality, and non-discrimination. They also argue that the SFDR regulation embeds a comprehensive scope of environmental issues but lacks a well-defined foundation of social impact measurement, creating therefore disagreement and divergence in sustainable finance. Another critic that is addressed to SFDR, is the category fuzziness making it difficult to make a distinction between sustainability meanings in each SFDR category. (Cremasco & Boni, 2022)

6. Demand for sustainable funds

Prior sections enabled us to understand the impact of investor sentiment proxied by several sentiment indicators on investment decisions and asset pricing. The focus of the literature discussed earlier covers mainly conventional assets and funds with a particular interest towards mutual funds. Recently, with the rise of sustainable funds, literature has also shed the light on this type of investments, with few studies trying to verify the impact of investor sentiment on sustainable fund flows.

Before delving deeper into the demand shaped by investor sentiment, we shall investigate one of the reasons for the popularity of sustainable investing. First, sustainable investments have proved to provide an attractive risk-return trade-off, particularly in terms of risk which seems to be lower compared to conventional investments. Therefore, it is relevant to say that the financial motive is one of the underlying reasons for the attractiveness of sustainable investments. For instance, in the case of SRI funds, (Signori, 2020), shed the light on several studies that attributed the outperformance of these investments to a superior performance of ESG-compliant companies, the positive effects of information transparency and the risk-mitigation role of sustainable practices. The latter was also reported by (Naqvi et al., 2022) to be one of the diversification benefits of sustainable investing particularly in the U.S ETFs

market. These findings are consistent with additional literature, such as Links et al. (2017) who emphasizes the outperformance of companies with strong sustainable practices, or (Albuquerque et al., 2019) who argues that companies engaged in Corporate Social responsibility (CSR) policies experience increased profit margins and higher firm value and are consequently less exposed to systematic risk, due to a mechanism of product differentiation.

However, the evidence of the outperformance of sustainable funds compared to conventional funds is nuanced. There is a large debate over this topic in the literature that requires further investigation, as outlined by (Marszk & Lechman, 2024) who provide a set of studies with different findings, from those confirming that sustainable funds do not outperform conventional funds, to those who find no significant difference between them, and finally those who report a higher performance of sustainable funds.

This nuance could be explained by greenwashing which consists of claiming to be engaged in sustainable practices without taking necessary actions to execute the claimed sustainable strategy, or by engaging in controversial actions that are not aligned with it. This problem is mostly prevailing in the U.S according to (Rompotis, 2023). In the first quarter of 2024, Article 9 funds ("dark green" funds) have seen a tremendous acceleration of outflows (Net outflows of almost EUR 4 billion) due after their downgrade from Article 9 classification to Article 8, bringing up the concern about the transparency of these funds and potential greenwashing issues. (Morningstar, 2024)

Another motive behind the growing demand of sustainable investing is their use for effective risk management, particularly climate risk or transition risk by investing in low-carbon or climate funds, as documented by (HROß et al., 2010) (Krueger et al., 2020), (Silvola & Landau, 2021) and (Marszk & Lechman, 2024).

Finally, the demand for sustainable investments could also yield from a regulatory framework that provides guidance on the investment strategy of financial institutions (Silvola & Landau, 2021). Or from institutional pressure as denoted by (Hartzmark & Sussman, 2019), according to whom, external regulation or internal regulation could be the underlying reason for increased exposure to sustainable investments.

Now, turning the non-financial motives, the risk/return trade-off and regulatory requirements are not the only determinants of demand for sustainable investments. Literature has shed the light on several motivations stemming from investors moral perspective and ethics. In fact, some investors make decisions based on their values and principles by assessing what is ethical and what is not. This ethical framework includes personal values, and the perception as well as the definition of ethical activities (Hartzmark & Sussman, 2019), it also involves the ambition to engage in environmentally, socially or ethically responsible activities either to make a change or have an impact, and this is underlying principle of impact funds for instance. Finally, another kind of ethics, which is related to the financial motives described earlier, is the opportunistic ethics, that make use of ethical investments to make pecuniary profit. (Signori, 2020) (Marszk & Lechman, 2024)

Behavioural finance reveals that investment decisions could be biased by heuristics and investors beliefs. Therefore, these ethical motives are also involved in their decision making. If investors experience a feeling of attachment to their values and principles, sentiment could play a crucial role in their investment decisions. Thus, aggregate fund flows shall reflect this sentiment. This rational was evidenced by (N. P. B. Bollen, 2007) who shows that SRI fund flows depict less volatility and are more responsive to lagged positive return compared to conventional funds, this pattern stems from what he refers to as differences in utility function rather than rational learning.

Numerous studies in the literature attempted to assess the magnitude of this sentiment compared to fundamentals. Among these (Riedl & Smeets, 2017) who link demand for Socially Responsible (SRI) funds solely to social preferences. They argue that financial motives do not explain the demand and the interest in these funds. They also explain that socially responsible investors are not constrained by higher management fees and lower returns, as they seek to satisfy their social motives.

(Noman & Naka, 2019) also provide evidence of higher impact exerted by dividend yield as a fundamental measure on sustainable fund flows compared to the consumer sentiment. However, they report that consumer sentiment has enhanced ability to predict flows in periods of increased sentiment and that the latter results in higher activism and consequently higher flows towards Socially Responsible (SRI) funds during periods of optimism.

In addition to the ethical preferences, mood also plays a pivotal role in shaping investors perception of sustainable funds. For instance (Fernandez-Perez et al., 2022) found that sustainable mutual funds attract greater inflows when investors' mood is declining, using the onset and recovery metric that measures monthly percentage of seasonally depressed individuals experiencing symptoms of depression as a proxy for mood. According to them, this behaviour depicts their risk aversion nature in periods of downturn, because investors perceive sustainable funds as safe investments when experiencing a feeling of fear.

Moreover, regulation has also proved to influence investors decision to allocate more money to sustainable funds. (Becker et al., 2022) show that introducing the new SFDR sustainability labels on mutual funds, resulted in increased inflows towards funds with labels compared to unrated ones. This does not stem necessarily from a genuine interest in the degree of ESG integration, but rather from investors' attention to a rating that seem to encompass this information as confirmed by (Guercio & Tkac, 2008) in the case of conventional funds. Investors seem to pay more attention to ESG ratings and score of rating agencies rather than the ones required by the ESG regulations as explained by (Ferriani, 2023).

The similarity of these studies, however, is their focus on ratings (e.g. Morningstar ratings) as a sustainability attribute. To our knowledge, most of the studies conducted on sustainable funds using SFDR labelling aimed at analysing investor behaviour after the introduction the SFDR rating. Few studies have deepened their analysis to verify whether the SFDR rating alone is sufficient to explain the pattern of fund flows.

Studying fund flows is therefore useful in examining and making conclusions about investor preferences, in order to see if nowadays sustainability is incorporated as an attribute in the decision-making process.

7. Growth in sustainable funds

According to the latest Morningstar report about Global Sustainable Fund Flows, the global universe of sustainable funds including open-end mutual funds and Exchange Traded Funds (ETFs) attracted USD 900 million of inflows in the first quarter of 2024, reflecting strong interest in sustainable investing.

Europe is considered as the leader in sustainability. In the first quarter of 2024, the European fund industry attracted inflows of USD 10.9 billion, and its market share in the sustainable funds' market reached 73%. Europe was also home of 84% of assets within sustainable funds landscape's total assets as reported **Erreur ! Source du renvoi introuvable.** (Morningstar, 2024)

Globally, sustainable funds refer to funds that claim to have engagements in sustainability or in ESG (Environmental, Social, Governance) topics, they also include impact funds.

Climate is the most popular topic, despite broad sustainable and ESG products remaining at the top of the products. Topics include climate transition, namely reduction of carbon emission and carbon intensity, they also cover topics such as investment in clean energies, mitigation of socioeconomic impacts of climate change, and responsible production.

From a performance point of view, 2023 was a year of economic uncertainty, regulatory changes including changes in sustainability classifications of many funds. These concerns translated in outflows by end 2023, reaching the lowest level since early 2021 and surprisingly in more inflows towards conventional funds (Reuters, 2023)

Looking at **Erreur ! Source du renvoi introuvable.**, we see that end 2023 and the first quarter of 2024 exhibit a different trend compared to the sustainability boom witnessed in 2021. First, sustainable equity funds attract more outflows compared to sustainable bonds that seem to attract more inflows (+244% compared to Q4'2023) despite the higher for longer climate. Second, we see a discernible decrease in investor appetite for ESG and sustainable funds. Third, the last quarter of 2023 and the first quarter of 2024 have witnessed the lowest number of sustainable products' launches compared to previous years.

In the Q1'24 Morningstar report, this slowdown could be explained by the though macroeconomic backdrop, inflation, uncertainty regarding rate cuts, and dominant concerns about recession in 2023. Another explanation is underperformance of sustainable strategies that prioritize renewable energies. These companies suffered supply chain disruptions and financial and materials inflation. (Morningstar, 2024)

Additionally, investors are recognizing that the popular sustainability tactics in 2022 are mostly thematic strategies than genuine sustainable strategies. This was exhibited in their overweighting of technology sectors and underweighting of renewable energies. Therefore,

investors are reallocating their funds from these thematic investments and shifting away from underperforming sectors.

Moreover, the slowdown in product development is mainly attributed to asset managers being more careful about their claims, after several greenwashing accusations and the uncertainty in the regulatory landscape on the future of SFDR classifications. (Morningstar, 2024)

8. Conclusion

Our literature review enabled us to gain a better understanding of the notion of investor sentiment as a determinant of asset prices, namely funds, on top of fundamental factors. We have seen the major measures of investor sentiment and different previous academic findings of the relationship between them and fund flows. Moreover, we have gained understanding of the key differences between ETFs and mutual funds, this will allow us to construct our hypothesis later.

Additionally, we have gained better understanding of sustainable investing, ESG standards and the SFDR regulation in Europe and how it prevents from greenwashing, as well as the different critics addressed to the regulation in the literature. On top of that, we have addressed recent literature addressing the topic of sustainable fund flows or sustainable flows of ETFs and concluded with an overview of some key number in the European fund industry with a particular focus on sustainability, in order to understand its overall dynamics and gain better understanding of what we have seen earlier in previous academic works.

II. Hypotheses

The literature has already shed light on investor sentiment and fund flows, with very few studies comparing ETFS flows with mutual fund flows. In addition, the literature has evolved to analyse decision-making using the flows of sustainable funds to explain whether sustainability information is incorporated into decision making beyond fundamentals.

It is undisputable that there is a growing interest towards sustainability. Asset managers offer a plethora of investment products aligned with investor preferences in terms of risk-return trade-off and in terms of sustainability themes including ETFs and mutual funds.

Literature provided empirical evidence that funds with high or improving sustainability rating gather large inflows. It is then important to verify if this is due to a genuine interest in sustainability that makes investors shift towards sustainable funds.

In line with Warther (1995), Del Guercio and Tkac (2002), Ben-Raphael et al. (2012) and other authors, about the solid influence of information on fund flows. We will first focus on the analysis of fund flows using the information hypothesis to examine the impact of investor sentiment on flows irrespective of their SFDR classification and their fund type, whether it is an ETFs or a mutual fund. This will be done by testing our first hypothesis:

> Hypothesis 1: Investor sentiment has a significant impact on fund flows.

This hypothesis posits a direct relationship between investor sentiment and fund flows, reflecting the impact of investor perceptions, attitudes, and emotions on investment decisions.

Second, to deepen our study and shift our focus towards sustainability, we will another hypothesis to verify if Exchange Traded funds are impacted by investor sentiment similar to mutual funds, given the major differences between the two types of funds. In addition to the separation between ETFs and mutual funds, we would like to see within each fund type whether fund flows react differently to sustainability.

We expect fund flows to respond differently to different fund types and sustainability classifications. First, the mutual fund flows literature has put a strong emphasis on the information hypothesis. (Warther, 1995) (Jank, 2012) (Ben-Rephael et al., 2012) (Kopsch et al., 2015)

However, there is more evidence that flows of ETFs depict a feedback-trader behaviour (Chau et al., 2011). This is also consistent with Kallinterakis & Kaur (2010) who find that the ETF market attract more uninformed private investors driven by trend-chasing behaviour. Therefore, we formulate our hypothesis as follows:

> Hypothesis 2: Investor sentiment affects fund categories and SFDR classifications differently.
>
> H2a: Investor sentiment impacts ETFs and mutual funds differently
>
> H2b: Investor sentiment affects conventional and sustainable funds differently.

Finally, we will shift our focus to sustainability to look more closely at the impact on conventional and sustainable funds. Based on literature from (Hartzmark & Sussman, 2019), (Becker et al., 2022), which provide evidence on the sensitivity of fund flows to sustainability, including regulation and ratings, we will examine whether investor sentiment has a greater impact on sustainable funds compared to conventional funds. Finally, we will assess the magnitude of this impact to see whether sentiment is triggered by sustainability as an attribute in the decision-making process by testing the following hypothesis:

> Hypothesis 3: Sustainable funds are more sensitive to investor sentiment than conventional funds.

To do this, we will apply the same regression equation to examine the relationship between fund flows and some variables depicting investor sentiment that we have identified in the literature, including market-based and survey-based measures. We therefore expect to have a stronger reaction from funds classified in Article 8 category, as confirmed by previous work that rather focused on the introduction of sustainability ratings and the SFDR regulation.

Amman et al. (2019) provide robust evidence of a strong impact of the publication of Morningstar sustainability ratings on fund flows, in particular from retail investors' side, whereas institutional investors do not exhibit a strong reaction to this piece of information. These results were derived from a regression analysis using a sample of funds that received a rating, and another sample of unrated funds, after the publication of the Morningstar sustainability rating in March 2016. These findings provide a new type of information incorporated into investors decision-making process.

Our expectations are inspired from existing evidence about sustainability-flow relationship and investors' propensity to react to sustainability information contained in ratings easy to read and easy to understand such as the Morningstar sustainability rating that enables them to bring more clarity to the concept of sustainability.

Moreover, we contribute to existing literature about fund flows by making focusing on both ETFs and mutual funds.

III. Data and model

This study is conducted using two samples of 104 funds, including fifty-two exchange traded funds (ETFs) and fifty-two open-end mutual funds to investigate the impact of investor sentiment on fund flows. In 2022, ETFs aligned with environmental, social and governance standards represented 65% of all net inflows into European ETFs in 2022. [7]

Since the fourth quarter of 2023, the actively managed funds universe witnessed a wave of outflows. However, passive funds (ETFs) seemed to keep the same level of flows than their counterparts. This disparity depicts investors growing preference towards passive strategies, putting emphasis on cost efficiency and exposure to market beta.

More globally, during the same period, ESG ETFs in Europe represented 18.8% of total assets. Parallelly, in the U.S. ESG related ETFs were only around 1% and total outflows totaled more than USD 8.8 billion (Morningstar, 2024). This slow momentum is due to the greenwashing fears driving investors to enter an anti-ESG movement in the US against the so-called "Woke Capitalism". In parallel, Europe represents home for sustainable investments, and ETFs offer to investors an opportunity to diversify their portfolios while gaining exposure to these investments in a flexible and cost-effective way. On the other hand, on top of ESG momentum, the regulatory environment in Europe has a significant role in fostering the growth of sustainable investments.

The Sustainable Finance Disclosure Regulation is one of these regulations. Its implementation enabled more transparency regarding the sustainability objectives and commitment of the funds. On the micro level, it has shed the light on the companies ESG policies and footprint. Moreover, despite the persistence of greenwashing concerns related to Labels and ESG ratings SFDR remains a solid framework that provides investors with more transparent information to make decisions about sustainable and responsible investing.

The SFDR has also proved to have an impact on the individual investors' behavior, and this is because investors are incentivized to invest in sustainable funds when they are informed about the sustainability of this funds (Hartzmark and Sussmann, 2019). Consequently, and according to the literature, the disclosure of the fund's category of SFDR (Article 6, Article 8, or Article9) is supposed to have an impact on the final investor's decision, which will have a direct impact on funds flows, as proved by (Alda, 2020; El Ghoul and Karoui, 2020 and Huang at al. 2020).

We therefore choose SFDR a robust criterion for our funds selection because it promotes transparency thanks to its standardized disclosure that prevents greenwashing and offers investors pertinent information about the degree of sustainability of financial products.

1. Methodology

To conduct our study, we used Bloomberg Terminal to retrieve data regarding our funds. We first constructed lists of raw data using the Fund Screening function (FSRC). The obtained list fulfils the following criteria that we have carefully specified in the filtering fields

First of all, we choose ETF as fund type to make sure that our dataset is solely made of ETFs. Moreover, we selected "Equity" in the Fund's asset Class Focus, in order to have the same pattern of fund flows and avoid unexpected results coming from fund flows movements linked with other asset classes. Literature provides an empirical proof that stocks, bonds, and gold returns are linked with flows into its fund's asset class. (Watcher 1995)

We have also specified Western Europe, Eurozone, European Union, European Region in Domicile and Fund Geographical Focus, and this is to neutralize the idiosyncratic impact of other economies on funds flows. Also, this was to make sure that funds are SFDR compliant, since all European funds fall under the SFDR perimeter and are all required to adhere to it.

Inspired from Amman et al. (2019) and Becker et al (2023) methodology, To avoid any potential bias stemming from the fund's age on fund flows and to make sure that selected funds' have the same quality of information regarding their sustainability engagement, we set "Inception Date before 2018" as a condition of every fund's inception data. This is because our study will extend from December 2018 to December 2023. We therefore aim to reduce the variability in fund age, in alignment with empirical proof provided earlier in the literature on the fund age as a determinant of fund flows. Chevalier and Ellison (1997), Huang et al. (2007), Morey (2019).

Finally, the last requirement was the disclosure of SFDR classification. This served us to assign each classification to the category of funds that we will make the object of this study: conventional funds and sustainable funds. We therefore included "Article 6", "Article 8" and "Article 9" in the SFDR classification field on Bloomberg.

As for the funds' size, the FSRC function has a "Total Assets" field in which we are supposed to select the desired funds' total assets. However, our attempts to select random total assets yielded in limited number of funds and since our objective is to have enough population to analyse, preferred not to include any specific condition and that field and decided to control for it later in the matching procedure.

To differentiate between ETFs and mutual funds, we used to FSRC feature of fund type, where we specified "ETF" for ETFs and "Open-end funds" for mutual funds. We also added a field of "Fund is actively managed".

Overall, his selection process enabled us to identify 84 ETFs composed of 47 funds classified as Article 6 and 37 funds classified as Article 8. For mutual funds, the selection yielded in 116 open-end mutual funds including 55 funds classified as Article 6 and 61 funds classified as Article 8 and Article 9, after having conducted some manual changes on the resulting sample, like removing funds issued in Switzerland, the UK or other European countries outside the European Union and that do not adhere to the SFDR regulation. However, we were limited in researching funds' costs and potential fees. Bloomberg enabled us to display annual operating

ratios for ETFs, but we did not have access to fees for Mutual Funds as these encompass front-end load fees, back-end load fees and management fees, that required an advanced feature provided by Morningstar only for specific licenses, and to which we did not have access. Therefore, we did not include this attribute in our selection.

Baker and Wurgler (2006) provided evidence that fund size and age both an impact on fund flows. Therefore, to obtain harmonized samples across conventional ETFs and sustainable ETFs, and conventional mutual funds and sustainable mutual funds, and overcome any unbalance stemming from differences in these two attributes, we trained Python Software to iteratively remove outliers in these samples until the difference between the means of size and age respectively become not statistically significant for each fund category, the objective is to have matching variables between conventional funds and sustainable funds. This was processed by calculating the first and third quartiles of the samples and determining the lower and upper bounds for outliers, this enabled us to filter data to find outliers and remove them consequently. This operation was iterated three times, and the outcome was two samples of 26 funds each in each category (ETFs and mutual funds). We conducted a t-test for means and variances to check if there is still a significant difference of the size and age between conventional funds and sustainable funds. As shown in **Erreur ! Source du renvoi introuvable.**, **Erreur ! Source du renvoi introuvable.**, **Erreur ! Source du renvoi introuvable.**, and **Erreur ! Source du renvoi introuvable.**, the results yielded in p-values superior to 5% for the two tests confirming that our samples of conventional funds and sustainable funds (for each category) have matched characteristics and that the difference is not significant anymore.

It is also worth noting that our matching procedure especially on mutual funds, yielded solely in Article 8 funds in the sustainable category, article 9 funds were automatically removed because they did not match our treatment criteria in terms of size.

The aim of this thesis is to study whether investor sentiment impacts fund flows, and if the impact is different across ETFs and mutual funds and across sustainable funds and conventional funds.

As for sustainability, at the light of our literature review, we decided to define the SFDR categories as the main criteria to determine if an ETF and mutual fund are conventional or sustainable, because the perimeter defined by the SFDR regulation is clear at distinguishing members that adopt sustainability objectives from those that do not.(Cremasco & Boni, 2022). Thus, ETFs and mutual funds classified as Article 8 are referred to as sustainable funds and those classified as Article 6 are referred to as conventional funds.

The matching procedure that we have initiated earlier enabled us to organize our data in panel form. Therefore, we will be able perform panel data regressions using Python Software. Before running our regression, we first normalized and scaled our data including the dependent variable and the independent variables, to avoid potential deficiencies of least squares regression, given that the latter is very sensitive to unusual observations. We also followed Amman et al. (2019) methodology to mitigate the impact of extreme value by winsorizing fund flows at the 1% and 99% levels.

The following independent variables (VIX, ESI, EUROSTOXX PUT/CALLRATIO, SENTIX, GPR, Cost of borrowing corporations, German Bund, Consumer Confidence Index, inflation expectations in Eurozone) serve as a proxy for investor sentiment, as provided in the literature. Every indicator exhibits a specific feeling. VIX is mainly used to gauge investors' sentiment of fear, European Economic Sentiment Indicator (ESI), Inflation expectations in Eurozone (ZEW) and the Consumer Confidence Index (CCI) of the OECD are used to provide an idea about economical outlooks based on the GDP growth expectations and households expectations regarding the general financial situation, inflation and unemployment outlook. Sentix leans more towards investor sentiment on financial markets. While cost of borrowing corporations and German Bund provide an idea about the inflation pattern and the cost of leverage and its impact on firms valuation and their financing capacity, as well as potential changes in monetary policy. This information combined gives an insight about the overall economic situation and the sentiment that it creates on the market.

Since we will assess the impact of this sentiment on fund flows, we will calculate monthly net flows from December 2018 to December 2023. This measure inspired from Sirri and Tufano (1998) defines fund flows as monthly total net assets at the end of the month reduced by the monthly returns as a percentage of total net assets at the beginning of the previous month.

$$Flowi, t = \frac{\mathrm{TNAi,t} - \mathrm{TNAi,t-1(1 + Ri,t)}}{\mathrm{TNAi,t-1}}$$

To avoid any potential multicollinearity later in the procedure. We will establish a correlation matrix between the dependent variable and independent variables. This will enable us to remove variables with less influence and that are highly correlated with other variables. We also seek to avoid any potential redundancy in the information provided by these indicators.

Finally, we will use panel data regression for our hypothesis testing, in the aim of answering our research question. Therefore, we will use several regression models to see if there is one that provides the most evidence to confirm or reject our hypotheses.

On top of that, we will also use a chi-square test in case one of our regression models does not have enough explanatory power. The use of this test is simply to corroborate our findings and is only complementary to our analysis in order to understand how our variables are associated with fund flows.

All these models will be developed in detail later in the section providing further insights about how the objective of each one.

1. Geopolitical Risk Index GPR

GPR is a measure that was developed by Dario Caldara and Matteo Iacoviello. Its purpose is to reflect the importance of risks related to adverse geopolitical events, based on text-search results of 10 newspapers: Chicago Tribune, the Daily Telegraph, Financial Times, The Globe and Mail, The Guardian, the Los Angeles Times, The New York Times, USA Today, The Wall Street Journal and the Washington Post. The index calculated the share of article about geopolitical events from the total new articles. The GPR also serves to assess the impact of these events on

the economy. The geopolitical risk (GPR) index has seen historical highs during the two world wars, at the beginning of the Korean War, during the Cuban Missile Crisis, and after 9/11.

The searching process is split into eight categories: War Threats (Category 1), Peace Threats (Category 2), Military Buildups (Category 3), Nuclear Threats (Category 4), Terror Threats (Category 5), Beginning of War (Category 6), Escalation of War (Category 7), Terror Acts (Category 8). Based on the search groups above, Caldara and Iacoviello also construct two subindexes. The Geopolitical Threats (GPRT) includes words belonging to categories 1 to 5 above. The Geopolitical Acts (GPRA) index includes words belonging to categories 6 to 8. In this study, we will be interested in Geopolitical Threat (GPRT Indicator), as we expect it to have more impact on the market.

Literature has shown that geopolitical events could have a negative impact on investor sentiment that is more responsive to domestic events (He, 2023). The data related to GPR was retrieved from the Iacoviello and Caldara website, we have then filtered on the period in which we are interested (from December 2018 to December 2023) as depicted in **Erreur ! Source du renvoi introuvable.**.

2. Sentix

The sentix economic Index is basically a leading economic indicator that can be used to forecast the development of a country's or region's gross domestic product. In addition, it is also an instrument for a better understanding of the financial markets as it proxies for the global market sentiment. **Erreur ! Source du renvoi introuvable.** provides an overview of the Sentix movements over our study period.

The sentix economic Index is a forecasting measure of GDP, it is also used to assess the state of financial markets since it is based on surveys of over 5500 private and institutional investors. These surveys encompass two main categories of questions, the first one is a situation assessment, and the second one revolves around economic expectations.

In general, Sentix indicator has two types of values negative one refer to periods of “Bear Market”; and Positive values proxying for “Bull Market”. For our study, we retrieved data covering the time period from December 2018 to December 2023 from the Sentix survey official website. (*Sentix Data*, 2024)

3. Cost of borrowing corporations, German Bund

Literature has already shed the light the relationship between borrowing rates (Kopsch et al., 2015), T-Bill rates, and fund flows, demonstrating that this relationship translates in more inflows towards equity funds when these indicators increase and indicate negative sentiment during risky times (Jank, 2012) . Therefore, we chose the German Bund, the equivalent of the T-bill rate in Europe since we are focusing on European funds from December 2018 to December 2023. The related data was retrieved from the Bloomberg Terminal. As for the cost of borrowing data, it was retrieved from the ECB website. We also provide in **Erreur ! Source du renvoi introuvable.** an overview of the evolution of the 10-year German Bond and in **Erreur ! Source du renvoi introuvable.** the evolution of the cost of borrowing of corporations over our study period.

4. VIX

The Chicago Board Options Exchange Volatility Index, or VIX, is an index that measures investors' expectations for the next 30 days regarding volatility in the U.S. stock market. The Index is formed based the following inputs: near and next terms options as well as their variance, and interest rates.

30 is a high level of VIX and it indicates risky times and increased volatility. See **Erreur ! Source du renvoi introuvable.** Historically, the average long-run average has been around 21. VIX is very representative of investor sentiment, as it was used in numerous works proving that it has an inverse relationship with fund flows (Ben Raphael et a. 2012)

The VIX data was retrieved from the CBOE website and covers the study period extending from December 2018 to December 2023.

5. Economic Sentiment Index (ESI)

The Economic Sentiment Index is an economic leading indicator produced by the Directorate General for Economic and Financial Affairs (DG ECFIN) of the European Commission and is published monthly. Its objective is to track GDP growth at Member states, EU and euro area levels. Published monthly by the European commission. The indicator is made up of five sectoral confidence indicators with different weights. The sectors covered are industry (weight 40 %), services (30 %), consumers (20 %), retail (5 %) and construction (5 %). Balances are constructed as the difference between the percentages of respondents giving positive and negative replies. EU and euro-area aggregates are calculated on the basis of the national results and seasonally adjusted.

The ESI is scaled to a long-term mean of 100 and a standard deviation of 10. See **Erreur ! Source du renvoi introuvable.** Thus, values above 100 indicate above-average economic sentiment and vice versa. For this study, we have retrieved monthly data from December 2018 to December 2023 from Eurostat website.

6. Eurostoxx put/call ratio

Eurostoxx put/call ratio is the European equivalent of its American peer the PCR that based on data collected by the CBOE, which is also an indicator of investor sentiment that is produced on the basis of options trading volumes or on the basis of options contracts on a given day or period. See **Erreur ! Source du renvoi introuvable.**

A ratio below 1 means that traders are buying more call options, suggesting an optimistic trend. Conversely a ratio above 1 indicates a weaker market. A value of 0.8 is considered as "normal" or "neutral". Many academics see PCR as a good indicator of investor sentiment. According to Oyster (1997) the best way to assess investor sentiment is by monitoring put/call ratios. Arbeter (2007) and Oyster (1997) both found evidence that when the put/call ratio increases, chances are high that the market drops afterwards.

7. Consumer Confidence Index

This consumer confidence indicator provides an indication of future developments of households' consumption and saving, based upon answers regarding their expected financial situation, their sentiment about the general economic situation, unemployment and capability of savings.

An indicator above 100 signals a boost in the consumers' confidence towards the future economic situation, because of which they are less prone to save, and more inclined to spend money on major purchases in the next 12 months.

Values below 100 indicate a pessimistic attitude towards future developments in the economy, possibly resulting in a tendency to save more and consume less.

8. ZEW Eurozone Inflation Expectations

The ZEW Indicator of Economic Sentiment, which has established itself as an early indicator since December 1991 of economic development ("ZEW Index"), is calculated from the expectations of financial market experts on the development of the economic situation in Germany. Participants are asked monthly about their expectations concerning the development of major international economies, including Germany, the eurozone, the United States and China. In total, the panel consists of about 350 financial analysts from banks, insurance companies and selected corporations, specifically from the finance, research, and economics departments as well as the investment and securities departments. Most of the participants are from Germany.

The financial experts are asked about their expectations on a six-month horizon regarding the development of the economy, the inflation rate, short- and long-term interest rates, equity prices and exchange rates. In addition, they are asked to assess the earnings situation in 13 German sectors. Besides a fixed survey section, special questions on current topics are included on a regular basis.

The table below summarizes our indicators and control variables with the code that we assign to each one of them in order to make our results visually comprehensible.

Table 1: Variable Coding Scheme

Variable	Code
Indicator of sentiment	
Sentix	SENTIX
Cost of borrowing corporations	CB
Germany 10 Year Government Bond	10Y DE
CBOE Volatility Index VIX	VIX
Economic Sentiment Index	ESI
Put/Call ratio Euro Stoxx 50 Optionen	PCR
Eurozone Inflation Expectations	ZEW
Consumer Confidence Index	CCI
Control Matrix	

Historical Monthly Return	X1
30-Day Volatility	X2

2. Descriptive Statistics

Table 2: Statistics of ETFs and Mutual Funds main characteristics

Matching Fund characteristics	Mean	Standard-error	Median	Standard-deviation	Variance
ETFs					
Age ETFs Article 6	12,84615	0,78973	14	4,02683	16,21538
Age ETFs Article 8	12,76923	0,69793	12	3,55874	12,66462
Log Size ETF Article 6	2,15880	0,09798	2,23374	0,49960	0,24960
Log Size ETF Article 8	2,07844	0,10971	2,12779	0,55940	0,31293
Mutual Funds					
MF Article 6	22,30769	1,07670	24	5,49013	30,14154
MF Article 8	22,11538	1,43294	24	7,30658	53,38615
Log Size MF Article 6	2,05216	0,07803	2,04131	0,39789	0,15831
Log Size MF Article 8	2,26390	0,04127	2,27200	0,21042	0,04428

Table 2 – reports the results of ETFs and mutual funds (separately) major attributes, in our case, age and size. Inspired from Amman et al, we avoid any bias from inadequate comparison and improves parametric statistical models. (Amman et al. 2019).

The matching procedure initiated earlier, yielded in similar characteristics. For ETFs, we observe a similar age and similar size for conventional funds as well as for sustainable funds. However, we also observe some differences in the variability of these attributes, as depicted by the variance of each sub-sample (conventional funds vs sustainable funds) in each sample (ETF vs Mutual funds). In the case for ETFs, for instance, conventional ETFs, depict higher variance compared to sustainable ETFs. This is explained by the fact that some conventional ETFs (6 identified) are older than the rest of the sample. AMUNDI DAX III-ETF ACC (LYXDAX GR), AMUNDI IBEX 35 UCITS ETF (LYXIB SM), BBVA-ACCION DJ EURO STOXX 50 (BBVAE SM), AM LEVDAX DAILY 2X LEV-ETF A (LYXLEDAX), BBVA-ACCION IBEX 35 ETF (BBVAI), X FTSE MIB 1D (XMIB GR). These ETFs are 17 years old. This is one of the limitations observed in our sample, since most of the conventional ETFs retrieved were much older compared to Article 8 ETFs. We assume that this is related to the fact that sustainable ETFs are in average younger in age than conventional ETFs because they are likely to attain a higher SFDR classification. (Lindemann, 2023)

Table 3: ETFs and Funds' Flows statistics

Fund Flows statistics	Mean	Median	Minimum	Maximum
ETFs				
ETF Article 6	0,11061	-0,00031	-0,23177	13,20916
ETFs Article 8	-0,00129	-0,00039	-0,08869	0,04086
Mutual Funds				
Mutual Funds Article 6	-0,00177	0,01074	-0,40535	0,21504
Mutual Funds Article 8	-0,00174	0,00822	-0,34978	0,21912

Regarding the descriptive statistics related to fund flows. On the ETFs side, we observe a large difference between Net Flows of conventional ETFs and sustainable ETFs. Sustainable ETFs seem to suffer large outflows, compared to conventional ETFs, which seem to gather more inflows. This suggesting higher variability in Net Flows of sustainable ETFs. We also observe a higher standard-deviation of returns of conventional ETFs compared the standard-deviation of returns of sustainable ETFs. We therefore assume that the disparity across flows is due to volatile returns, in consistency with Sirri and Tufano (1998) findings, suggesting that funds with high volatility attract less inflows.

We also observe that the monthly return of conventional funds is up to 1.03% compared with a return of 0.9% of sustainable funds, and their respective standard-deviation are respectively: 5.7% and 7.1%. There are numerous factors explaining this variability in flows and returns for ETFs. First, following (Chau et al., 2011), investors might chase returns and if conventional funds offer higher returns, this results in higher inflows towards them. Second, we suppose that some ETFs might include clean energy stocks. It is important to keep in mind that the clean and renewable energy market have been witnessing strong headwinds since 2020, due to increasing inflation, spiking interest rates and supply chain disruption, affecting therefore its performance. According to Morningstar the sector equity alternative energy funds (which also includes ETFs) posted an average return of -11% in 2022 and -10.5% in 2023 respectively.[8]

For mutual funds, we observe a very slight indifference, almost negligible between conventional funds and sustainable funds. The variability of the sub-samples is also similar in terms of minimum values and maximum values, indicating at first sight that these funds might be impacted similarly by macroeconomic events. It is worth to note that in recent years have been characterized by a climate of downturn and the active universe has been witnessing large outflows compared to the passive universe. (Morningstar)

It is important to note that these descriptive statistics are not standardized yet, and for our regression analysis we will proceed to the standardization of Net Flows to ensure that our results are not distorted by extreme values.

Overall, these statistics enable us to have a first sight of the movement of flows of ETFs and mutual fund flows and draw a first understanding of their relationship with control variables and independent variables.

[8] https://www.morningstar.co.uk/uk/news/248370/clean-energy-is-the-future-so-why-have-investors-struggled.aspx

3. Control matrix

As outlined in literature, return and the fund's volatility exert significant impact on fund flows. Therefore, we will introduce them as variables of control into our model for both ETFs and mutual funds, irrespective of their SFDR classification. This aims at isolating the specific effect of our independent variables by mitigating their potential bias arising from control variables on our regression analysis.

Following (Warther, 1995) method, the correlation between past returns and flows, suggests that it would be more accurate to lag the returns by one month. This reflects the relationship between returns and fund flows, in line with the feedback-trader hypothesis, in which inflows and outflows depict investors' reaction to positive returns respectively. Moreover, as emphasized by (Amman et al., 2017), (Huang et al., 2022) and (Becker et al., 2022), investors react to funds encompassing sustainability information throughout labels, and since SFDR is supposed to provide increased transparency about the sustainability level of the fund, this results in increased inflows, consequently this could result in price pressure mechanism enhancing the performance of the fund, this was namely demonstrated in the case of sustainable funds by (Van der Beck, 2021), who provides evidence of price pressure of flows on ESG funds realized return and their expected returns going forward.

As for fund's volatility, like return, it is an attribute that should be controlled for, not only for its correlation with returns, but also due its impact on fund flows. This is in line with (Wang et al., 2021) work, in which funds flows exhibit a negative correlations with past fund volatility. In fact, they also indirectly account for the correlation between returns and fund's volatility, since they found that timing for volatility in investment decisions leads to increased returns. The impact on fund flows suggest therefore that investor's behaviour is driven by this consideration.

Finally, for the same reason that investors react to past information, we also lag other variables by one month. This control matrix is included in our regression model regardless of the sample we test and will enable us to derive conclusions about the impact stemming from investor sentiment and its magnitude, for our two hypotheses.

4. Correlation matrix

We construct a correlation matrix to circumvent multicollinearity issues that would potentially impede our regression model. **Erreur ! Source du renvoi introuvable.** provides the results of our analysis, which gives us an idea about the correlation between the independent variables. Inspired from (Fox et al., 2023), we define a threshold of 80% proxying for strong correlation for our variables. Therefore, variables with correlation ratios below this threshold do not posit potential issues of multicollinearity.

We observe a strong positive correlation of 88.82% between 10Y DE and CBC, indicating a strong relationship between the two variables. This is not surprising because the cost of borrowing and the German bond yield generally react in the same direction as a response to monetary policy changes. For instance, during inflation, bond yields increase, as well as interest rates, making therefore cost of financing expensive.

VIX and PCR also depict a strong correlation of 96.3%, because their both movements are based options. Therefore, they will both naturally capture the prevailing market sentiment.

Based on these correlations, we therefore opted to keep 10-Y DE and VIX and to remove CBC and PCR, simply because literature offers a wide array of works using these measures, and the underlying literature of our work incorporates them more frequently, making us better informed about them.

5. Regression model

To test our hypotheses, we will run the following regression model, including ETFs and mutual funds, and all the SFDR categories (Article 6 and Article 8). **$\boldsymbol{\theta x_{i,t-1}}$ is out control matrix incorporating the control variables X1 and X2.**

$$Net\ Flow_{i,t} = \beta_0 + \beta_1 SENTIX_{t-1} + \beta_2 10YDE_{t-1} + \beta_3 ESI_{t-1} + \beta_4 VIX_{t-1} + \beta_5 ZEW_{t-1} + \beta_6 CCI_{t-1} + \theta x_{i,t-1} + \varepsilon_i \quad (1.1)$$

In this comprehensive regression, we attempt to test our first hypothesis **(Hypothesis 1: Investor sentiment has a significant impact on fund flows)** to see if investor sentiment exerts a statistically significant impact on fund flows, regardless of the fund type and SFDR category.

In this model, we account for six independent variables. Each one is included in consistency with the empirical evidence provided by the literature about its implication with the movement of fund flows. “SENTIX”, “ESI”, and “CCI” are considered pure sentiment indices, primarily focused on capturing market sentiment throughout a survey-based approach. “VIX”, “ZEW” and “10Y DE” are categorized as indirect measures of investor sentiment because they proxy for the overall state of market and the level of riskiness as outlined in the literature. We also incorporate the control matrix that we have constructed earlier including the historical monthly return “X1” and the 30D volatility of the fund “X2”. To test the second hypothesis:

Hypothesis 2 (Investor sentiment affects fund categories and SFDR classifications differently), we will run the same model (1.1) to examine the impact of investor sentiment on fund flows on two separate samples (1) ETFs and (2) Mutual funds.

1. A sample of Exchange Traded Funds split into sub-samples, a first one of conventional funds classified as Article 6 and a second one of sustainable funds classified as Article 8.
2. A sample of open-end mutual funds split into sub-samples, a first one of conventional funds classified as Article 6 and a second one of sustainable funds classified as Article 8.

This separation aims at discerning potential disparities in the impact of investor sentiment on fund flows of ETFs and fund flows of mutual funds to test the hypothesis **H2a (Investor sentiment impacts ETFs and mutual funds differently)**, and on conventional funds and

sustainable funds within each fund category to test the hypothesis **H2b (Investor sentiment affects conventional and sustainable funds differently)**.

Subsequently, to shift our focus on sustainability we will introduce a binary variable on the two samples. When separating our samples, we have one grouping ETFs, and the second one encompassing mutual funds. The binary variable serves as categorical indicator delineating between conventional and sustainable funds, based on the SFDR classification. We will compare this model with the previous one used to test H2b and retain the one that answers best our question.

The regression model including a dummy variable will be as follows:

$$Net\ Flow_{i,t} = \beta_0 + \beta_1 SENTIX_{t-1} + \beta_2 10YDE_{t-1} + \beta_3 ESI_{t-1} + \beta_4 VIX_{t-1} + \beta_5 ZEW_{t-1} + \beta_6 CCI_{t-1} + + \beta_7 Sustainable_i + \theta x_{i,t-1} + \varepsilon_i \quad (1.2)$$

Where $Sustainable_i$ equals one when the fund is classified under Article 8 category and 0 when it is not.

To provide more accurate answers to our hypotheses, we will also examine the magnitude of the impact exerted by investor sentiment on fund flows using the coefficients of equation (1.1). On the basis of the results of the magnitude test and the regression test of equation (1.2), we will be able to confirm or reject **Hypothesis 3 (Sustainable funds are more sensitive to investor sentiment than conventional funds)**.

6. Inference test

To overcome the potential limits that could potentially stem from our regression model in drawing our conclusions. We will also perform the Chi-square hypothesis test of independence on SPSS Software. This method inspired from (Fortune, 1998) aims at investigating if there is a dependence between fund flows and our set of indicators, only in case regression results do not present sufficient causality between variables in testing one of our main hypotheses. Therefore, this inference test is only complementary to our regression results.

At the light of the regression results on the ETFs sample, it is difficult to draw conclusive findings from the model used, as our model yields in a weak R^2 (we will provide more details later in the results' section), and we seek to confirm our regression results to be able to confirm or reject our hypothesis instead of providing partial answer.

We will therefore explore hypothesis testing as an alternative to investigate the relationship between Net Flows and our measures of investor sentiment. In this context, the chi-square test is a suitable test that will allow us to assess the independence between them and potential relationships that the regression model might not capture earlier.

For this matter, we will construct our hypotheses as follows:

H0: Net Flows and Sentiment are independent.

H1: Net Flows and Sentiment are not independent.

These hypotheses will be tested on the ETF sample (conventional and sustainable), for each sentiment indicator separately since the chi-square test only enables us to test the independence between two variables. For this same reason, we will not include the control variables that we have introduced earlier in our regression model, since we do not test the relationship using multiple variables and controlling for some. The test will be conducted every time between Net Flows and five other variables including: "SENTIX", "GPR", "10Y DE", "ESI", "ZEW", "CCI".

We will therefore transform our data as follows:

- For Net Flows, negative flows will be categorized as "Outflows", whereas positive one will be categorized as "Inflows".
- Sentix Indicator exhibits two types of values. Negative values proxying pessimistic sentiment during "Bear Market"; therefore they will be transformed into categorical values of "Bear Market". Positive values proxying for optimistic sentiment during "Bull Market" periods will be transformed into categorical values of "Bull Market". [9]
- Geopolitical Risk Index GPR, exhibits several types of values based on the number of papers that have included words related to adverse geopolitical events. We have retrieved the related dataset since 1985 and observed that the Index takes on average a value of 80 in the absence of geopolitical tensions. Values revolving around 100 are related to periods of low geopolitical risks. However, values above 200 were observed in periods of increased threats and a climate of geopolitical uncertainty. Therefore, we classify values of 80 and below under the category "No Risk", the values ranging between 80 and below 200 as "Low Risk" and values equal to 200 or above under the category "High Risk".
- The Economic Sentiment Indicator ESI, has two types of values, those below 100 are classified as "Below average economic sentiment", and values above 100 indicate above-average economic sentiment. This classification follows the Eurostat guidance.[10]
- The Eurozone Inflation Expectations Index has either negative or positive values. Negative values are associated with financial experts' pessimistic outlook about inflation. We therefore categorize these values as "Low Inflation Expected". Conversely, positive values depicting a positive outlook are categorized as "High Inflation Expected".
- Consumer Confidence Index of OECD Values below 100 are categorized as "Pessimistic Outlook" and vice versa,[11] following the definition of OECD.
- The 10-year German Bund yield depict several yields ranging from negative ones to positive ones. Before COVID-19, the bund yields did not vary much (See **Erreur ! Source du renvoi introuvable.**), the average yield on that period was equal to -0.21%.

[9] Source: Investing.com

[10] Source : Eurostat https://ec.europa.eu/eurostat/databrowser/product/page/teibs010

[11] Source : OECD Data : https://data.oecd.org/leadind/consumer-confidence-index-cci.htm#:~:text=confidence%20index%20(CCI)-,This%20consumer%20confidence%20indicator%20provides%20an%20indication%20of%20future%20developments,unemployment%20and%20capability%20of%20savings.

Significant changes were noticed starting from January 2021 where we observe a steady increase until December 2023. Accounting for these changes and the pattern of the yields. We categorize negative yield and the 0% yields as "Low yields" and yields above 0% as "High yields".

- Finally, for the VIX Index, we put a threshold of 23.81 following Chen and Yang (2021) method, in which we define values below this threshold as "Low volatility", values between 23 and 30 are categorized as "Low volatility" and values above 30 as "High Volatility".

IV. Results

1. Regression model

Comprehensive regression

Table 2 summarizes the results of our comprehensive regression using equation (1.1).

Table 4: Comprehensive regression results including ETFs and Mutual Funds

	All funds	
	Coefficient	p-value
X1	0,027500	6,5458E-07
X2	-0,000600	0,462000
SENTIX	0,001834	0,064886797
GPR	0,006762	4,56929E-16
VIX	0,008036	4,85416E-15
ESI	0,002270	0,019720806
10Y DE	0,000712	0,650859
CCI	0,007635	6,48063E-07
ZEW	-0,005899	2,57858E-07
R-squared	22,0%	

*
***
Not significant

We observe that "GPR", "VIX", "CCI", "ESI" and "ZEW" exert a statistically significant impact on fund flows regardless of the fund type and SFDR category, as they reach a statistically significant relationship at the conventional level of 5%. We observe the same statistical significance on the control variable X1 as well.

Only the control variable of volatility "X2", "SENTIX" and the independent variable "10Y DE" fail to attain a level of statistical significance.

All variables exhibit a positive impact on fund flows, except "ZEW" inflation expectations Index that is negatively related to fund flows.

Regression model on ETFs

Table 5: Regression results of conventional ETFs sample

	Conventional ETFs	
	Coefficient	p-value
X1	-0,000376077	0,746093708
X2	0,000753063	0,521804428
SENTIX	0,002026594	0,13925012
GPR	0,000571298	0,61764905
VIX	-0,002529926	0,13213288
ESI	0,000421646	0,75204567
10Y DE	-0,000876858	0,69388048
CCI	-0,002610973	0,24518952
ZEW	-0,000048144	0,97541383
R squared	0,04%	
		*
		***
		Not significant

On the sample of conventional ETFs, all the variables fail to attain a level of significance at the 5% conventional level.

The observed relationships of this model are not statistically significant. Consequently, it is difficult to draw conclusions about the direction of the potential causality link or make a judgement of the explanatory power of the model, especially that we have not yet explored the impact on sustainable ETFs.

Table 6: Regression results of sustainable ETFs

Sustainable ETFs		
	Coefficient	p-value
X1	-0,00013212	0,647349411
X2	-0,00133612	3,5217E-05
SENTIX	0,0010325	0,002283851
GPR	0,00043842	0,11864408
VIX	-0,00103122	0,019932408
ESI	0,00075784	0,021351439
10Y DE	-0,00199181	0,00029600
CCI	-0,00168626	0,00225720
ZEW	-0,00111208	0,00393857
R-squared	5,1%	
		*
		***
		Not significant

Table 4 depicts the results of the regression analysis conducted on the sample of sustainable ETFs. In this model, the coefficient of determination (R^2) yielded a value of 5.1%, indicating that approximately 5.1% of the variability in sustainable ETFs' flows is explained by some of the investor sentiment measures included in the model. "SENTIX", "X2", "VIX", "ESI", "CCI", and "ZEW" exert a statistically significant impact on sustainable ETFs flows at the 5% conventional level.

The coefficients' signs of "SENTIX" and "ESI" are positive, which means that they effect on ETFs flows is positive. On the other hand, "VIX" and ZEW" depict negative signs associated with their coefficients, suggesting a negative effect on ETFs flows.

Also, "10Y DE" has a statistically significant negative relationship with Net Flows of sustainable ETFs at the 0.1% level. It is important to remind that "10Y DE" was not statistically significant before making a distinction between ETFs and mutual funds. Also, in our comprehensive regression, the direction of the coefficients associated with "CCI" and "VIX" was positive.

As for control variables, "X1" which stands for return does not exhibit a statistically significant relationship with Net Flows. We observed a similar pattern on the conventional ETF sample. Moreover, this is not surprising as we assume that investors who invest in sustainable ETFs might have a preference for sustainability over return. "X2" on the other hand exhibits a negative relationship with Net Flows of sustainable ETFs at the 0.1%, in alignment with Sirri & Tufano (1998) findings, regarding the negative relationship between volatility and flows in the mutual fund literature.

Regression model on mutual funds

We will first run the regression model on the sub-sample of conventional open-end mutual funds, including the same control matrix and the same independent variables. Then, we will re-apply the model on the sub-sample of sustainable funds.

Table 7: Regression on conventional open-end mutual funds

Conventional Mutual Funds		
	Coefficient	p-value
X1	0,064308823	1,4792E-296
X2	-0,003433850	0,079042643
SENTIX	0,004896317	0,016797414
GPR	0,011641852	3,46513E-11
VIX	-0,018413211	9,28543E-17
ESI	0,011664391	1,24196E-08
10Y DE	-0,035562324	3,90839E-25
CCI	-0,019348651	2,14026E-09
ZEW	-0,021502743	1,16775E-18
R-squared	59,0%	
		*
		***
		Not significant

The first step of our analysis on two separate samples yielded in an R-square of 59% and all the variables reached a level of significance at a 0.01%, except "SENTIX" exhibiting a statistically significant impact at the conventional level of 5%. The control variable X2 that stands for the fund's volatility is not statistically significant. This provides us with better insights about the relationship between mutual funds' flows and investor sentiment, compared with the results that we have obtained earlier on the sample of ETFs.

Table 8: Regression on sustainable open-end mutual funds

Sustainable Mutual Funds		
	Coefficient	p-value
X1	0,05733565	1,617E-300
X2	-0,00426486	0,010747116
SENTIX	0,00437002	0,015591837
GPR	0,01039049	1,38169E-11
VIX	-0,01665145	2,7908E-18
ESI	0,01091645	1,12993E-09
10Y DE	-0,03297145	1,09913E-27
CCI	-0,02030073	1,34429E-12
ZEW	-0,01880986	1,41215E-18
R-squared	60%	
		*
		***
		Not significant

The second step of our analysis consists of repeating the same regression on the sub-sample of sustainable mutual funds. This resulted in a R-square of 60%, which is slightly higher than the results obtained earlier on the sub-sample of conventional funds.

Regarding the statistical significance of our independent variables, we observe that all the independent variables exert a statistically significant impact on fund flows. The signs of "SENTIX", "ESI", and "GPR" coefficients are positive, revealing a positive effect. Conversely,

"VIX", "10Y DE", "CCI" and "ZEW" exert a negative impact as shown in the signs of their coefficients. We also observe that the direction of the relationship between fund flows and the independent variables is similar to these observed on the conventional mutual funds' sample.

Variables	Coefficients	
Independent Variables	Conventional Funds	Sustainable Funds
SENTIX	0.00489	0.00437
GPR	0.01164	0.01039
VIX	-0.01841	-0.01665
ESI	0.01166	0.01091
10Y DE	-0.03556	-0.03297
CCI	-0.01943	-0.02030
ZEW	-0.02150	-0.01880
Control Variables		
X1	0.06431	0.05733
X2	Not statistically significant	-0.00426

Table 9: Summary of regression results of Mutual Funds' sample

Table 9 summarizes the coefficients of each independent and control variables in the two regressions run. We observe that the impact of sentiment measures is the same in terms of direction. We shall now explore if there is any different impact stemming from the sustainability aspect of the fund.

Now let us examine closely each causal relationship. As a reminder, ESI is a proxy for GDP growth, while "SENTIX" is a metric assessing the sentiment on financial markets. It is logical that they both have a positive relationship with Net Flows. The economic sentiment captured by ESI translates into reaction on financial markets that is depicted by investor sentiment "SENTIX". When the two indexes go up, this proxies for an optimistic outlook. Conversely, when they go down this indicates a pessimistic outlook on the economy. In our case, whether it is a conventional fund or sustainable fund, the reaction is similar, as the positive sentiment translates into more inflows towards equity funds. This is consistent with (Ben-Rephael et al., 2012) who also found a weakly positive relationship between a survey-based sentiment index. In their case it was the Consumer Confidence Index of The Michiguan University. However, one inconsistent result that we observe on our side is on the Consumer Confidence Index, that demonstrates a negative relationship with Net Flows of both conventional funds and sustainable funds in our regression model, which is similar to what we have observed earlier on the ETF sample. The coefficient associated with "CCI" becomes negative when we separate between ETFs and mutual funds.

Regarding the direction of the "VIX", "10Y DE", and "ZEW" coefficients, these demonstrate an inverse relationship with Net Flows.

Starting with the VIX, the direction of its relationship suggests that a climate of fear on the market, investors have increased propensity to sell, which explains the positive association between increased implied volatility on the market and outflows from equity funds.

As for the 10Y DE, the negative sign associated with it indicates when bond yields decrease, this leads to increased inflows towards equity mutual funds. This is because high yields make bond funds more attractive than equity funds and conversely, low yields make equity funds more attractive.

Net Flows in both samples are also sensitive to "ZEW", our model shows that when households inflation expectations are high as measured by the index, Net Flows of conventional and sustainable funds decrease.

These results confirm once again our two first hypotheses (H1 and H2), but we do not see yet a clear-cuts impact of investor sentiment on sustainable funds and conventional funds.

Regression on ETFs using binary variables

We now introduce a binary variable that describes which SFDR category the fund is. The model (1.2) will be applied on each fund type separately. The dummy variable takes a value of 1 when it is a sustainable fund classified under Article 8 category, and a value of 0 for conventional funds classified under Article 6 category.

Table 10: Regression on ETFs sample using a dummy variable

	ETFs	
	Coefficient	p-value
X1	-0,000200	0,750000
X2	-0,001100	0,191000
SENTIX	0,001600	0,059000
GPR	0,148900	5,63E-05
VIX	-0,001700	0,079000
ESI	0,000500	0,589000
10Y DE	-0,001500	0,260000
CCI	-0,001900	0,164000
ZEW	-0,000800	0,418000
Sustainable	-0,028200	5,82E-07
R-squared	0,6%	
		*
		***
		Not significant

Table 2 exhibits our regression results. We observe a R^2 of 0.6%, suggesting merging the two sub-samples (conventional ETFs and sustainable ETFs) and introducing a categorical variable to derive the effect of being sustainable or not, shows that only 0.6% of the variability of the sample could be explained by the investor sentiment.

Moreover, we only have one variable in this model exerts a statistically significant impact on ETFs. "GPR" is significant at the 1% level, and the positive sign associated with its coefficient indicates a positive relationship with Net Flows. This means that an increase in sustainable ETFs flows is associated with an increased "VIX" seems to have a negative relationship that is statistically significant at the 10% level.

Our results however, reveal that some measures of sentiment that we have introduced in the model do not longer have a statistically significant impact on fund flows. On top of that, the introduction of dummy seems to have a negative impact effect on Net Flows, suggesting that sustainable ETFs receive less flows than conventional ETFs, regardless of the overall state of the economy and the geopolitical climate.

Regression model on mutual funds using a binary variable

Now, to test if investor sentiment impacts sustainable funds more than conventional funds in the mutual fund universe, we introduce a binary variable similar to the manipulation we exerted on the ETF sample. Again, the binary variable takes a value of 1 when the fund is sustainable and classified under Article 8 category, and 0 when it is not.

Table 11: Regression on mutual funds sample using a dummy variable

	Mutual Funds	
	Coefficient	p-value
X1	0,802100	4,0967E-268
X2	-0,060900	0,221020245
SENTIX	0,081000	0,006555669
GPR	0,155400	5,10262E-11
VIX	-0,233300	2,07296E-16
ESI	0,153500	8,45249E-06
10Y DE	-0,480400	2,73681E-20
CCI	-0,278000	5,23739E-09
ZEW	-0,285400	4,83444E-12
Sustainable	0,028900	0,192790916
R-squared	55,8%	
		*
		***
		Not significant

We observe statistically significant effects stemming from “X1”, “SENTIX”, “GPR”, “VIX”, “ESI”, “10Y DE”, “CCI”, “ZEW” at the 1% level. “SENTIX” and “GPR” exert a positive impact on mutual fund flows, the remaining variables exert a negative effect on mutual fund flows. The direction of the relationship did not change which enables us to preserve our interpretations. Also, we observe that introducing a dummy does not have a statistically significant impact on mutual fund flows. This means that all investor sentiment measures have indeed a statistically significant impact on mutual fund flows, but sustainability as defined by SFDR is not an attribute that investors take into account into their investment decisions.

This model in which we make a separation between ETFs and mutual funds enabled us to confirm two of our hypotheses. First, we observe that investor sentiment exerts a statistically significant impact on fund flows. Our hypothesis has been already supported and confirmed in our literature review, namely in the findings of Warther (1995), (Ben-Rephael et al., 2012) and other authors.

We observe in this model that the separation between ETFs and mutual funds showcases different patterns in fund flows across the two categories of funds: ETFs and sustainable funds, as we witness an impact that is more pronounced on mutual funds compared to ETFs. Also, we saw a positive relationship between Net Flows and "CCI" in our comprehensive regression. Surprisingly, when separating funds into ETFs and mutual funds, we observe a negative impact on both samples.

Third, we observe different patterns in the relationship between investor sentiment and sustainable fund flows irrespective of the fund's type (ETFs or mutual fund). For instance, grouping samples into two major samples of ETFs and mutual funds and introducing a binary variable was not able to predict whether sustainability is a significant attribute driving investor sentiment. However, when we separate our samples into two distinct sub-samples of conventional ETFs/Mutual Funds and sustainable ETFs/Mutual funds, we observe that the samples of sustainable ETFs and mutual funds have more explanatory power and might help us answer our third hypothesis. Therefore, we will retain this model and we will attempt to assess the magnitude of these relationships separately using the one-standard deviation change in investor sentiment proxies on the dependent variables "Net Flows".

First, we shall specify that we will only keep the sample of mutual funds, because the reaction to investor sentiment as measured by conventional ETFs flows and sustainable ETFs flows was clear in the regression model conducted on the ETFs sample, and we will also affirm later our results using a chi-square test. On the mutual funds' side, we observe no significant difference between conventional funds and sustainable funds, therefore, we will rerun our regression model on the mutual funds' sample using the same method we did earlier, without introducing a binary variable, on the two sub-samples (conventional and sustainable) of mutual funds, and this time we remove "ZEW Index", not only because its inclusion may be redundant, as it contains less information related to inflation compared to "10Y DE", but also because it would have been more accurate to assess this relationship in the case of bond funds. **Erreur ! Source du renvoi introuvable.** documents the results observed.

The equation is now as follows:

$$Net\ Flow_{i,t} = \beta_0 + \beta_1 SENTIX_{t-1} + \beta_2 10YDE_{t-1} + \beta_3 ESI_{t-1} + \beta_4 VIX_{t-1} + \beta_6 CCI_{t-1} + \theta x_{i,t-1} + \varepsilon_i \quad (1.3)$$

The results are similar to what we have obtained earlier in the model including ZEW. The regression run on conventional funds' sample yield in a R^2 of 56.9%. The regression run on sustainable funds' sample has a R^2 of 57.7%.

To assess the magnitude of the impact of sentiment on sustainable funds compared to conventional funds, we are examining the absolute effect of a one-standard-deviation change in each sentiment indicator on the dependent variable "Net Flows". It is important to remind that our variables are expressed in logarithmic form, therefore one-standard deviation variation in the independent variable corresponds to a percentage change of δ*(β*100) in the dependent variable. This approach is inspired from (Miguel Unzue, 2023) work, in which the dependent variables with the most significant impact were tested further to assess the magnitude of their effect.

Table 12: Change in Net flows following a one-standard deviation change in independent variables

		SENTIX	GPR	VIX	ESI	10Y DE	CCI
Conventional Mutual Fund	p-value	0,845762606	6,39509E-07	5,53738E-14	0,002114385	0,001432	5,83E-09
	Coefficient	0,000395376	0,008789321	-0,01698986	0,006125538	-0,01444	-0,00994
	Standard deviation	0,164401247	42,48444526	7,841603781	11,25394063	1,208227	1,884726
	Change in Net Flows	Not statistically significant	37,34%	-13,32%	6,89%	-1,75%	-1,87%
Sustainable Mutual Fund	p-value	0,787863937	2,4864E-07	9,28669E-15	0,000824084	3,64E-11	1,77E-05
	Coefficient	0,000483245	0,00797452	-0,0150617	0,005792538	-0,01445	-0,0118
	Standard deviation	0,164401247	42,48444526	7,841603781	11,25394063	1,208227	1,884726
	Change in Net Flows	Not statistically significant	33,88%	-11,81%	6,52%	-1,75%	-2,22%

For the model including mutual funds, we observe that "SENTIX" is no longer statistically significant. The other variables ("GPR", "VIX", "ESI", "10Y DE" and "CCI") remain significant at the 0.01% and 1% level. The direction of these coefficients is still the same, suggesting that the relationships are maintained in consistency with our results from the previous model.

Now turning to the interpretation of these results, we observe that a one-standard deviation increase in "GPR" results in 33.88% increase in flows to sustainable funds. A higher magnitude is observed on the conventional funds' side, as a one-standard deviation increase in "GPR" results in 37.4%. Turning to the "VIX", A one-standard deviation increase in "VIX" yields in a decrease in flows to sustainable funds of 11.81%, compared to 13.32% decrease in flows of conventional funds. These results however seem unexpected in regards of our assumptions inspired from (Fernandez-Perez et al., 2022) about the correlation between risk aversion and investor preference of sustainable funds.

The economic sentiment captured by "ESI" has statistically significant impact on both conventional funds and sustainable funds with the percentage change in their respective fund flows being fairly similar between the two types of funds. a one standard-deviation change increase in this indicator, leads to more inflows towards conventional funds (+6.89%) and sustainable funds (+6.52) with sustainable ETFs.

10Y DE depicts a negative statistically significant impact on Net Flows sustainable ETFs and mutual funds (conventional and sustainable). The magnitude is the same for both, as an increase in the German Bond Yield entails outflows at the same speed.

Finally, the magnitude of the negative impact that "CCI" exerts on fund flows is stronger for sustainable mutual funds. Our regression reports that a one-standard deviation increase in the

consumer confidence index, leads to -2.22% decrease in sustainable mutual fund flows compared to -1.87% in conventional fund flows. This is consistent with the findings of (Fernandez-Perez et al., 2022).

2. Chi-square inference test

Table 13: Chi-square test on ETFs samples

	Conventional ETFs		Sustainable ETFs	
	P-value**	Cramer's V	P-value**	Cramer's V
SENTIX	0,88696046	0,01229907	0	0,72108752
VIX	0,22641418	0,03037437	0	1
ESI	0,62055748	0,01243102	0	1
10 Y DE	0,7183625	0,00905591	0	1
ZEW	0,3018442	0,02592584	0	1
GPR	0,80607313	0,01648802	0	0,70829396

Significance reported as *p<0.05

Table 13: Chi-square test on ETFs samples reports the results of our chi-square test to complement our initial findings on the sample of ETFs and decide if we reject or not our null hypothesis about the independence of the variables.

As mentioned earlier, SPSS performs the test on 'Net Flows,' repeating the analysis five times with each of the five sentiment indicators to analyze their respective associations. The procedure applies to conventional ETFs and sustainable ETFs separately like we have done in our regression model without the dummy variable.

The test provides similar results from the conventional funds side, as we observe no significant association between five explanatory variables and the Net flows of conventional funds. Not only their Cramer's V are weak, but none of the variables demonstrates results of independence that are statistically significant. This is in line with the regression results that we have obtained earlier. It is therefore possible to validate our observations regarding the weak relationship between conventional ETFs flows and investor sentiment, since there is not sufficient evidence to reject the null hypothesis according to which, conventional Net Flows and investor sentiment measures are independent.

Regarding sustainable ETFs, the chi-square test allows us to derive more conclusions compared to the regression model. Within our sample, we observe a strong association between the five sentiment measures and sustainable ETF flows. All measures depicted a relationship that is statistically significant at the 5% level, leading us to reject the null hypothesis and to conclude a dependence between Net Flows and sentiment.

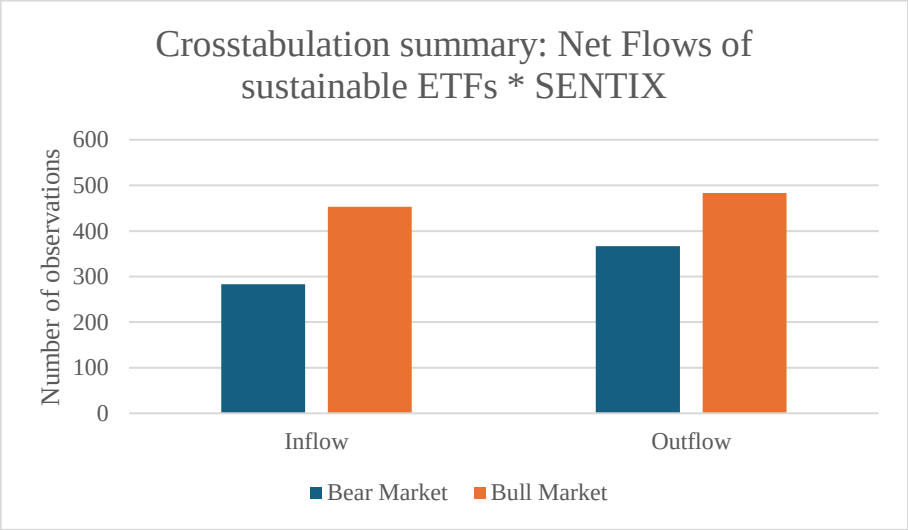
As for the magnitude of the relationships, Sentix Index "SENTIX" and the Geopolitical Risk Index "GPR", exhibit a statistically significant association with the Net Flows of sustainable

ETFs, but the intensity of this association is moderate since their respective Cramer's Vs do not reach the value of 1 like the rest of the variables.

On the other hand, "ESI", "VIX", "10Y DE", and "ZEW", depict strong association with Net Flows of sustainable ETFs, and all of these measures reach a Cramer's V value of 1, indicating the strong magnitude of their relationship.

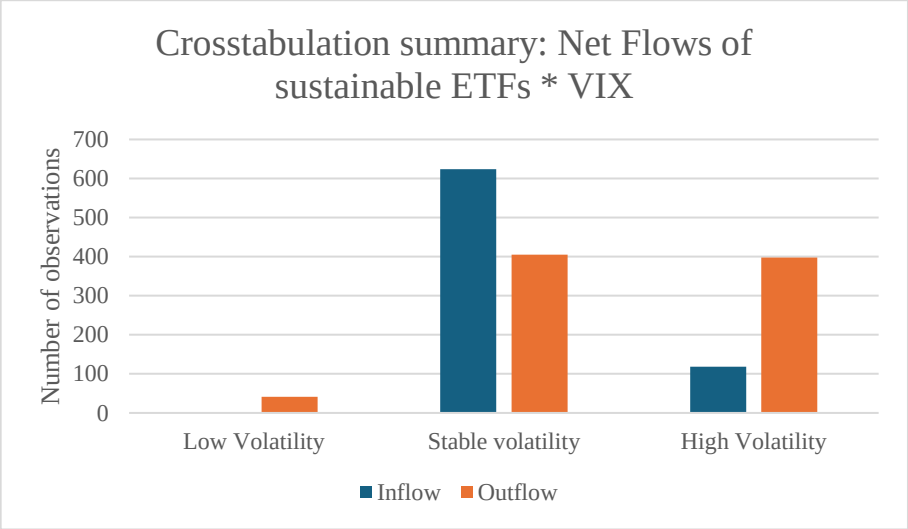
Now let us examine each association separately and describe the pattern of funds flows following the movement of each sentiment measure.

Table 14: Crosstabulation summary of chi-square test between Net Flows of sustainable ETFs and SENTIX



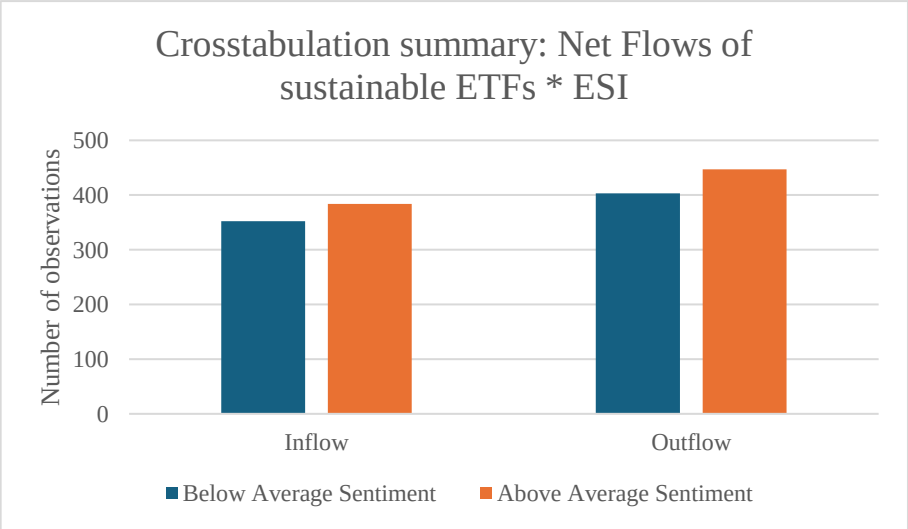
Looking closely at the Sentix, we see that an increase in inflows is associated with a state of Bull Market as captured by the Sentix. This means that in periods of bull market where investors are optimistic about the future, investors put their money in sustainable ETFs, and this is in line with (Hartzmark & Sussman, 2019) who find that sustainability is viewed as an attribute for future performance. However, from a perspective of mood, this is not consistent with (Fernandez-Perez et al., 2022)' findings, stipulating that investors tend to invest in sustainable funds when their mood decline.

Table 15: Crosstabulation summary of chi-square test between Net Flows of sustainable ETFs and VIX



Now regarding the relationship with the implied market volatility as represented by the VIX, we witness an inverse relationship, confirming the impact that we have observed in the regression analysis. We observe that sustainable ETFs witness strong outflows and less inflows in periods of increased volatility compared to a period of stabilized volatility. Once again, this is not in line with (Fernandez-Perez et al., 2022)' findings. These results do not depict a risk-averse behavior pushing investors to perceive sustainable funds as safer than conventional funds. On the contrary, they have more propensity to invest in periods of stable volatility. Now looking back at the literature, this behavior is similar to the one that investors demonstrate towards conventional funds, (Ben-Rephael et al., 2012) and (Kopsch et al., 2015) who also observe an inverse relationship between conventional funds and VIX.

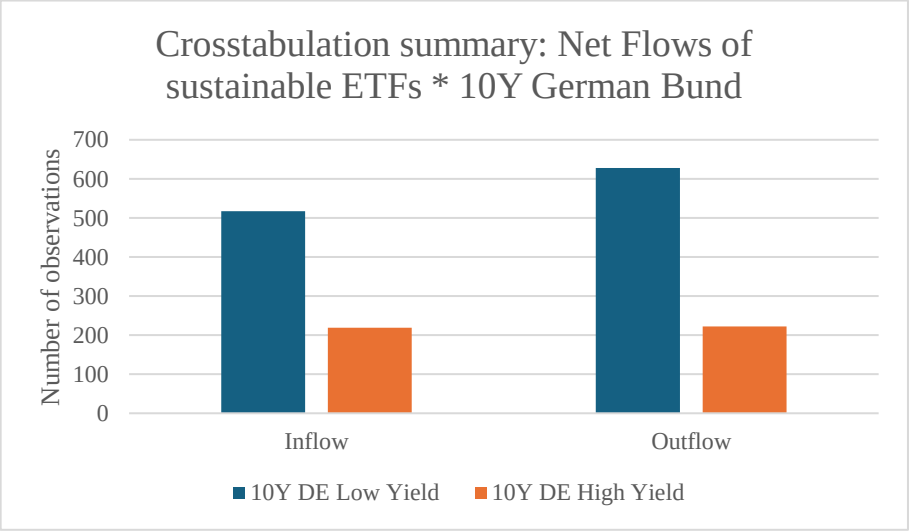
Table 16: Crosstabulation summary of chi-square test between Net Flows of sustainable ETFs and ESI



If we move to the economic sentiment, we observe a positive relationship as depicted by the coefficient of "ESI" in our regression model. Despite the slight difference in fund flows pattern

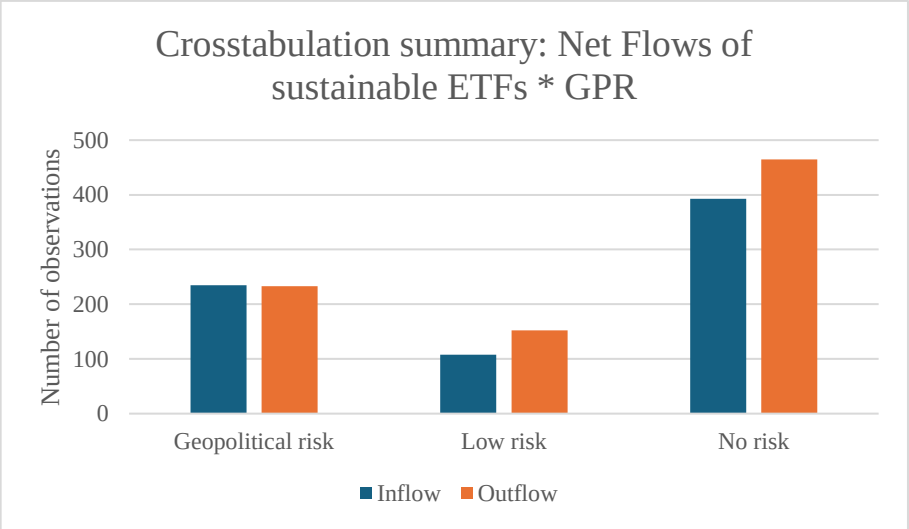
in each state of the sentiment as proxied by the ESI, we can already see that inflows increase in periods of Above Average Sentiment, and that there are more outflows than inflows in period of declining sentiment captured by the ESI as "Below Average Sentiment". However, we observe more outflows in periods of Above Average Sentiment, this could mean that sustainable ETFs suffer outflows regardless of the overall economic climate. Therefore, there are numerous things to say about investors' behavior in that case, but no definitive conclusions could be drawn from this test about the reason why sustainable ETFs suffer outflows. These results are perplexing and not aligned on those provided by the retained linear regression conducted on the sample of sustainable ETFs.

Table 17: Crosstabulation summary of chi-square test between Net Flows of sustainable ETFs and 10Y German Bund



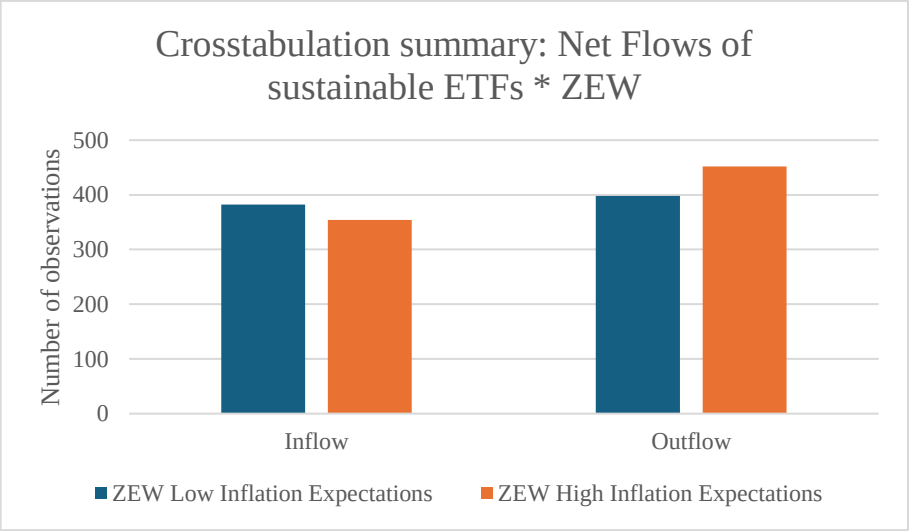
Looking at the relationship between the 10Y German bond yield and the sustainable fund flows, we observe an inverse relationship. Our sample demonstrates increased outflows associated with high yields and increased outflows associated with low yields. This is also in line with the causal link observed in the regression model. This supports our hypothesis earlier suggesting that equity funds become attractive when bond funds' yields decline, and less attractive when there are promising yields when the bond market becomes attractive.

Table 18: Crosstabulation summary of chi-square test between Net Flows of sustainable ETFs and GPR



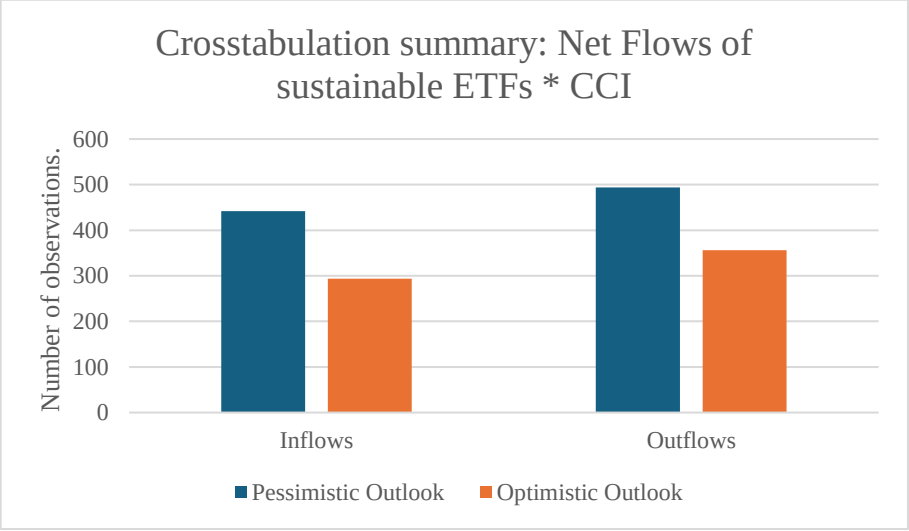
If we turn our attention to the GPR Index proxying for geopolitical risk. On the inflows level, sustainable ETFs seem to attract more inflows during periods no risk and periods of increased geopolitical risk. This observation in line with (Noman & Naka, 2019) and (Fernandez-Perez et al., 2022) findings regarding the perception of safety that investors might have when they put money in sustainable investments. In their work, they use changes in mood as a proxy for investor sentiment. In our case, the GPR could be as proxy of mood, since geopolitical uncertainty is associated with feelings of fear and anxiety. Moreover, this particular result is not surprising, because investors who care about sustainability, may perceive sustainable funds as safer and resilient to geopolitical risk. Another possible explanation as outlined by (Hartzmark & Sussman, 2019) could be a behavior that is driven by social motives. This means that in a period of increased geopolitical risk some investors might be impacted by a feeling of investing in funds that are perceived as "good" in order to feel that they are "doing good". A final assumption which is also in line with (Hartzmark & Sussman, 2019), and that we have developed earlier in our literature review, is that investors inject more money in sustainable funds during periods of geopolitical uncertainty under institutional constraints. Let us not forget that our main criterion for sustainability is being classified under "Article 8" Category of the SFDR regulation, which calls for transparency of the promotion of environmental, social and governance principles. However, we see as much outflows as inflows in these periods of increase geopolitical risk, we assume that investors react differently during such periods, this is why we cannot establish a clear distinction between the impact of geopolitical risk on flows of sustainable ETFs, the same result was achieved in the regression model.

Table 19: Crosstabulation summary of chi-square test between Net Flows of sustainable ETFs and ZEW



Finally, when we look at the Households Inflation Expectations Index "ZEW", we also observe an inverse relationship as depicted by the regression model. This relationship is demonstrated as follows: decreasing inflows and increased outflows are associated with high inflation expectations. These expectations are usually prevailing during a climate of downturn and economic uncertainty leading investors to withdraw their money from equities.

Table 20: Crosstabulation summary of chi-square test between Net Flows of sustainable ETFs and CCI



Finally, the observations from the relationship of Net Flows with the Consumer Confidence Index are consistent with our regression results. We see that sustainable fund flows are negatively related to the Consumer Confidence Index. This is not aligned with the findings of (Ben-Rephael et al., 2012) who report a weakly positive relationship, but they support the conclusions drawn by (Edmans et al., 2022) and (Fernandez-Perez et al., 2022).

3. Conclusion

In this study, we investigate the impact of investor sentiment on fund flows in both exchange-traded funds (ETFs) and mutual funds, with a particular focus on sustainability. On the light of our results, we hereby provide a comprehensive summary of our findings and attempt to give answers to our hypotheses.

First, our comprehensive regression (1.1), as well as our separate regressions demonstrated that investor sentiment exerts a statistically significant impact on fund flows. This supports our first hypothesis "Investor sentiment has a significant impact on fund flows". In fact, our hypothesis was inspired from existing literature about the impact of investor sentiment on fund flows, with many works focusing on mutual funds and few studies shedding the light on the pattern on ETF flows compared to their counterparts.

Second, we have separated our sample into two samples of ETFs and mutual funds, each one divided into two sub-samples of conventional ETF/mutual funds and sustainable ETF/mutual fund. This separation is based on our belief that investor sentiment affects ETFs and mutual funds differently, and that it also affects conventional funds and sustainable funds in a different way given the difference between the characteristics of ETFs and mutual funds. Actually, we have observed the following:

(1) Different impact of investor sentiment on ETFs and mutual funds
(2) Different impact of investor sentiment on conventional funds and sustainable funds in each fund category

To elaborate further, we see that the impact of investor sentiment is more pronounced for mutual funds than for ETFs. This is supportive to our second hypothesis: "Investor sentiment has a different impact across ETFs and mutual funds". Running our regression on two separate models revealed that we have more variability in mutual fund flows explained by investor sentiment compared to ETFs, as the explanatory power of the model applied to ETFs was not as predictive as that applied to the mutual fund sample. We therefore confirm the hypothesis H2a "Investor sentiment impacts ETFs and mutual funds differently". This is not surprising for two reasons, first ETFs flows enable trading on information, the movement of flows is explained by the feedback trader hypothesis, which is more useful to explain a return-chasing behavior, rather than sensitivity to new information, according to what literature provides. Second, literature rejects the feedback trader hypothesis in monthly data (Kalaycıoğlu, 2006), outlining ETFs capture sentiment more rapidly than mutual funds, on daily basis or weekly basis, whereas mutual fund flows traditionally depict an information-responsive behavior encompassing information broader than just returns. We observe similar pattern using lens of sustainability, as we see that conventional ETFs are not impacted by investor sentiment, whereas sustainable ETFs are impacted by several sentiment measures: "SENTIX", "VIX", "ESI", "10Y DE", "CCI", "ZEW", and "X2". On the mutual funds' side, we observe that all measures of sentiments impact both conventional mutual funds and sustainable mutual funds. It is also crucial to note that the signs of coefficients are the same whether it is a conventional fund or a sustainable fund.

Third, shifting our focus on sustainability, when we separate our samples into ETFs and Mutual Funds to account for the different impact of investor sentiment exerted on both fund types and introduce a dummy variable, we observe a negative impact stemming from the introduction of the dummy on the ETFs sample and an insignificant impact on the mutual funds' sample. This specific model does not respond to our third hypothesis, and we prefer to stick to a model that provides deeper insights. Therefore, we consider that separating our model into ETFs and Mutual Funds and distinguishing between conventional and sustainable category within each fund types, enables us to see that investor sentiment has greater impact on sustainable ETFs compared to conventional ETFs. This was first observed throughout the results of our first regression model and confirmed by the results of our chi-square test.

Turning our attention to mutual funds, we see that investor sentiment has a strong impact on both flows of conventional mutual funds and sustainable mutual funds, the direction of the relationships and their statistical significance is also identical for both. When we assess the magnitude of the impact of each sentiment measure on fund flows and make the distinction between fund types and SFDR categories as depicted in equation (1.3). We cannot conclude if there is an absolute effect with stronger magnitude on one side compared to another, depending on the indicator.

We see that "VIX", "10Y DE" and "ESI" exert a stronger impact on conventional mutual funds compared to sustainable mutual funds. However, we observe that the negative impact stemming from the "CCI" is stronger in magnitude, suggesting that sustainable mutual fund flows are more sensitive to changes in the consumer confidence index. In other words, the inverse relationship between "CCI" and mutual fund flows, indicates that when mood worsens, flows towards sustainable funds increase, but when investors are in a good mood, flows towards sustainable funds decrease. We can also see a shifting impact of "ESI" on "Net Flows", which depict a positive relationship, but the difference in magnitude is almost negligible. This provides evidence that sustainable funds and conventional funds are impacted differently by investor sentiment, and this difference is more pronounced when the mood declines. This enables us to confirm our third hypothesis "Sustainable funds are more sensitive to investor sentiment than conventional funds", partially because the effects reported by the results are nuanced, since we see weaker impacts from the "VIX" or "GPR" on sustainable funds on sustainable funds, suggesting that there is variability depending on the type of sentiment.

V. Limitations

During our study, we faced several constraints, therefore, we find it very important to highlight the limitations we encountered in this analysis and how they could be overcome in future studies to reach more conclusive results.

First, as mentioned in our methodology, we were constrained by the availability of some information such as costs and fees associated with the investment in ETFs and sustainable funds, given their importance in driving the demand for each type of fund. Particularly in the current macroeconomic climate, that suggests more propensity to invest in passive funds (including ETFs) compared to active funds (including open-end mutual funds).

Another limitation that we have encountered is our limited access to Morningstar, we think that we would have a larger sample with further information such as the monthly SFDR classification and Morningstar Globe and sustainability ratings, as well as the change associated with each indicator to have a better insight of the impact of such information on investor sentiment.

Moreover, several works in the literature have made the difference between institutional and private investors to better analyze the demand for ETFs and mutual funds, as well as the sentiment towards sustainability and which funds attract informed and uniformed investors. In our case, we have incorporated two control variables: historical monthly returns and the 30 days volatility associated with each fund. Other studies incorporated further control variables such as fund's monthly Alpha or excess return. Some authors also opted for the % change in sentiment measures instead of the standardize indexes.

Finally, due to the rapidity to trade information observed on the ETF market, it would have been more accurate to deepen our analysis by examining weekly data or daily data and potentially apply the same frequency on mutual funds, to verify if there would be better results. In our case, we were challenged by time and access to data, therefore despite the confirmation of our third hypothesis on the ETFs side, we remain skeptical, as our regression model yielded only in a R^2 of 5.1%.

VI. Discussion

Building upon the empirical results presented in the previous section, this discussion aims at providing potential avenues for further research within the field of sustainable investing and asset management. This section is devoted to deliberating on these prospective pathways.

In a context of financial innovation, and implication of extra financial information in the decision-making process. We attempted to examine closely the impact of investor sentiment as a non-fundamental component on fund flows, by making the distinction between two types of investment vehicles and shedding the light on sustainability as an important attribute in investing, while taking into account the potential different impact stemming from investor sentiment.

This study helped us address our hypothesis and advance our understand of the topic. However, further research in the same field could provide clearer conclusions by taking into account additional variables that we have not included in the model. For instance, the literature shed the light on the cost of research as an important driver of demand and therefore for fund flows. Due to limited access to data, we did not include these variables although their inclusion could be more pertinent to draw a more concise conclusions about the demand of ETFs and mutual funds as measured by the flows in the current backdrop. Another example could be to extend the focus on the monthly change in the SFDR classification and examine how to this could affect investor sentiment and fund flows subsequently.

Given the complex relationship between fund flows and investor sentiment, we realize that investor sentiment has a different impact on flows depending on the fund types, in accordance with the underlying information provided by the literature regarding the different structure and mechanism of each fund. We also observed that flows react differently across conventional

funds and sustainable funds. Another difference that one must take into account is the one related to the type of sentiment. As detailed earlier, sentiments of fear as gauged by the "VIX" or "GPR" during periods of geopolitical threats seem to have a stronger impact on conventional funds compared to sustainable funds. On the other hand, the sentiment captured by the consumer confidence index of OECD seems to confirm that sustainable funds are more impacted by investor sentiment, particularly when mood declines (as opposed to the effect depicted by the economic sentiment indicator "ESI" that showcases positive and almost similar impact across conventional funds and sustainability funds). This is in line with (Fernandez-Perez et al., 2022) who report similar results indicating that investors are risk averse and perceive sustainable funds as "less risky".

Though, our results seem ambiguous about an absolute preference for sustainable funds using the "Article 8" category" as an indicator for sustainability. We therefore assume that since investors are information sensitive. They seem to attach more attention to information such as Morningstar ratings or the announcement effect of introduction of a label or a regulatory framework as highlighted by (Becker et al., 2022) and (Ferriani, 2023) who provide confirmation that sustainable flows that attract higher inflows are the result of investors relying on Morningstar ESG ratings to make portfolio decisions, except for Article 9 funds that intentionally invest in sustainable businesses as part of their underlying strategy.

Additionally, the timeframe covered by the study is characterized by ambivalence stemming from a climate of macroeconomic uncertainty, and several consequences on demand towards the equity-funds since the COVID-19, altered by inflation, high interest rates, supply chain disruption and regulatory updates in the SFDR framework. All these combined together, result in mixed sentiments of fear, bullish or bearish feeling. In our opinion, future research in a timeframe with less uncertainty and more clearness regarding the definition and measurement of sustainability as established by SFDR could provide better insights regarding the impact of investor sentiment on flows of sustainable funds and ETFs.

General conclusion

Financial markets have witnessed many developments and innovation offering investors a wide array of investment vehicles to satisfy their needs and to adjust to regulatory developments. Moreover, finance has evolved from being solely focused on returns and performance to becoming engaged in sustainable development and finance the green transition.

In this study, we focus on Europe as leader on sustainability because on top of the prevailing sentiment among investors about the importance of sustainability, Europe also supports this paradigm shift by establishing a regulatory framework to foster sustainable finance and prevent from greenwashing. Therefore, we establish the SFDR classification "Article 8" as a criterion to differentiate between conventional funds/ETFs and sustainable funds/ETFs. Our analysis aimed at addressing the following research question: "Does investor sentiment have a greater impact on sustainable funds?"

The first section of our study aims at providing an extensive overview of the literature that has already shed the light on the hypothesis that we wanted to test. We began by addressing investor sentiment and its importance on financial markets, as well as its impact on fund flows. Then we moved to fund flows to understand their determinants and how they proxy for investors' demand. Given the differences observed in real life between ETFs and mutual funds, we decided to shed the light on these differences in our literature review, for two reasons. First, we attempted to verify if investor sentiment affects differently ETFs and mutual funds. Second, in the event that this hypothesis is confirmed, we thought it prudent to account for this variability in impact in order to avoid potential distortions in our later analysis between conventional and sustainable investments. Finally, we have provided a comprehensive overview of the key concepts surrounding sustainable investing, ESG standards and the SFDR regulation. We have also been at the forefront of academic research that is interested in sustainable fund flows. We shall also remind that few studies have combined the analysis of sustainable ETFs and sustainable open-end mutual funds. The most relevant works in the literature on fund flows focus on either one or the other, with a greater number of works in the literature on mutual funds. On the mutual funds' side, Amman et al., (2017), Hartzmark & Sussman, (2019), Becker et al., (2022) provide empirical evidence that investors care for ESG ratings and Morningstar sustainability ratings, and are impacted by announcement effect such as the introduction of the SFDR classification, therefore, their studies report higher inflows towards sustainable funds.

On the ETFs side, (Carmona et al., 2024) report an increased momentum for sustainability-focused ETFs, in particular SRI ETFs, suggesting that investors are increasingly looking for options that align with their values on social and environmental issues. (Marszk & Lechman, 2024) also provide empirical evidence that non-financial motives in the case of sustainable ETFs are becoming more important than financial motives. Finally, we provide an overview of the current state of sustainable investing in Europe, highlighting current trends across fund types and conventional and sustainable funds.

To conduct our empirical analysis, we established a methodology that was mainly inspired by the work of Amman et al. (2017) and Becker et al. (2022). Our hypotheses are also drawn from the existing literature, but the difference in our work lies in the focus we place on the dissimilarities between fund types and SFDR classifications as major criterion of sustainability in our study.

At the light of our inspirations from these relevant works, we first started by cleaning and matching our samples in order to have a harmonized population in terms of age and size. We have also standardized, winsorized and transformed our data into logarithmic expression. Based on the resulting sample, we have conducted several panel regressions that we can summarize in three main equations (1.1), (1.2), (1.3) applied on different samples, hence the different results details in the results' section. Based on the insights provided on the regression model conducted on two separate samples, we (1) confirm our regression results on the ETFs sample using a chi-square inference test. (2) we focus on sustainability, by running a comprehensive regression on all funds and introducing a binary variable which stands for the SFDR classification, followed by a regression conducted on two samples, one sample of ETFs and one sample of mutual funds, both incorporating a dummy variable. Finally, we run a final regression on mutual funds' sample where we remove the "ZEW" variables, and based on the resulting coefficients, we assess the magnitude of the remaining variables between conventional funds and sustainable funds.

The different regressions we ran allowed us to distinguish which one best answered our research question. The comprehensive regression performed using equation (1.1) enabled us to confirm that investor sentiment indeed influences fund flows, regardless of the fund's type and SFDR classification. However, there were some interesting key points that we observed when we split the samples into ETFs and mutual funds, and then each into sub-samples of conventional and sustainable investments. This allowed us to confirm our second hypothesis and clearly see a different impact of investor sentiment between ETF flows and mutual fund flows. We also observed that sustainable ETFs are more affected by investor sentiment compared to conventional ETFs, however they are not as affected as, for example, sustainable mutual funds. We therefore decided to account for this different impact on the two fund types in our analysis of sustainable flows. Especially that the binary variable models produced confusing results, suggesting more outflows from sustainable ETFs and no significant impact on investors' decision stemming from being a sustainable or conventional mutual fund.

On the ETF side, the results of both the regression analysis and the chi-square test confirm that investor sentiment has a greater impact on sustainable ETFs than on conventional ETFs. The Chi-square test was only complementary to our results, and we used it mainly because the regression performed on ETFs yielded a weak R^2. On the mutual funds' side, we observe that sentiment indicators exert the same statistically significant impact on fund flows, with

differences in magnitude depending on the type if sentiment. Conventional funds seem to attract more inflows in periods of increased fear as captured by the CBOE volatility index VIX and the geopolitical risk index GPR. However, the Consumer Confidence Index CCI that captures broader information and economic sentiment exhibits an inverse relationship with fund flows, in consistency with the findings of (Fernandez-Perez et al., 2022), confirming that sustainable funds attract more inflows in periods of uncertainty due to the risk aversion nature of investors. Another important thing to note is that the difference between the reaction of sustainable ETFs flows and sustainable mutual funds flows to investor sentiment, might be due to the fact that sustainability is more achievable throughout active strategies and could depict better the preference of investors' towards sustainability. Let us not forget that even though ETFs offer great advantages in terms of costs and diversification, it might lack engagement and focus on sustainability. In our opinion, this might be the reason why we saw clearer results on the mutual funds' side and less insights from the models run on the ETFs sample.

These results answer our third hypothesis; however, they only give partial answers to our third hypothesis. We indeed observed different patterns of flows across conventional funds and sustainable funds leading us to confirm that investors do not look at conventional investments in the same way they consider sustainable investments, but this needs to be investigated further in the future.

Last but not least, our results lack acuity, and we assume that this might be due to the fact that we did not incorporate further independent such as measures of sustainability or control variables that could potentially provide clearer insights about the existence of a green sentiment. For example, (Briere & Ramelli, 2021) create a Green Sentiment Index that reflects changes in investor interest in environmental responsibility, and differs from other thematic indexes trying to capture the sentiment towards sustainability such as: Google Search Activity or news-based climate risk indexes. Furthermore, it is crucial to highlight that it is challenging for researchers to observe and quantify changes in sustainability preferences. Additionally, it is difficult to distinguish shifts in these preferences from changes in expectations about a fund's performance, management type, management fees, and investment strategies that are prioritized based on the economic cycle.

Finally, the concluding sections of this thesis present a summary of the key findings, an elaboration on the constraints encountered, and a discussion of potential avenues for future research in the field of sustainable investing and fund flows.

References

Agapova, A. (2011). Conventional mutual index funds versus exchange-traded funds. *Journal of Financial Markets*, *14*(2), 323-343. https://doi.org/10.1016/j.finmar.2010.10.005

Albuquerque, R., Koskinen, Y., & Zhang, C. (2019). Corporate Social Responsibility and Firm Risk : Theory and Empirical Evidence. *Management Science*, *65*(10), 4451-4469. https://doi.org/10.1287/mnsc.2018.3043

Amman, M., Bauer, C., Fischer, S., & Muller, P. (2017). *The Impact of the Morningstar Sustainability Rating on Mutual Fund Flows*. https://onlinelibrary.wiley.com/doi/abs/10.1111/eufm.12181

Avramov, D., Cheng, S., Lioui, A., & Tarelli, A. (2022). Sustainable investing with ESG rating uncertainty. *Journal of Financial Economics*, *145*(2), 642-664. https://doi.org/10.1016/j.jfineco.2021.09.009

Baker, M., & Wurgler, J. (2006). Investor Sentiment and the Cross-Section of Stock Returns. *The Journal of Finance*, *61*(4), 1645-1680. https://doi.org/10.1111/j.1540-6261.2006.00885.x

Bandopadhyaya, A., & Jones, A. L. (2008). *Measures Of Investor Sentiment : A Comparative Analysis Put-Call Ratio Vs. Volatility Index*. 8.

Barber, B. M., & Odean, T. (2008). All That Glitters : The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors. *Review of Financial Studies*, *21*(2), 785-818. https://doi.org/10.1093/rfs/hhm079

Barber, B. M., Odean, T., & Zheng, L. (2005). Out of Sight, Out of Mind : The Effects of Expenses on Mutual Fund Flows*. *The Journal of Business*, *78*(6), 2095-2120. https://doi.org/10.1086/497042

Basu, D., Hung, C.-H., Oomen, R. C. A., & Stremme, A. (2006). When to Pick the Losers : Do Sentiment Indicators Improve Dynamic Asset Allocation? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.889006

Becker, M. G., Martin, F., & Walter, A. (2022). The power of ESG transparency : The effect of the new SFDR sustainability labels on mutual funds and individual investors. *Finance Research Letters*, *47*, 102708. https://doi.org/10.1016/j.frl.2022.102708

Bengo, I., Boni, L., & Sancino, A. (2022). EU financial regulations and social impact measurement practices : A comprehensive framework on finance for sustainable development. *Corporate Social Responsibility and Environmental Management*, *29*(4), 809-819. https://doi.org/10.1002/csr.2235

Ben-Rephael, A., Kandel, S., & Wohl, A. (2012). Measuring investor sentiment with mutual fund flows. *Journal of Financial Economics*, *104*(2), 363-382. https://doi.org/10.1016/j.jfineco.2010.08.018

Boehmer, B., & Boehmer, E. (2003). Trading your neighbor's ETFs : Competition or fragmentation? *Journal of Banking & Finance*, *27*(9), 1667-1703. https://doi.org/10.1016/S0378-4266(03)00095-5

Bollen, J., Mao, H., & Zeng, X. (2011). Twitter mood predicts the stock market. *Journal of Computational Science*, *2*(1), 1-8. https://doi.org/10.1016/j.jocs.2010.12.007

Bollen, N. P. B. (2007). Mutual Fund Attributes and Investor Behavior. *Journal of Financial and Quantitative Analysis*, *42*(3), 683-708. https://doi.org/10.1017/S0022109000004142

Briere, M., & Ramelli, S. (2021). Green Sentiment, Stock Returns, and Corporate Behavior. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3850923

Brown, G. W., & Cliff, M. T. (2005). Investor Sentiment and Asset Valuation. *The Journal of Business*, *78*(2), 405-440. https://doi.org/10.1086/427633

Campbell, J. Y. (1991). A Variance Decomposition for Stock Returns. *The Economic Journal*, *101*(405), 157. https://doi.org/10.2307/2233809

Carmona, J., Delcoure, N., & Fernandez, F. H. (2024). The rise of sustainable, responsible and impact investing : ETFs and ESG. *International Journal of Portfolio Analysis and Management*, *2*(4), 285-315. https://doi.org/10.1504/IJPAM.2024.137752

CBOE Official Website. (2024). [jeu de données]. https://www.cboe.com/market_data_services/

Chau, F., Deesomsak, R., & Lau, M. C. K. (2011). Investor sentiment and feedback trading : Evidence from the exchange-traded fund markets. *International Review of Financial Analysis*, *20*(5), 292-305. https://doi.org/10.1016/j.irfa.2011.06.006

Chen, M.-P., Lee, C.-C., & Hsu, Y.-C. (2017). Investor sentiment and country exchange traded funds : Does economic freedom matter? *The North American Journal of Economics and Finance*, *42*, 285-299. https://doi.org/10.1016/j.najef.2017.07.015

Chevalier, J., & Ellison, G. (1997). Risk Taking by Mutual Funds as a Response to Incentives. *Journal of Political Economy*, *105*(6), 1167-1200. https://doi.org/10.1086/516389

Cremasco, C., & Boni, L. (2022). Is the European Union (EU) Sustainable Finance Disclosure Regulation (SFDR) effective in shaping sustainability objectives? An analysis of investment funds' behaviour. *Journal of Sustainable Finance & Investment*, 1-19. https://doi.org/10.1080/20430795.2022.2124838

Da, Z., Engelberg, J., & Gao, P. (2015). The Sum of All FEARS Investor Sentiment and Asset Prices. *Review of Financial Studies*, *28*(1), 1-32. https://doi.org/10.1093/rfs/hhu072

D'Ecclesia, R. L., Morelli, G., & Stefanelli, K. (2023). *Are the green ETFs really green?* [Sapienza University of Rome]. https://www.fcm.uni-

hannover.de/fileadmin/fmt/Conference_on_Climate_and_Energy_Finance/Session_1A/Are_the_green_ETFs_really_green.pdf

Dennis, P., & Mayhew, S. (2002). Risk-Neutral Skewness : Evidence from Stock Options. *The Journal of Financial and Quantitative Analysis*, *37*(3), 471. https://doi.org/10.2307/3594989

Edmans, A., Fernandez-Perez, A., Garel, A., & Indriawan, I. (2022). Music sentiment and stock returns around the world. *Journal of Financial Economics*, *145*(2), 234-254. https://doi.org/10.1016/j.jfineco.2021.08.014

Elton, E. J., Gruber, M. J., Comer, G., & Li, K. (2002). Spiders : Where Are the Bugs? *The Journal of Business*, *75*(3), 453-472. https://doi.org/10.1086/339891

Escrig-Olmedo, E., Jesus Munoz-Torres, M., & Fernandez-Izquierdo, M. A. (2010). *Socially responsible investing : Sustainability indices, ESG rating and information provider agencies*. https://www.inderscienceonline.com/doi/abs/10.1504/IJSE.2010.03549

European Central Bank—ECB Portal. (2024). [jeu de données]. https://data.ecb.europa.eu/data/data-categories/financial-markets-and-interest-rates/bank-interest-rates/cost-borrowing-indicators/data

Eurostat. (2024). [jeu de données]. https://ec.europa.eu/eurostat/databrowser/product/page/teibs010

Fernandez-Perez, A., Garel, A., & Indriawan, I. (2022). In the mood for sustainable funds? *Economics Letters*, *217*, 110691. https://doi.org/10.1016/j.econlet.2022.110691

Ferriani, F. (2023). The importance of labels for sustainable investments : SFDR versus Morningstar globes. *Applied Economics Letters*, 1-7. https://doi.org/10.1080/13504851.2023.2208326

Fortune, P. (1998, février). *Mutual Funds, Part II: Fund Flows and Security Returns*.

Fox, M., Nguyen, A., & Dumas, C. (2023). Effectiveness of not-for-profit labels and commercial ratings in guiding fund flows to sustainable investments. In *Management & Prospective* (Vol. 40, p. 141-154).

Fuchita, Y., Litan, R. E., Nomura Institute of Capital Markets Research, & Brookings Institution (Éds.). (2008). *Pooling money : The future of mutual funds*. Nomura Institute of Capital Markets Research ; Brookings Institution Press.

Galbreath, J. (2013). ESG in Focus : The Australian Evidence. *Journal of Business Ethics*, *118*(3), 529-541. https://doi.org/10.1007/s10551-012-1607-9

García, D. (2013). Sentiment during Recessions. *The Journal of Finance*, *68*(3), 1267-1300. https://doi.org/10.1111/jofi.12027

Geopolitical Risk Index Official Website. (2023). [jeu de données]. https://www.matteoiacoviello.com/gpr.htm

Greenwood, R., & Shleifer, A. (2014). Expectations of Returns and Expected Returns. *Review of Financial Studies*, *27*(3), 714-746. https://doi.org/10.1093/rfs/hht082

Guercio, D. D., & Tkac, P. A. (2008). Star Power : The Effect of Monrningstar Ratings on Mutual Fund Flow. *Journal of Financial and Quantitative Analysis*, *43*(4), 907-936. https://doi.org/10.1017/S0022109000014393

Hartzmark, S. M., & Sussman, A. B. (2019). Do Investors Value Sustainability? A Natural Experiment Examining Ranking and Fund Flows. *The Journal of Finance*, *74*(6), 2789-2837. https://doi.org/10.1111/jofi.12841

He, Z. (2023). Geopolitical risks and investor sentiment : Causality and TVP-VAR analysis. *The North American Journal of Economics and Finance*, *67*, 101947. https://doi.org/10.1016/j.najef.2023.101947

Henriques, A. C. L. P. les détails de l'auteur . (2022). *Henriques, A. C. L. (2022). The performance of ETFs aligned with sustainable development goals and ESG ETFs (Doctoral dissertation, Universidade do Minho (Portugal))*. [Universidade do Minho]. https://www.proquest.com/openview/0e3e9c35d5e4f422b4ead98c8959cf1a/1?pq-origsite=gscholar&cbl=2026366&diss=y

Hodrick, R. J. (1992). Dividend Yields and Expected Stock Returns : Alternative Procedures for Inference and Measurement. *Review of Financial Studies*, *5*(3), 357-386. https://doi.org/10.1093/rfs/5.3.351

HROß, S., Vogt, C., & Zagst, R. (2010). SOCIALLY RESPONSIBLE INVESTMENTS. In R. Kiesel, M. Scherer, & R. Zagst, *Alternative Investments and Strategies* (p. 3-20). WORLD SCIENTIFIC. https://doi.org/10.1142/9789814280112_0001

Huang, J., Wei, K. D., & Yan, H. (2022). Investor learning and mutual fund flows. *Financial Management*, *51*(3), 739-765. https://doi.org/10.1111/fima.12378

Ippolito, R. A. (1992). Consumer Reaction to Measures of Poor Quality : Evidence from the Mutual Fund Industry. *The Journal of Law and Economics*, *35*(1), 45-70. https://doi.org/10.1086/467244

Ivković, Z., & Weisbenner, S. (2009). Individual investor mutual fund flows☆. *Journal of Financial Economics*, *92*(2), 223-237. https://doi.org/10.1016/j.jfineco.2008.05.003

Jank, S. (2012). Mutual fund flows, expected returns, and the real economy. *Journal of Banking & Finance*, *36*(11), 3060-3070. https://doi.org/10.1016/j.jbankfin.2012.07.004

Jiang, Y., Guo, F., & Lan, T. (2010). Pricing Efficiency of China's Exchange-Traded Fund Market. *The Chinese Economy*, *43*(5), 32-49. https://doi.org/10.2753/CES1097-1475430503

Kalaycıoğlu, S. (2006, février 7). *Exchange Traded Fund Flows*. 32.

Kaustia, M., & Yu, W. (2021). Greenwashing in Mutual Funds. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3934004

Kopsch, F., Song, H.-S., & Wilhelmsson, M. (2015). Determinants of mutual fund flows. *Managerial Finance*, *41*(1), 10-25. https://doi.org/10.1108/MF-06-2013-0161

Krueger, P., Sautner, Z., & Starks, L. T. (2020). The Importance of Climate Risks for Institutional Investors. *The Review of Financial Studies*, *33*(3), 1067-1111. https://doi.org/10.1093/rfs/hhz137

Kurov, A. (2008). Investor Sentiment, Trading Behavior and Informational Efficiency in Index Futures Markets. *Financial Review*, *43*(1), 107-127. https://doi.org/10.1111/j.1540-6288.2007.00188.x

Lee, C. M. C., Shleifer, A., & Thaler, R. H. (1991). Investor Sentiment and the Closed-End Fund Puzzle. *The Journal of Finance*, *46*(1), 75. https://doi.org/10.2307/2328690

Lindemann, J. (2023). *Are article 9 funds superior ? A comprehensive empirical analysis of the SFDR regulation on its efficacy, flows and performance*. http://hdl.handle.net/10400.14/42851

Madura, J., & Richie, N. (2010). Overreaction of Exchange-Traded Funds During the Bubble of 1998–2002. In B. Bruce (Éd.), *Handbook of Behavioral Finance*. Edward Elgar Publishing. https://doi.org/10.4337/9781849809108.00013

Marszk, A., & Lechman, E. (2019). New technologies and diffusion of innovative financial products : Evidence on exchange-traded funds in selected emerging and developed economies. *Journal of Macroeconomics*, *62*, 103064. https://doi.org/10.1016/j.jmacro.2018.10.001

Marszk, A., & Lechman, E. (2024). What drives sustainable investing? Adoption determinants of sustainable investing exchange-traded funds in Europe. *Structural Change and Economic Dynamics*, *69*, 63-82. https://doi.org/10.1016/j.strueco.2023.11.018

Miguel Unzue, E. (2023). *Does climate change affect the trading volume of sustainable funds?* [Université catholique de Louvain]. http:// hdl.handle.net/2078.1/thesis:41599

Morningstar. (2024). *Global Sustainable Fund Flows : Q1 2024 in Review*. Morningstar. https://www.morningstar.com/lp/global-esg-flows

Naqvi, B., Rizvi, S. K. A., Hasnaoui, A., & Shao, X. (2022). Going beyond sustainability : The diversification benefits of green energy financial products. *Energy Economics*, *111*, 106111. https://doi.org/10.1016/j.eneco.2022.106111

Nguyen, V., Van Ness, B. F., & Van Ness, R. R. (2007). Inter-market competition for exchange traded funds. *Journal of Economics and Finance*, *31*(2), 251-267. https://doi.org/10.1007/BF02751646

Noman, A., & Naka, A. (2019). *Predicting Return on Socially Responsible Investment Funds with Market Fundamental and Consumer Confidence*. 20.

OECD Data. (2024). [jeu de données]. https://data.oecd.org/leadind/consumer-confidence-index-cci.htm#:~:text=confidence%20index%20(CCI)-,This%20consumer%20confidence%20indicator%20provides%20an%20indication%20of%20future%20developments,unemployment%20and%20capability%20of%20savings.

Parguel, B., Benoît-Moreau, F., & Larceneux, F. (2011). How Sustainability Ratings Might Deter 'Greenwashing' : A Closer Look at Ethical Corporate Communication. *Journal of Business Ethics*, *102*(1), 15-28. https://doi.org/10.1007/s10551-011-0901-2

Riedl, A., & Smeets, P. (2017). Why Do Investors Hold Socially Responsible Mutual Funds? *The Journal of Finance*, *72*(6), 2505-2550. https://doi.org/10.1111/jofi.12547

Rompotis, G. G. (2023). Do ESG ETFs "Greenwash"? Evidence from the US Market. *The Journal of Impact and ESG Investing*, *3*(4), 49-63. https://doi.org/10.3905/jesg.2023.1.070

Ruiz, J. L. (2018). Financial development, institutional investors, and economic growth. *International Review of Economics & Finance*, *54*, 218-224. https://doi.org/10.1016/j.iref.2017.08.009

Schmeling, M. (2007). Institutional and individual sentiment : Smart money and noise trader risk? *International Journal of Forecasting*, *23*(1), 127-145. https://doi.org/10.1016/j.ijforecast.2006.09.002

Schütze, F., & Stede, J. (2024). The EU sustainable finance taxonomy and its contribution to climate neutrality. *Journal of Sustainable Finance & Investment*, *14*(1), 128-160. https://doi.org/10.1080/20430795.2021.2006129

Sentix Data. (2024). [jeu de données]. https://www.sentix.de/index.php/en/

Shiller, R. (1994). *Stock Prices and Social Dynamics*. https://www.brookings.edu/wp-content/uploads/1984/06/1984b_bpea_shiller_fischer_friedman.pdf

Signori, S. (2020). Socially Responsible Investors : Exploring Motivations and Ethical Intensity. In L. San-Jose, J. L. Retolaza, & L. Van Liedekerke (Éds.), *Handbook on Ethics in Finance* (p. 1-23). Springer International Publishing. https://doi.org/10.1007/978-3-030-00001-1_5-1

Silvola, H., & Landau, T. (2021). *Sustainable Investing : Beating the Market with ESG*. Springer International Publishing. https://doi.org/10.1007/978-3-030-71489-5

Sirri, E. R., & Tufano, P. (1998). Costly Search and Mutual Fund Flows. *The Journal of Finance*, *53*(5), 1589-1622. https://doi.org/10.1111/0022-1082.00066

Small, K., Wansley, J., & Hood, M. (2012). The impact of security concentration on adverse selection costs and liquidity : An examination of exchange traded funds. *Journal of Economics and Finance*, *36*(2), 261-281. https://doi.org/10.1007/s12197-009-9117-z

Sun, L., Najand, M., & Shen, J. (2016). Stock return predictability and investor sentiment : A high-frequency perspective. *Journal of Banking & Finance*, *73*, 147-164. https://doi.org/10.1016/j.jbankfin.2016.09.010

Tsalikis, G. (2020). *Exchange traded funds in Europe and the US : Performance and tracking errors* [Πανεπιστήμιο Μακεδονίας, Σχολή Επιστημών Διοίκησης Επιχειρήσεων, Τμήμα Λογιστικής και Χρηματοοικονομικής]. https://doi.org/10.12681/eadd/47694

Van der Beck, P. (2021). *Flow-driven ESG returns*. (21-71).

Wang, F., Yan, X. (Sterling), & Zheng, L. (2021). Should Mutual Fund Investors Time Volatility? *Financial Analysts Journal*, *77*(1), 30-42. https://doi.org/10.1080/0015198X.2020.1822705

Warther, V. A. (1995). Aggregate mutual fund flows and security returns. *Journal of Financial Economics*, *39*(2-3), 209-235. https://doi.org/10.1016/0304-405X(95)00827-2

Whaley, R. E. (2009). Understanding the VIX. *The Journal of Portfolio Management*, *35*(3), 98-105. https://doi.org/10.3905/JPM.2009.35.3.098

Yu, J., & Yuan, Y. (2011). Investor sentiment and the mean–variance relation☆. *Journal of Financial Economics*, *100*(2), 367-381. https://doi.org/10.1016/j.jfineco.2010.10.011

Zhou, G. (2018). Measuring Investor Sentiment. *Annual Review of Financial Economics*, *10*(1), 239-259. https://doi.org/10.1146/annurev-financial-110217-022725

Zwergel, B., & Klein, C. (2006). On the Predictive Power of Sentiment—Why Institutional Investors are Worth Their Pay. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.965890