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# An event study on the impact of the Sustainable Finance Disclosure Regulation on mutual fund inflows and Morningstar Sustainability Ratings


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The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

# Abstract

I examine the impact of the Sustainable Finance Disclosure Regulation (SFDR) on the net monthly flows and the Morningstar Sustainability Ratings of mutual funds based in the European Union from January 2019 to March 2022 via an event study method and fixed effects and random effects panel regressions. I find that funds that were required to comply with SFDR have higher sustainability ratings after the announcement of SFDR on November 2019 while the impact of the SFDR on the flows of EU funds after March 2021 is insignificant. Funds with higher sustainability ratings had smaller outflows than funds with lower ratings. Article 6 and 8 funds saw larger outflows than Article 9 funds. The evidence indicates that investors value high sustainability funds more than low sustainability funds.

Keywords: ESG, fund flows, mutual funds, sustainability ratings, policy intervention.

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# 1. Introduction

Inflows into mutual funds that incorporate environmental, social and governance (ESG) factors have grown over the past 10 years. Concerns about the trade-off between returns and sustainability have accompanied rising interest in and regulatory scrutiny of ESG investment products (Quinn et al., 2021). In 2018, the European Commission published its action plan on sustainability that aimed to orient capital flows towards a more sustainable economy, to integrate sustainability into risk management, and to foster transparency and long-termism. The three main accompanying regulations are Climate Benchmarks Regulation (EU 2019/2089), the Sustainable Finance Disclosure Regulation (EU 2019/2088), and the Taxonomy Regulation (EU 2020/852).

In this paper, I investigate the effect of the Sustainable Finance Disclosure Regulation (SFDR) on European mutual funds by comparing the changes in sustainability ratings and net flows of EU funds to funds domiciled in the United States and thus unaffected by the SFDR. I also investigate whether changes in net flows depend on whether a fund is classified as Article 6, 8, or 9. I use various techniques to assess the impact of the SFDR on mutual funds such as event study, difference-in-differences interaction terms, fixed effects panel regressions, and random effects panel regressions.

My thesis adds to the literature on ESG and mutual funds by examining how a policy intervention impacts the behavior of investors who buy ESG funds. The findings contribute to how a certain type of an exogenous shock impacts fund flows and classifications. I find evidence that after the publication of SFDR, EU funds tend to have higher Morningstar Sustainability Ratings and that after the effective date of SFDR, EU funds tend to have larger outflows than US funds. However, the impact of the SFDR on fund flows is overall insignificant. EU funds with higher sustainability ratings had smaller outflows than funds with lower ratings. Article 8 and 9 funds had smaller outflows than Article 6 funds. Article 9 funds had slightly smaller outflows than Article 8 funds. I infer that investors prefer to hold funds with higher sustainability ratings, possibly because Article 9 funds tend to have higher ratings and they might believe that such funds are more likely to comply with the SFDR.

This paper is structured as follows. Section 2 presents background information on ESG investing, regulations, and ratings. Section 3 contains a review of relevant literature. Section 4 outlines the data collection and sample selection process. Section 5 describes the research methodology. Section 6 discusses the results. Section 7 concludes the paper with a discussion for further research and the future of ESG investing.

## 2. Motivation & Background

### 2.1 ESG Investing: Definition, Interest, Inflows, Ratings

ESG investing is the consideration of environmental, social, and governance criteria in the investment process. Environmental factors include the level of greenhouse gas emissions and damage done to ecosystems such as forests and oceans. Social factors include compliance with human rights, labor regulations, and workplace health and safety codes. Governance factors include how well a company adheres to a set of principles that define the rights and responsibilities of various stakeholders. In the Principles for Responsible Investment (UNPRI), the United Nations defined responsible investment as an investing approach that incorporates ESG factors into investment decisions to generate long-term sustainable returns and to better manage risk.

Over the past two decades, concerns about ESG issues and corporate governance practices of businesses have risen among investors and consumers. The increasing number of mutual funds that claim to consider ESG factors in investment and voting decisions indicate the rising interest in ESG investing. Inflows into funds labeled "sustainable" have risen from $13.3 billion in 2012 to $21.4 billion in 2014 (Global Sustainable Investment Alliance, 2014). The collect assets under management of RPI signatories is US$103.4 trillion as of 31 March 2020 (Principles for Responsible Investment, 2020).

ESG mutual funds are portfolios of equities, bonds, money market instruments, and other assets that consider ESG factors in the investment process. Third party rating agencies such as Morningstar derive sustainability ratings that assess ESG mutual funds on dimensions such as carbon footprints and labor disputes. The score provides a simple snapshot of how "sustainable" a mutual fund is. The growth of ESG investing has prompted debate on the way asset managers incorporate ESG criteria to build portfolios and select funds.

There are several ways that asset managers consider ESG data into the investment process. First, they can evaluate funds or assets based on ESG criteria. They can exclude assets from their portfolios via negative screening or buy assets that meet ESG related criteria or goals via positive screening (Sandberg et al., 2009). Second, asset managers can attempt to influence companies or help them to perform better on ESG criteria via engagement. Engagement can include funds voting with shares of portfolio companies, meeting with management, supporting shareholder proposals, or initiating litigation. Third, funds can engage in impact investing by investing in companies that explicitly aim to achieve goals that benefit society such as a firm that produces renewable energy.

Most empirical literature on ESG mutual funds focuses on the differences between the costs, returns, and performance of conventional funds and ESG funds (Renneboog et al., 2008; Hong & Kacperczyk, 2009; Utz et al., 2014). Gil-Bazo et al. (2010) compared the differences between the pre-fee and post-fee financial performance of conventional funds and SRI funds. They found that there are no significant differences in fees and that SRI funds have a higher post-fee, risk-adjusted return than comparable conventional funds.

Pérez-Gladish et al. (2013) found that there is no statistically significant difference in the performance of SRI funds and conventional funds. Nofsinger and Varma (2014) showed that funds that regularly engage in shareholder activism significantly outperform regular funds during crises but do not outperform regular funds in non-crisis periods. Leite and Cortez (2015) studied the performance of French mutual funds in market crises and regular times. They found that SRI funds underperformed conventional funds in regular times and attributed the underperformance to SRI funds that used negative screenings. SRI funds that employed positive screening mechanisms and conventional funds do not have a statistically significant difference in performance. Bechetti et al. (2015) compared funds of various sizes and domiciles and found that SRI funds outperformed conventional funds during the 2008 Great Financial Crisis.

There are various ways that funds can communicate how they incorporate ESG into the investment process. In general, there is information asymmetry between buyers or consumers and sellers or producers (Akerlof, 1970). In financial markets, asset managers know more about mutual funds than investors. Information asymmetry introduces transaction costs from identifying top performing funds. Thus, asset managers wish to either reduce information asymmetry or use it to their advantage. Asset managers can reduce information asymmetry by sending a signal to investors (Spence, 1973; Riley, 1979). An example of a signal is selecting a name that makes it easy or difficult for potential investors to discern characteristics of a fund. Opportunistic asset managers can obfuscate information by providing inaccurate or unsubstantiated information about funds (Ellison and Ellison, 2009; Flammer, 2021) or select a misleading name for a fund to change investors' perception (Cooper et al., 2005; Espenlaub et al., 2017).

While ESG funds can communicate their strategies via their names, there is no universal definition or criteria for "green," "ESG," or "sustainable" funds. Funds that claim to incorporate ESG information also must consider and balance information across the three categories. Funds can provide information that help investors to determine the fund's notion of ESG aligns with the investor's preferences. Through the summary prospectus, statutory prospectus, and statement of additional information, funds disclose their investment goals,

portfolio holdings, how they incorporate ESG criteria and use ESG data, policies on engagement and voting, and whether they benchmark themselves to an index. El Ghoul and Karoui (2021) studied how changes in fund names impact flows and discovered that US asset managers have changed the names of funds to sustainability-related names to signal their commitment.

Greenwashing is the practice of conveying misleading or unsubstantiated information about a financial product to give the impression that it is more sustainable or socially responsible. Investors may have difficulty in evaluating extra-financial or ESG performance of mutual funds, thereby allowing asset managers to get away with greenwashing. To help investors distinguish ESG funds from conventional funds, third party nonprofit organizations such as the Forum for Sustainable and Responsible Investment (USSIF) published criteria while non-financial rating agencies such as Novethic issued certifications and scores.

However, ratings may be distorted if they are based only on declarations provided by asset managers (Statman and Glushkov, 2016). Investors may supplement information from asset managers with ratings from parties such as Morningstar or Thomson Reuters. ESG scores issued by rating agencies vary depending on the methodology and data used, which can confuse investors. Some countries have started to issue regulations to combat greenwashing by compelling asset managers to provide standardized, transparent information. To demonstrate their commitment to the United Nation's 2030 Agenda and Sustainable Development Goals (SDGs) and international agreements such as the Paris Climate Agreement, countries have released drafts of regulatory frameworks on ESG investing and disclosures.

## 2.2 Regulations in ESG Investing

As interest in ESG funds grow, financial regulators have started to scrutinize practices related to sustainable finance and draft regulations to make ESG practices more consistent and transparent, especially those related to ESG ratings, investing approaches, taxonomies, product disclosure, and marketing. Regulations can curb greenwashing by requiring funds to disclose how they plan to commit to ESG investing or help portfolio firms to work towards ESG objectives. To help investors to easily compare and verify information, disclosure should be based on standardized metrics and criteria such as greenhouse gas emissions, percentage of women in a firm's board of directors. Regulations can include requirements governing communications and conduct with retail investors so that they understand

information disclosed by funds and use that information to make investment decisions matching their preferences.

According to the European Commission, sustainable finance incorporates ESG considerations into investment decisions and leads to long-term investments into sustainable economic activities and projects. Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment will introduce a sustainable finance taxonomy presenting criteria for determining if an economic activity is environmentally sustainable. The EU Action Plan on Sustainable Finance outlines a regulatory framework to promote sustainable finance. In March 2021, the European Commission's Technical Expert Group on Sustainable Finance published a final report on the EU Taxonomy outlining taxonomies and clarifying labels of sustainable financial products. On June 2020, the three European Supervisory Authorities – European Securities and Market Authority, European Insurance and Occupational Pensions Authority, and European Banking Authority – published a consultation paper on proposed ESG disclosure standards for financial market participants (FMPs), advisers, and products. These standards were developed under the SFDR to improve the transparency and quality of disclosure of ESG information to investors.

According to Pacces (2021), EU regulations can help align the incentives of financial market participants with the sustainability preferences of investors. First, the SFDR requires financial market participants to publish information about the impact of their investments on sustainability. Second, the Taxonomy Regulation requires financial market participants to substantiate any claim that states an investment has an impact on achieving sustainability goals and the information aligns with a standardized taxonomy of sustainable economic activities.


## 2.3 Sustainable Finance Disclosure Regulation

The European Parliament and Council published Regulation (EU) 2019/2088 of 27 November 2019 on sustainability-related disclosure in the financial services sector (SFDR). From 10 March 2021, the Regulation applies to financial market participants and financial advisers that provide investment advice, insurance advice or portfolio management. The Regulation requires financial market participants and advisers to disclose sustainability risks and how funds promote ESG characteristics and to inform investors how they consider sustainability risks in their investment process and what metrics they use to evaluate ESG factors of investments. Financial market participants must disclose the Principal Adverse Impacts (PAIs) of their investments on sustainability factors and the ways they mitigate

sustainability risk on their websites and reports. The Regulatory Technical Standards, which will apply from 2022, provide templates for the disclosure and indicators of principal adverse impacts. If financial market participants do not choose to disclose information, they must explain why they do not consider sustainability risks to be relevant to products and consider the principal adverse impacts of their investment decisions.

Financial market participants are required to classify products according to three discrete and mutually exclusive categories: Article 6, 8, or 9. Article 6 funds do not integrate sustainability factors into the investment process but are required to explain how they consider sustainability risks in investing decisions. If Article 6 funds do not deem sustainability risks or Principal Adverse Impacts to be relevant, they are required to provide an explanation. Article 8 funds promote environmental and social (ES) characteristics, invest in companies that follow good governance practices, and disclose how they promote ES characteristics. These funds must disclose how they align with the EU Taxonomy. Article 9 funds have sustainable investment as their objective, concretely disclose how they aim to achieve the objective, and designate a market index fund as a reference benchmark.

SFDR provides new definitions of "sustainable investments," "sustainable risks," and "sustainable factors." Sustainability factors are "environmental, social and employee matters, respect for human rights, anti-corruption and anti-bribery matters." Sustainability risk is an ESG event or condition that may cause a material negative impact on the value of an investment. A sustainable investment is an investment that contributes to an environmental goal or a social objective (European Parliament, 2019). Examples of environmental objectives include the efficient use of energy, renewable energy, raw materials, water and land, waste production, greenhouse gas emissions, impact on biodiversity and the circular economy. Examples of social objectives include tackling inequality, fostering social cohesion, social integration, labor relations, investing in human capital or economically or socially disadvantage communities. It is also a given that the investee companies comply with good governance practices, particularly those regarding tax compliance, sound management structures, and employee relations and remuneration.

## 2.4 Morningstar Sustainability Ratings

The Morningstar Sustainability Rating (MSR) is calculated and provided by Morningstar since 1 March 2016 for over 24,000 US mutual funds and 50,000 EU funds. The rating gives each fund a score of one, two, three, four, or five globes based on how the fund deals with the ESG issues of its underlying holdings according to research conducted by the ESG research and ratings firm Sustainalytics. Each holding is assigned a sustainability score and a fund's

rating comes from the weighted average score of the holdings. The purpose of the rating is to help investors assess to what degree their portfolios are exposed to ESG risks that are not responsibly managed by investee companies.

The Morningstar Sustainability Rating is calculated the following way. First, Morningstar identifies which portfolio holdings are exposed to material ESG risks and which holdings fall under the corporate risk or sovereign risk rating frameworks. Second, the Portfolio Corporate Sustainability Score and Portfolio Sovereign Sustainability Score for the past 12 months are calculated for each portfolio. Third, those scores are used to calculate the Historical Corporate Sustainability Score and Historical Sovereign Sustainability Score. Fourth, the Historical Corporate Sustainability Score and Historical Sovereign Sustainability Score of a portfolio are compared to other historical scores within the same Morningstar Global Category and given a rating from one to five to determine a Portfolio Corporate Sustainability Rating and Portfolio Sovereign Sustainability Rating. Fifth, the weighted average of the Corporate Rating and the Sovereign Rating depending on the relative contribution of the corporate and sovereign positions within an overall fund is taken and rounded to the nearest whole number.

The Morningstar Sustainability Rating for a corporate issuer is calculated using ESG Risk Ratings from Sustainalytics, which calculates the degree to which a company's enterprise value is at risk due to unmanaged ESG risks. The overall unmanaged risk is measured by calculating the company's exposure to and management of material ESG issues. The ESG Risk Ratings are an absolute risk assessment that can be compared across industries. A five-globe fund is ranked in the top 10% of funds in its category. A four-globe fund is in the top 10-32.5% of funds. A three-globe fund is in the top 32.5-67.5%. A two-globe fund is in the top 67.5-90% of funds. A one-globe fund is the bottom 10% of funds.

The Morningstar Sustainability Rating (including Portfolio Corporate and Sovereign Sustainability Scores, Historical Corporate and Sovereign Scores, and Portfolio Corporate and Sovereign Sustainability Ratings) is issued one month and six business days after the reported publication date for the company and country data.

## 2.5 Mutual Funds by SFDR Article Classification and Morningstar Sustainability Ratings

According to Morningstar, product offerings of and inflows into Article 8 and 9 funds increased in 2021. In the second quarter of 2021, 42% of the new funds in the universe were launched as either Article 8 or 9 funds and inflows into Article 8 and 9 amounted to 44% of

total inflows within the universe of Morningstar funds. In the third quarter of 2021, 50% of the new funds in the universe were launched as either Article 8 or 9 funds and inflows into Article 8 and 9 amounted to 57% of total inflows within the universe of Morningstar funds (Bioy et al., 2022).

The SFDR is meant to promote transparency and disclosure rather than to incentivize asset management companies to change fund names and labels. According to Goldman Sachs, asset managers have challenges with selling and marketing Article 6 funds, thus putting pressure on asset managers and investors to shift flows towards Article 8 or 9 funds. As clients increasingly demand ESG funds, there is increasing pressure on asset managers to relabel or launch funds as Article 8 or 9. Even though the number of Article 6 funds are two times larger than the number of Article 8 and 9 funds combined, flows into Article 8 and 9 funds from January 2019 to January 2022 totaled US$902 billion while flows into Article 6 totaled US$601 billion. From the same period, the number of Article 6 equity funds was 5,748 and fixed income funds was 4,272; the number of Article 8 equity funds was 3,576 and fixed income funds was 2,021; the number of Article 9 equity funds was 613 and fixed income funds was 220 (Tylenda et al., 2022).

From April 2021 to January 2022, Article 6, 8, and 9 funds witnessed net inflows. However, from February to June 2022, Article 6 and 8 funds saw net outflows while only Article 9 funds saw net inflows. According to Morningstar, Article 8 funds saw outflows of €2.1 billion in the first quarter of 2022 and €30.3 billion in the second quarter due to geopolitical conflicts, market volatility, and rising inflation. However, Article 9 funds saw inflows of €10 billion in the first quarter and €5.9 billion in the second quarter of 2022 (Bioy et al., 2022).

By comparing the Morningstar Sustainability Ratings of Article 6, 8 and 9 funds, we can see whether Article 8 and 9 funds meet their legal obligations and limit exposures to ESG risk. In June 2022, 33.6% of Article 6 funds, 51.6% of Article 8 funds and 71.8% of Article 9 funds received 4 or 5 globe ratings. Indeed, the percentage of Article 9 funds with 4 or 5 globe ratings increased at the expense of Article 6 funds in 2022. This confirms the intuitive hypothesis that Article 8 and 9 funds would manage ESG risks better than Article 6 funds.

# 3. Literature Review & Theory

Academic research on ESG funds primarily have focused on the topic of risk-adjusted returns (Pedersen et al., 2021; Pástor et al., 2021), how changes in sustainability ratings of funds impact fund flows (Hartzmark & Sussman, 2019; Ammann et al., 2019), and how institutional holders of mutual funds vote in ESG proposals (Michaely et al., 2022). However, there is little research on how regulatory changes impact fund flows, labeling, and sustainability ratings. Therefore, this paper investigates the effect of the SFDR on how EU mutual funds change their sustainability ratings as measured by the Morningstar Sustainability Ratings and the categories under SFDR. I also investigate if demand for funds with higher sustainability ratings increase after the announcement of the SFDR on 27 November 2019 and after the required implementation on 10 March 2021 and if changes in net inflows depend on whether a fund is labeled as an Article 6, 8, or 9 fund.

## 3.1 ESG Labels and Disclosure of Information

The purpose of disclosure is to provide consumers with information to aid them make better choices, to ensure that asset prices reflect all information, and to bolster increased public confidence in the financial markets. The comparability of fund-specific information and the standardization of disclosure format, timing and requirements help investors to be more confident about the transparency and efficiency of financial markets. The effectiveness of regulation governing disclosure depends on the effectiveness and quality of enforcement.

Several researchers have investigated whether ESG ratings or labels encourage investors to invest in sustainable funds and whether funds that are rated more sustainable receive more money from investors. Pacces (2021) claimed that the introduction of mandatory, standardized disclosure of sustainability information to the EU Taxonomy Regulation has the following positive effects. First, the regulation may align the interest of institutional investors with the interest of their beneficiaries and discourage greenwashing as the beneficiaries will have an easier time comparing information across products. Second, the Regulation may incentivize institutional investors to use their voice to encourage companies in their portfolios to pursue sustainable corporate governance and policies. Third, investors may be able to make better comparisons and decisions as financial market participants are required to provide information based on the same standards.

Mugerman et al. (2022) analyzed the impact of a regulation that alerted investors of the potential credit risk of junk bond investments. In 2009, the Israel Securities Authority introduced a regulation that required mutual fund managers to add an exclamation mark to

the names of mutual funds that held high-yield corporate bonds more than their maximum exposure to equity investments, thus increasing the salience of risk disclosure on mutual fund flows without changing the quantity or quality available to the public. They discovered that fixed income mutual funds that added an exclamation mark to their names experienced a statistically significant reduction in net flows, where the decline in fund inflows was greater than the rise in fund outflows. The addition of the exclamation mark on fund names led to a 1% reduction in net mutual fund inflows.

## 3.2 Fund Flows and Exogenous Shocks

Albuquerque et al. (2021) invested the trading behavior of actively managed equity mutual funds during the COVID-19 market crash. ESG funds, and to a lesser extent non-ESG funds, contributed to the resilience of ES stocks during the crash by aggressively buying them. In response to fund outflows, ESG and non-ESG funds sold non-ES stocks more aggressively than ES stocks. There is weak evidence that ESG funds sold less stocks during the crisis.

In the first half of 2020 during the crash, the ESG orientation of funds is strongly and negatively associated with net sales once controlled for fund flows. Whether during the crash or not, the negative impact of inflows on net sales is more evident and salient for ESG funds than for non-ESG funds. Albuquerque et al. theorized that mutual fund investor behavior and fund managers' portfolio allocation choices might have contributed to how ES stocks exhibited resilience during the COVID-19 crash. They found no difference in net sales between ESG funds and non-ESG funds towards ES stocks versus non-ES stocks in response to fund inflows. Since prior research from Pastor and Vorsatz (2020) showed that ESG-funds experienced inflows during the crash, Albuquerque et al. concluded that inflows into ESG funds can explain why ES stocks showed resiliency during February and March 2020.

Pastor and Vorsatz (2020) analyzed the flows and performance of US. actively managed equity mutual funds during the COVID-19 crash. During the crisis, most active funds underperform passive benchmarks while funds with high Morningstar Sustainability Ratings and high star ratings performed well. Investors prefer funds with high sustainability ratings, especially environmental scores, while non-ESG funds mostly experienced outflows. Their findings suggest that investors valued sustainability during the crisis. Net sales of non-ESG stocks become increasingly sensitive to fund outflows during the crash while the sensitivity of net sales of ES stocks to fund outflows did not increase. The sensitivity of net sales to outflows for ES stocks stayed stable in the crash period. Pastor and Vorsatz concluded that non-ESG funds contributed heavily to the resilience of ES stocks.

## 3.3 Fund Flows and Changes in Fund Names

Literature indicates that changes in fund names lead to changes in fund flows and turnovers but no changes in subsequent returns. El Ghoul & Karoui (2021) examined 28 mutual funds that changed their names to sustainability-related names between 2003 and 2018. Each fund with a name change is matched with a similar fund without a name change with the closest propensity score based on similar characteristics: age, total net assets, style, and expense ratios. They observed that in the subsequent year funds with name changes demonstrate an increase in fund flows by 14.16% per year, a significant increase in portfolio turnover, and no substantial change in fund alpha and betas.

Cooper et al. (2005) examined whether changes in the names of mutual funds impact fund inflows and performance after controlling for characteristics such as fees, performance, total net assets, fund flow, and standard deviation of returns. One year after a fund changes its name to reflect a current popular investment style, the fund experiences no improvement in returns but an average cumulative abnormal flow of 28%. Further, funds whose holdings match the style implied by the new name experience similar increase in flows while funds whose holdings do not match the style experience no change in flows. Their findings imply that investors are impacted by cosmetic changes.

## 3.4 Fund Flows and Changes in Morningstar Ratings

Ammann et al. (2017) examined how the introduction of Morningstar Sustainability Rating in March 2016 impact mutual fund flows after controlling for characteristics such as 12-month alpha, performance rating, log total net assets, fund age, expense ratio, and turnover ratio. They found that retail investors shift money away from low-rated funds to high-rated funds and react more strongly than institutional investors to the exogenous shock of the availability of sustainability information. The average retail fund with a high Morningstar Sustainability Rating received between $4.1 million and $10.1 million higher net flows while the average retail fund with a low Morningstar Sustainability Rating suffered from $1.0 million to $5.0 million lower net flows than the average fund with an average sustainability rating during the first year after the publication of the Rating.

Hartzmark and Sussman (2019) demonstrated that mutual fund investors treat sustainability as a positive attribute and allocate more money to funds with the highest ratings after the initial publication of Morningstar Sustainability Ratings in March 2016. Before the ratings were published online, funds received similar levels of flows. After the ratings were

published, the funds with the highest sustainability rating experienced inflows of 4% of fund size over the next 11 months while funds with the lowest sustainability rating experienced outflows of 6% of fund size.

**Graph 1: Timeline of the Sustainable Finance Disclosure Regulation**

This graph shows the timeline of events relevant to this study.



| 2019 | January | November | 2020 | 2021 | March | 2022 | March |
|------|---------|----------|------|------|-------|------|-------|
| | Start of Sample | Announcement of SFDR | | | Required compliance with SFDR | | End of Sample |
| | | | | | Introduction of SFDR Article Classification | | |
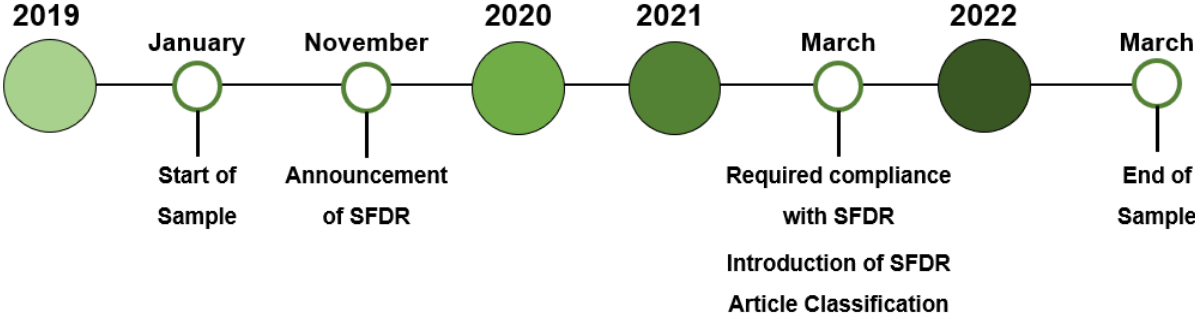
## 4. Data

I gather data from the Morningstar Direct database on each fund's monthly Sustainability Rating, net asset value, return in percentage terms, inception date, global category, and SFDR classification. The Morningstar Sustainability Rating of a fund is assessed based the ESG risk of individual securities. The rating of the fund is calculated based on comparison with its peer group comparison. Morningstar ranks mutual funds on a scale from one (worst) to five (best) within their global category. Morningstar also provides fund categories based on underlying holdings and data on each fund's SFDR classification: Article 6, 8, or 9. As each fund has unique characteristics over time, the dataset is a panel data.

To measure investors' reaction to the regulation, I use the most recent Morningstar Sustainability Rating at the beginning of a month and lag all control variables by one month. If investors react to new information from the Article classification after March 2021, they will buy Article 8 or 9 funds and sell Article 6 funds. However, the effect should not happen before the publication of the Article classification, which occurred in March 2021. I split my sample in two parts: one from January 2019 to March 2021 before SFDR compliance is mandatory, and the other from March 2021 to March 2022 after SFDR compliance is mandatory.

To examine fund flows and rating changes, I compare EU funds to US funds and create two samples. The first sample contains all US funds, which do not have SFDR classifications in Morningstar. I classify these funds as Article 0. The second sample contains all EU funds with a SFDR classification in Morningstar. There is only one datapoint for SFDR classification which was given on March 2021. Fund flows, age, net assets, and monthly return are winsorized at the 1% level and 99% level. First, I extract data on 24,720 US funds and 43,533 EU funds from Morningstar Direct. Then, I remove observations from funds for which there was missing data. Every fund had to have all variables from January 2019 to March 2022. My final sample contains 12,803 US funds and 12,216 EU funds with available monthly data. Monthly net flow is the percentage growth of a fund's assets under management in excess of growth that would have occurred if there were no new inflows and all dividends were reinvested.

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

The list of variables can be found in Table A.1 of the Appendix.

## 5. Methodology & Hypotheses

### 5.1 Hypotheses

*Hypothesis 1: Funds affected by the SFDR have higher sustainability ratings than funds unaffected by SFDR after November 2019.*

I assess whether the announcement of SFDR will compel funds to be more sustainable and whether a regulatory change has a greater impact on the sustainability ratings of EU funds than on US funds. This hypothesis can be tested by comparing the changes in the ratings of EU and US funds. The requirement to comply with SFDR puts pressure on EU funds to disclosure more information and to better manage ESG risks. As asset management companies in the EU face growing demand for ESG funds, they are more likely to launch or relabel funds as Article 8 or 9, which tend to have higher sustainability ratings than Article 6 funds. Therefore, I predict that the average sustainability rating of EU funds will increase while the average sustainability rating of US funds will not change or increase very slightly.

*Hypothesis 2: Funds with higher Morningstar Sustainability Ratings receive higher inflows than funds with lower Morningstar Sustainability Ratings after March 2021.*

Hartzmark and Sussman (2019) found that US funds with low sustainability ratings saw outflows while those with high ratings received net inflows from 2016 to 2017. Pastor and Vorsatz (2020) found that from February to April 2020, flows of US actively managed funds are almost monotonic across the five globe sustainability ratings: five globe funds had the largest net flows while one globe funds had the lowest flows. If investors value sustainability or perceive sustainable funds, then funds with higher ratings (4 or 5 globes) will have higher net inflows or lower net outflows than funds with lower ratings (1 or 2 globes) after March 2021. This hypothesis can be tested by comparing the sign and magnitude of the coefficients of comply and the interaction term between EU and Comply (EUxComply) for funds with different ratings. I predict that funds with higher ratings have higher inflows, which implies that the SFDR has a positive impact on funds with higher ratings.

*Hypothesis 3: Among all funds compliant with SFDR, Article 8 or Article 9 funds receive higher inflows than Article 6 funds after March 2021.*

*Hypothesis 3a: Article 8 funds receive higher inflows than Article 6 funds.*

*Hypothesis 3b: Article 9 funds receive higher inflows than Article 8 funds.*

According to Table 5, 33.69% of Article 9 funds have 4 globe ratings and 31.10% of Article 9 funds have 5 globe ratings while 27.83% of Article 8 funds have 4 globe ratings and 11.55% of Article 8 funds have 5 globe ratings. Further, 21.12% of Article 6 funds have 4 globe ratings and 5.06% of Article 6 funds have 5 globe ratings. Since Article 9 funds are subject to stricter requirements and thus have higher Morningstar Sustainability Ratings than Article 8 funds on average, I anticipate that inflows into Article 9 funds will be higher than flows into Article 8 funds and flows of Article 8 funds will be higher than flows of Article 6 funds.

## 5.2 Event Study

I use the event study method to estimate the impact of SFDR on mutual fund flows and Morningstar Sustainability Ratings. Funds will be grouped according to the Article classification they received in March 2021. Further, I assess whether a difference in the Article classification impacts net flows and sustainability ratings.

The treated group is composed of all funds sold in the EU that are required to comply with SFDR. The control group is made up of US funds that do not comply with SFDR. There are two events: the European Commission passing the SFDR in November 2019 and financial market participants complying with SFDR in March 2021. Between the two dates, financial market participants had time to change their portfolios and adjust the ESG risk, ratings, and labels of funds.

The pre-treatment period is January 2019 to November 2019. The first post-treatment period is from November 2019 to February 2021. The second post-treatment period is from March 2021 to March 2022. In the first treatment period, I assess whether there is a significant change in the Morningstar Sustainability Rating of funds while controlling for monthly net flow, the logarithm of net assets, age, and monthly return. In the second treatment period, I evaluate whether there is a significant change in the flow of funds while controlling for the logarithm of net assets, age, and monthly return.

## 5.3 Panel Regressions

The two primary regressions for panel data are the fixed effects regression and the random effects regression. A fixed effects model controls for and omits time-invariant independent variables uncorrelated with the dependent variable. A regressor may be endogenous and correlated with a random time-invariant independent variable. The fixed effects model estimates the percentage of the within variation of variables. The random effects model attempts to measure systematic, random effects of individual cross entities and accounts for

time-invariant independent variables uncorrelated with the dependent variable. The regressor is exogenous and all coefficient estimators are consistent.

I will run an ordinary least squares (OLS) regression, a fund fixed effects regression, a time fixed effects regression, and a random effects regression. I include month fixed effects to compare the cross-sectional differences of funds and to control for unobserved time effects. The fund fixed effects regression controls for omitted variables that vary across funds but do not change over time. The fund fixed effects regression compares the ratings and flows of each fund over time. The time fixed regression controls for unobserved variables that do not vary across entities but change over time. The time fixed effects regression compares the ratings and flows of the US funds to EU funds.

The following regression estimates the impact of SFDR on Morningstar Sustainability Ratings after the announcement in November 2019:

$$MSR_{i,t} = \beta_0 + \beta_1 * EU_i + \beta_2 * Announce_i + \beta_3 * EU_i \times Announce_t + \beta_4 * LogNA_{i,t-1} + \beta_5 * Age_{i,t-1} + \beta_6 * Return_{i,t-1} + \mu_{i,t}$$

$EU_i$ is a treatment dummy variable that equals 0 if a fund is not based in the EU and equals 1 if a fund is based in the EU. $Announce_t$ is a time dummy variable that equals 0 if the month is before November 2019 and equals 1 if the month is after November 2019. $EU_i \times Announce_t$ is the coefficient of the interaction between the time dummy and the treatment dummy. It is the difference-in-differences estimator indicating observations for EU funds after the announcement. In this regression:

- $\beta_0$ is the mean outcome of the control group before November 2019,
- $\beta_0 + \beta_1$ is the mean outcome of the treatment group before November 2019,
- $\beta_2 + \beta_3$ is the difference between the treatment group after and before November 2019,
- $\beta_2$ is the difference between the control group after and before November 2019,
- $\beta_0 + \beta_2$ is the mean outcome of the control group after November 2019,
- $\beta_0 + \beta_1 + \beta_2 + \beta_3$ is the mean outcome of the treated group after November 2019,
- $\beta_3$ is the difference of differences or the impact of SFDR on ratings of EU funds.

The following regression estimates the impact of SFDR on fund flows after the SFDR classification labels of funds are revealed in March 2021:

$$FLOW_{i,t} = \beta_0 + \beta_1 * EU_i + \beta_2 * Comply_t + \beta_3 * EU_i \times Comply_t + \beta_3 * LogNA_{i,t-1} + \beta_4$$
$$* Age_{i,t-1} + \beta_5 * Return_{i,t-1} + \mu_{i,t}$$

$EU_i$ is a treatment dummy variable that equals 0 if a fund is not based in the EU and equals 1 if a fund is based in the EU. $Comply_t$ is a time dummy variable that equals 0 if the month is before March 2021 and equals 1 if the month is after March 2021, the month when the SFDR classification of funds is released. $EU_i \times Comply_t$ is the coefficient of the interaction between the time dummy and the treatment dummy. It is the difference-in-differences estimator indicating observations for EU funds after they are required to demonstrate compliance with SFDR and receive the Article classification from Morningstar Direct. In this regression:

- $\beta_0$ is the mean outcome of the control group before March 2021,
- $\beta_0 + \beta_1$ is the mean outcome of the treatment group before March 2021,
- $\beta_2 + \beta_3$ is the difference between the treatment group after and before March 2021,
- $\beta_2$ is the difference between the control group after and before March 2021,
- $\beta_0 + \beta_2$ is the mean outcome of the control group after March 2021,
- $\beta_0 + \beta_1 + \beta_2 + \beta_3$ is the mean outcome of the treated group after March 2021,
- $\beta_3$ is the difference of differences or the impact of SFDR on flows of EU funds.

### 5.3.1 Hausman Test

I assess whether a fixed effects model or a random effects model is more appropriate by conducting the Hausman specification test. In a fixed effects model, the errors are correlated with the regressors. In a random effects model, the errors are not correlated with regressors. The null hypothesis of the Hausman test is that the errors are not correlated with regressors and the random effect model is appropriate. If the Chi statistic is significantly large, then the null hypothesis is rejected and the fixed effects model should be used. If the Chi statistic is not significantly large, then the null hypothesis is failed to be rejected and the random effects model should be used instead (Hausman, 1978).

### 5.4 Difference-in-Differences

I examine the cross-sectional difference in the outcomes of the control group and the treatment group and time-series difference in the outcomes of the pre-treatment period and the post-treatment period. Using the difference-in-differences methodology, I compare the changes in sustainability ratings and flows of EU mutual funds to those of US mutual funds before and after March 2021. First, I estimate the average change between the treated group

and the control group in the pre-treatment period from January 2019 to March 2021. Second, I estimate the average change between the treated group and the control group in the post-treatment period from March 2021 to March 2022.

I estimate the treatment effect by subtracting the average change in the control group from the average change in the treatment group. This controls for time-invariant and unobserved characteristics that may come from inherent differences between the two groups. The method relies on several assumptions. First, there are no variations or interferences in the treatment. This assumption holds as there are no country-specific variations of the SFDR or staggered introduction or implementation of the regulation. Second, the covariates are not influenced by the treatment. This assumption holds since the SFDR classification does not impact the age, monthly return, and size of funds. Third, the parallel trends assumption must apply. While the control group and treatment group are not equivalent, the same trend should hold for both groups and the difference between the two should remain constant. Unobserved characteristics that impact whether a group gets treated do not vary over time. I assume that the control group and the treatment group before the introduction of SFDR would have followed the same trend if the SFDR were never introduced. Without the SFDR, the difference between the control group and the treatment group would have stayed the same over time. This assumption holds since the standardized difference between EU funds and US funds in November 2019 and the standardized difference between EU funds and US funds in March 2021 are similar based on the results in Tables 2 and 3.

The difference-in-differences estimators compares the cross-sectional ratings and monthly net flows of US and EU funds. $EU_i \times Announce_t$ is the difference-in-differences estimator for the regressions on Morningstar Sustainability Ratings in Tables 6, 10, and 13. It compares the ratings of EU funds to US funds before and after November 2019. $EU_i \times Comply_t$ is the difference-in-differences estimator for the regressions on monthly flows in Tables 8, 11, 12, 14, and 15. It compares the flows of EU funds to US funds before and after March 2021.

# 6. Results

## 6.1 Summary Statistics

### Table 1: Summary Statistics

This table shows the summary statistics for all variables. The sample includes 12,216 EU funds and 12,803 US funds from January 2019 to March 2022. Below are the values for the number of observations, mean, standard deviation, the minimum value, and the maximum value.

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| MSR | 969,383 | 3.051 | 1.029 | 1 | 5 |
| Age (months) | 973,401 | 10.843 | 8.232 | 0.003 | 97.628 |
| Net assets ($) | 973,021 | 591,585,598 | 84,279,197 | 83,440,144 | 1,286,377,444 |
| Log net assets | 972,925 | 16.902 | 2.995 | 0.693 | 27.03 |
| Monthly return (%) | 972,977 | 1.193 | 5.627 | -68.405 | 65.511 |
| Flow (%) | 972,975 | 10.497 | 3,869.96 | -156,254.8 | 3,457,525.5 |
| Flow_w (%) | 972,975 | 0.369 | 0.864 | -1.313 | 5.480 |

### Graph 2: Percentage of Funds by SFDR Article

This graph shows the number and the percentage of funds that are and are not required to comply with the SFDR. Approximately half of all funds in the sample are domiciled in the US and not required to comply; they will be referred to as Article 0 funds in this study. Among the remaining funds based in the EU that are required to comply, 20.37% are Article 6 funds, 25.39% are Article 8 funds, and 3.19% are Article 9 funds.



Frequency of Funds by SFDR Classification
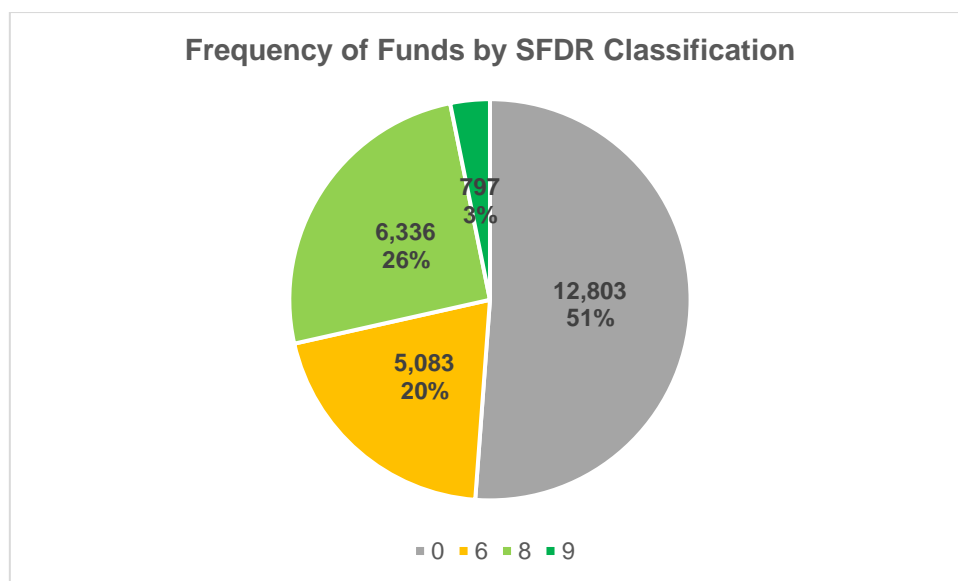
**Graph 3: Percentage of Morningstar Sustainability Ratings**

This graph shows the number and the percentage of all monthly Morningstar Sustainability Ratings given to all funds from January 2019 to March 2022. The ratings vaguely follow a normal distribution: 6.78% of all ratings are 1, 21.83% of all ratings are 2, almost 40% of all ratings are 3, 23.64% of all ratings are 4, and 8.4% of all ratings are 5.

**Frequency of Funds by Sustainability Rating**

| 81,469 | 65,740 |
| 8% | 7% |

| 229,139 | 211,636 |
| 24% | 22% |

381,399
39%

■ 1 ■ 2 ■ 3 ■ 4 ■ 5
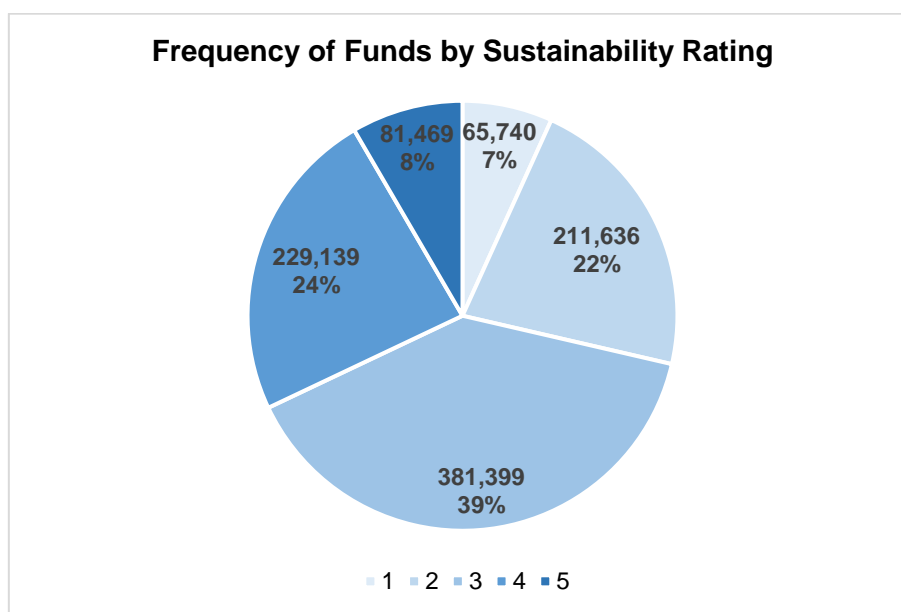
**Table 2: Mean Values of Variables (November 2019)**

This table presents the mean values of EU funds and US funds and the difference between EU funds and US funds in terms of standard deviation as of November 2019. Flow_w is the average monthly flow winsorized at the 1% and 99% levels. Netassets_w is the average net assets of funds winsorized at the 1% and 99% levels. Log net assets is the average logarithmic value of fund net assets. The fund age is the average age of funds up to the announcement of SFDR. On average, EU funds have higher ratings, fund inflows winsorized at the 1% and 99% levels, and monthly returns. US funds have higher net assets and fund age.

|  | Mean in EU funds | Mean in US funds | Standardized Difference |
| --- | --- | --- | --- |
| MSR | 3.15 | 3.03 | 0.118 |
| Flow (%) | 7.56 | 11.09 | -0.001 |
| Flow_w (%) | 0.60 | 0.31 | 0.286 |
| Net asset ($) | 107,171,125.43 | 693,081,487.03 | -0.143 |
| Net asset_w ($) | 106,743,247.58 | 435,459,597.80 | -0.339 |

| | | | |
|---|---|---|---|
| Log net assets | 16.04 | 17.12 | -0.369 |
| Monthly return (%) | 1.62 | 1.09 | 0.085 |
| Fund age (months) | 8.42 | 11.46 | -0.413 |

**Table 3: Mean Values of Variables (March 2021)**

This table presents the mean values of EU funds and US funds and the standardized difference between EU funds and US funds as of March 2021. Flow_w is the average monthly flow winsorized at the 1% and 99% levels. Netasset_w is the average net assets of funds winsorized at the 1% and 99% levels. Log net asset is the average logarithmic value of fund net assets. The fund age is the average age of funds up March 2021. On average, EU funds have higher ratings. US funds have higher inflows, net assets, monthly returns, and fund age.

| | Mean in EU funds | Mean in US funds | Standardized Difference |
|---|---|---|---|
| MSR | 3.18 | 3.03 | 0.149 |
| Flow (%) | 2.75 | 11.87 | -0.003 |
| Flow_w (%) | 0.22 | 0.40 | -0.230 |
| Net asset ($) | 134,626,703.91 | 661,801,137.26 | -0.132 |
| Net asset_w ($) | 133,698,711.29 | 415,660,310.03 | -0.292 |
| Log net assets | 16.33 | 17.01 | -0.235 |
| Monthly return (%) | -0.09 | 1.44 | -0.301 |
| Fund age (months) | 9.63 | 11.09 | -0.199 |

As expected, the mean Morningstar Sustainability Rating of EU funds increased from 3.15 to 3.18 while the mean Morningstar Sustainability Rating of US funds stayed the same at 3.03. The mean monthly flow of EU funds fell from 7.56% to 2.75% while the mean monthly flow of US funds slightly increased from 11.09% to 11.87%. The mean winsorized monthly flow of EU funds fell from 0.60% to 0.22% while the mean winsorized monthly flow of US funds slightly increased from 0.31% to 0.40%. While the data makes it difficult to infer why flows to EU funds fell while flows to US funds rose after the introduction of SFDR, a possible reason is that investors are uncertain about how to assess the immediate impact of SFDR on EU funds or perceive a tradeoff between sustainability ratings and fund performance. The mean monthly return of EU funds fell from 1.62% to -0.09% while the mean monthly return of US funds rose from 1.09% to 1.44%.

**Table 4: Transition Probability of Morningstar Sustainability Rating**

This table shows the transition probabilities for each Morningstar Sustainability Rating from January 2019 to March 2022. For example, 94% of funds rated as 1 receive the same rating in the next month while 4.96% of funds rated as 1 receive a rating of 2 in the next month. Most funds receive the same rating in the next month and very few funds have ratings that change by more than 1 globe. Funds with ratings of 2 or 3 have a higher chance of seeing a 1-globe increase in their ratings rather than a 1-globe decrease.

| | | **Next Month Rating** | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | Total |
| **Current Month Rating** | 1 | 93.99% | 4.96% | 0.76% | 0.25% | 0.04% | 100% |
| | 2 | 1.29% | 93.72% | 4.63% | 0.28% | 0.08% | 100% |
| | 3 | 0.09% | 2.27% | 94.92% | 2.59% | 0.13% | 100% |
| | 4 | 0.03% | 0.29% | 4.05% | 93.98% | 1.64% | 100% |
| | 5 | 0.05% | 0.05% | 0.49% | 4.37% | 95.04% | 100% |
| | Total | 6.74% | 21.78% | 39.38% | 23.66% | 8.44% | 100% |

**Table 5: Morningstar Sustainability Rating and SFDR Article Classification**

This table shows the percentage of sustainability ratings that each type of fund received. For example, 6.81% of funds that did not comply with the SFDR received a rating of 1 while 1.15% of Article 9 funds received a rating of 5. As expected, Article 8 and 9 funds tend to have higher sustainability ratings: 5.06% of Article 6 funds, 11.55% of Article 8 funds, and 31.10% of Article 9 funds had ratings of 5.

| | | **SFDR Article Classification** | | | |
|---|---|---|---|---|---|
| | | 0 | 6 | 8 | 9 |
| **MSR** | 1 | 6.81% | 10.24% | 4.67% | 1.15% |
| | 2 | 24.43% | 23.79% | 16.57% | 9.76% |
| | 3 | 40.09% | 39.80% | 39.38% | 24.30% |
| | 4 | 21.92% | 21.12% | 27.83% | 33.69% |
| | 5 | 6.75% | 5.06% | 11.55% | 31.10% |

## 6.2 Comparing Various Regressions

### Table 6: Morningstar Sustainability Rating Regressions

This table reports results from the following regressions: ordinary least squares (OLS), fund fixed effects, time fixed effects, and random effects. The outcome variable is the Morningstar Sustainability Rating. The covariates are EU, announce, EUxAnnounce, log net assets, age, monthly return, and flow. EU is a binary variable that indicates whether a fund is registered in the EU or in the US and required to comply with SFDR. Announce is a binary variable that indicates whether a month is before or after November 2019 while EUxAnnounce is the interaction term that estimates how the Morningstar Sustainability Rating of a fund would be impacted by the announcement of the SFDR. Log net assets is the logarithmic value of a fund's net assets. Age is the age of a fund in months since its inception date. Monthly return is the return of a fund month expressed in percentage terms. Flow is the net flow of a fund expressed in percentage terms. Standard errors are clustered on the fund level and reported in parentheses. The statistical significance at the 10%, 5%, and 1% levels are respectively denoted by *, **, and ***.

| MSR | (1) OLS | (2) FE | (3) FE | (4) RE |
|---|---|---|---|---|
| EU | 0.1534*** | | 0.0709*** | 0.2493*** |
| | (0.0281) | | (0.0131) | (0.0112) |
| Announce | 0.0226*** | 0.0238*** | | 0.0213*** |
| | (0.0029) | (0.0016) | | (0.0016) |
| EUxAnnounce | 0.0151*** | 0.0135*** | 0.0132*** | 0.0138*** |
| | (0.0042) | (0.0023) | (0.0023) | (0.0023) |
| Lognetasset_w | 0.0315*** | 0.0110*** | 0.0139*** | 0.0114*** |
| | (0.0004) | (0.0007) | (0.0008) | (0.0008) |
| Age_w | -0.0006*** | 0.0330*** | 0.0078 | 0.0195*** |
| | (0.0001) | (0.0062) | (0.0059) | (0.0005) |
| Monthlyreturn_w | -0.0005*** | -0.0003*** | 0.0018*** | -0.0004*** |
| | (0.0002) | (0.0001) | (0.0002) | (0.0001) |
| Flow_w | -0.0198*** | -0.0012 | -0.0030*** | -0.0020*** |
| | (0.0013) | (0.007) | (0.0008) | (0.0007) |
| Constant | 2.924*** | 2.4943*** | 2.6519*** | 2.5169*** |
| | (0.0067) | (0.0139) | (0.0562) | (0.0158) |
| Fixed Effects | No | Fund | Month | No |
| Within $R^2$ | | 0.0041 | 0.0053 | 0.0039 |
| Between $R^2$ | | 0.0010 | 0.0008 | 0.0014 |

| | | | | |
|---|---|---|---|---|
| Overall $R^2$ | 0.0063 | 0.0005 | 0.0000 | 0.0013 |
| F-test | 871.18 | 641.27 | 116.76 | |
| Prob > F | 0.00 | 0.00 | 0.00 | |
| Wald $X^2$ | | | | 2,761.32 |
| Prob > $X^2$ | | | | 0.00 |
| # of obs. | 968,618 | 968,618 | 968,618 | 968,618 |

Looking at the value and the statistical significance of the EUxAnnounce interaction term across various regressions, the announcement of SFDR had a minor, positive impact on the sustainability ratings of EU funds after November 2019. Even before the announcement of SFDR, EU funds had higher sustainability ratings than US funds on average. According to all four regressions, larger funds have higher ratings while monthly flow is negatively correlated with ratings.

In the OLS regression, all variables are statistically significant at the 1% level. Larger funds have higher ratings, perhaps because larger funds have more resources available to change underlying holdings to have higher ratings. According to the OLS regression, older funds tend to have lower sustainability ratings. However, according to the fund fixed effects model and random effects model, fund age and sustainability ratings are positively correlated.

In the fund fixed effects regression, all variables besides flow are statistically significant at the 1% level. EU is omitted because it is collinear with fund fixed effects. Larger and older funds tend to have higher sustainability ratings. In the month fixed effects regression, Announce is omitted because it is collinear with month fixed effects. All variables except for age are statistically significant at the 1% level. Monthly return is positively correlated with sustainability ratings but in the other three regressions, it is negatively correlated with ratings.

In the random effects regression, all variables are statistically significant at the 1% level. Larger and older funds tend to have higher sustainability ratings. However, monthly return and net flow are negatively correlated with ratings. Perhaps older funds have the capacity to provide more information on the way they manage ESG risk that enables Morningstar Direct to give higher ratings.

**Table 7: Hausman Test for Morningstar Sustainability Rating Regressions**

This table presents the results of a Hausman test for the third and fourth regressions in Table 6, or the time fixed effects regression and the random effects regression on the Morningstar Sustainability Rating.

| | Coefficient |
|---|---|
| Chi-square test value | 1,491.21 |
| P-value | 0 |

The test statistic is statistically significant as the p-value equals 0. Therefore, the null hypothesis of the Hausman test can be rejected and the time fixed effects model is preferred.

**Table 8: Monthly Net Flow Regressions**

This table reports results from the following regressions: OLS, fund fixed effects, time fixed effects, and random effects. The dependent variable is the monthly fund flow expressed in percentage terms. The covariates are EU, comply, EUxComply, log net assets, age, and monthly return. EU is a binary variable that indicates whether a fund is registered in the EU or in the US and required to comply with SFDR. Comply is a binary variable that indicates whether a month is before or after March 2021 while EUxComply is the interaction term that estimates how the flow of a fund would be impacted by the requirement to comply with the SFDR. Standard errors are clustered on the fund level and reported in parentheses. The statistical significance at the 10%, 5%, and 1% levels are respectively denoted by *, **, and ***.

| Flow | (1) OLS | (2) FE | (3) FE | (4) RE |
|---|---|---|---|---|
| EU | 0.0225*** | | 0.0663*** | 0.0246*** |
| | (0.0025) | | (0.0061) | (0.0028) |
| Comply | -0.2422*** | -0.4490*** | | -0.2443*** |
| | (0.0020) | (0.0036) | | (0.0026) |
| EUxComply | 0.0064 | 0.0032 | 0.0092** | 0.0063 |
| | (0.0061) | (0.0036) | (0.0030) | (0.0059) |
| Lognetasset_w | -0.0074*** | -0.1180*** | 0.0222*** | -0.0080*** |
| | (0.0003) | (0.0012) | (0.0010) | (0.0004) |
| Age_w | -0.0003*** | 0.1286*** | -0.5886*** | 0.0040** |
| | (0.0001) | (0.0016) | (0.1636) | (0.0002) |
| Monthlyreturn_w | 0.0076*** | 0.0057*** | 0.0202*** | 0.0068*** |
| | (0.0004) | (0.0002) | (0.0002) | (0.0002) |
| Constant | 0.5578*** | -0.6644*** | -0.7918*** | 0.5597*** |
| | (0.0058) | (0.0257) | (0.0302) | (0.0074) |
| Fixed Effects | No | Fund | Month | No |

| | | | | |
|---|---|---|---|---|
| Within R$^2$ | | 0.0285 | 0.3217 | 0.0216 |
| Between R$^2$ | | 0.0069 | 0.0072 | 0.0309 |
| Overall R$^2$ | 0.0221 | 0.0000 | 0.0005 | 0.0221 |
| Pseudo R$^2$ | | | | |
| F-test | 5,041.79 | 5,555.56 | 10,703.01 | |
| Prob > F | 0 | 0 | 0 | |
| X$^2$ | | | | 21,752.81 |
| Prob > X$^2$ | | | | 0 |
| # of obs. | 927,627 | 927,627 | 972,627 | 927,627 |

Looking at the value and the statistical significance of the EUxComply interaction term across the four regressions, the requirement to comply with the SFDR had a negligible impact on the net flows of EU funds after March 2021. While the signs of the coefficients of EU and EUxComply are positive, the value of the EUxComply coefficient is not significantly different from zero. The discrepancy between the magnitude and sign of the comply coefficient and EUxComply coefficient may be attributed to how EU funds tended to have higher monthly inflows from January 2019 to March 2021 but the requirement to comply with SFDR may have led to a reduction in flows after March 2021. After March 2021, funds regardless of their domicile saw outflows, perhaps due to the coronavirus pandemic. According to all four regressions, funds with smaller net assets and higher returns tend to have higher flows.

In the fund fixed effects regression, EU is omitted because it is collinear with fund fixed effects. According to the fund fixed effects regression and the random effects regression, net assets are negatively correlated with net flow while older funds tend to have higher inflows. In the month fixed effects regression, Announce is omitted because it is collinear with month fixed effects. Net assets are positively correlated with net flow while older funds tend to have higher outflows.

**Table 9: Hausman Test for Flow Regressions**

This table presents the results of a Hausman test for the third and fourth regressions in Table 8, or the time fixed effect regression and the random effects regression on monthly net flow.

| | Coefficient |
|---|---|
| Chi-square test value | 13,221.40 |
| P-value | 0 |

The test statistic is statistically significant as the p-value equals 0. Therefore, the null hypothesis of the Hausman test can be rejected and the time fixed effects model is preferred.

## 6.3 Panel Regressions

### 6.3.1 Fixed Effects Regressions

**Table 10: Morningstar Sustainability Rating Fixed Effects Regression by SFDR Article**

This table presents the results of a time fixed effects panel regression for funds by SFDR classification. The outcome variable is the Morningstar Sustainability Rating. The covariates are EU, EUxAnnounce, log net assets, age, monthly return, and flow. Announce is omitted because it is collinear with month fixed effects. The value of announce equals 0 if the month is before November 2019 while it equals 1 if the month is after November 2019. The second row shows the results for funds that do not have to comply with SFDR. The third row shows the results for Article 6 funds, the fourth for Article 8 funds, and the fifth for Article 9 funds. Standard errors are clustered on the fund level and reported in parentheses. The statistical significance at the 10%, 5%, and 1% levels are respectively denoted by *, **, and ***.

| MSR | Art. 0 | Art. 6 | Art. 8 | Art. 9 |
|---|---|---|---|---|
| EU | 0 | 0.1068*** | 0.1243*** | 0.1021*** |
| | (0) | (0.0034) | (0.0040) | (0.0030) |
| EUxAnnounce | 0.0035 | 0.0195*** | 0.0740*** | 0.0367*** |
| | (0.0025) | (0.0017) | (0.0023) | (0.0067) |
| Lognetasset_w | 0.0192*** | 0.0062*** | 0.0095*** | -0.0100** |
| | (0.0015) | (0.0014) | (0.0014) | (0.0033) |
| Age_w | 0.0077*** | -0.0103*** | 0.1142*** | 0.0705*** |
| | (0.0009) | (0.0013) | (0.0012) | (0.0038) |
| Monthlyreturn_w | 0 | -0.0007*** | 0.0005* | -0.0014* |
| | (0) | (0.0002) | (0.0002) | (0.0006) |
| Flow_w | -0.0025* | 0.0002 | -0.0026* | 0.0048 |
| | (0.0011) | (0.0012) | (0.0013) | (0.0035) |
| Constant | 2.0841*** | 2.5297*** | 2.8593*** | 3.4463*** |
| | (0.0239) | (0.0267) | (0.0247) | (0.0505) |
| Within $R^2$ | 0.0008 | 0.0005 | 0.0397 | 0.0130 |
| Between $R^2$ | 0.0000 | 0.0019 | 0.0012 | 0.0124 |
| Overall $R^2$ | 0.0000 | 0.0014 | 0.0001 | 0.0067 |
| F-test | 63.39 | 17.74 | 1,983.33 | 80.81 |

| | | | | |
|---|---|---|---|---|
| Prob > F | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| # of obs. | 495,348 | 196,487 | 246,052 | 30,731 |

Based on the value of the EUxAnnounce coefficient, the introduction of SFDR had no impact on the sustainability ratings of funds that did not need to comply but had a positive, statistically significant impact on the sustainability ratings of Article 6, 8, and 9 funds. Interestingly, the SFDR had a bigger impact on the ratings of Article 8 funds than on Article 9 funds. A potential reason is that Article 9 funds had higher ratings than Article 8 funds before November 2019, so there is more room for the ratings of Article 8 funds to increase. Fund flows and monthly returns do not significantly impact ratings. Older funds tend to have higher ratings, which may be because they had more time to manage ESG risks better and to adjust their underlying holdings in accordance with ESG investing principles or guidelines.

### Table 11: Flow Fixed Effects Regression by SFDR Article

This table presents the results of a fund fixed effects panel regression. The outcome variable is the flow. The covariates are comply, EUxComply, log net assets, age, and monthly return. EU is omitted because it is collinear with fund and SFDR classification fixed effects. The value of EU equals 0 if the SFDR classification is 0 while the value of EU equals 1 if the SFDR classification is 6, 8, or 9. The second row shows the results for funds that do not have to comply with SFDR, the third for Article 6 funds, the fourth for Article 8 funds, and the fifth for Article 9 funds. Standard errors are clustered on the fund level and reported in parentheses. The statistical significance at the 10%, 5%, and 1% levels are respectively denoted by *, **, and ***.

| Flow | Art. 0 | Art. 6 | Art. 8 | Art. 9 |
|---|---|---|---|---|
| Comply | -0.4018*** | -0.5222*** | -0.5200*** | -0.4680*** |
| | (0.0039) | (0.0080) | (0.0197) | (0.0064) |
| EUxComply | 0 | -0.4839*** | -0.4366*** | -0.3815*** |
| | (0) | (0.0081) | (0.0065) | (0.0199) |
| Lognetasset_w | -0.0472*** | 0.0044** | 0.0033 | 0.0134** |
| | (0.0020) | (0.0027) | (0.0022) | (0.0055) |
| Age_w | 0.1025*** | 0.1635*** | 0.1492*** | 0.1817*** |
| | (0.0020) | (0.0040) | (0.0032) | (0.0101) |
| Monthlyreturn_w | 0.0038*** | 0.0074*** | 0.0064*** | 0.0213*** |
| | (0.0002) | (0.0004) | (0.0003) | (0.0010) |

| | | | | |
|---|---|---|---|---|
| Constant | 0.0061*** | -1.016*** | -0.9020*** | -0.8234*** |
| | (0.0415) | (0.1007) | (0.0533) | (0.0436) |
| Within $R^2$ | 0.0316 | 0.0278 | 0.0269 | 0.0412 |
| Between $R^2$ | 0.0037 | 0.0018 | 0.0085 | 0.0001 |
| Overall $R^2$ | 0.0002 | 0.0003 | 0.0000 | 0.0012 |
| F-test | 3,946.77 | 1,379.50 | 1,662.55 | 323.56 |
| Prob > F | 0 | 0 | 0 | 0 |
| # of obs. | 496,951 | 197,949 | 246,830 | 30,897 |

Regardless of their domicile, funds saw outflows after March 2021, perhaps due to the coronavirus pandemic. The EUxComply coefficient is statistically significant at the 1% level for Article 6, 8, and 9 funds. Thus, I infer the introduction of SFDR had a negative, statistically significant impact on the net flows of EU funds. Article 6 funds had larger outflows than Article 8 funds, which in turn had larger outflows than Article 9 funds. Older funds and funds with higher returns have higher inflows, and this effect is stronger for Article 9 funds than for the other three types of funds.

**Table 12: Flow Fixed Effects Regression by Morningstar Sustainability Rating**

This table presents the results of a time fixed effects panel regression for funds categorized by Morningstar Sustainability Ratings. The outcome variable is the flow. The covariates are EU, comply, EUxComply, log net assets, age, and monthly return. Standard errors are clustered on the fund level and reported in parentheses. The statistical significance at the 10%, 5%, and 1% levels are respectively denoted by *, **, and ***.

| Flow | MSR 1 | MSR 2 | MSR 3 | MSR 4 | MSR 5 |
|---|---|---|---|---|---|
| EU | 0.3259*** | 0.3314*** | 0.4004*** | 0.5128*** | 0.8045*** |
| | (0.0458) | (0.0592) | (0.1448) | (0.0726) | (0.0943) |
| Comply | -0.5404*** | -0.4419*** | -0.3856*** | -0.3850*** | -0.3664*** |
| | (0.0181) | (0.0087) | (0.0060) | (0.0152) | (0.0080) |
| EUxComply | 0.0295 | -0.0027 | -0.0050 | 0.0009 | -0.0215 |
| | (0.0194) | (0.0095) | (0.0063) | (0.0083) | (0.0150) |
| Lognetasset_w | -0.0192*** | -0.0078*** | -0.0126*** | -0.0121*** | 0.0111*** |
| | (0.0058) | (0.0024) | (0.0022) | (0.0029) | (0.0047) |
| Age_w | 0.1232*** | 0.1061*** | 0.0925*** | 0.0949*** | 0.1111*** |
| | (0.0086) | (0.0042) | (0.0028) | (0.0037) | (0.0068) |

| | | | | | |
|---|---|---|---|---|---|
| Monthlyreturn_w | 0.0078*** | 0.0015*** | 0.0041*** | 0.0094*** | 0.0011*** |
| | (0.0007) | (0.0004) | (0.0003) | (0.0003) | (0.0006) |
| Constant | 0.4075*** | 0.4720*** | 0.5705*** | 0.6927*** | 0.7417*** |
| | (0.1415) | (0.0709) | (0.0445) | (0.0576) | (0.0922) |
| Within $R^2$ | 0.0298 | 0.0226 | 0.0218 | 0.0234 | 0.0246 |
| Between $R^2$ | 0.0077 | 0.0011 | 0.0015 | 0.0005 | 0.0042 |
| Overall $R^2$ | 0.0001 | 0.0001 | 0.0002 | 0.0001 | 0.0000 |
| F-test | 376.07 | 917.64 | 1,612.10 | 1,030.57 | 384.42 |
| Prob > F | 0 | 0 | 0 | 0 | 0 |
| # of obs. | 65,672 | 211,530 | 381,097 | 228,954 | 81,365 |

The impact of SFDR on EU funds after March 2021 is minimal given that the EUxComply interaction term is not statistically significant. All variables except for EUxComply are statistically significant at the 1% level. Based on the value of the comply coefficient, funds with lower ratings had larger outflows than funds with higher ratings after March 2021. Not surprisingly, older funds and funds with higher monthly returns tend to have higher inflows. While fund size is negatively correlated for funds with 1 to 4 globe ratings, it is positively correlated for funds with 5 globe ratings.

### 6.3.2 Random Effects Regressions

**Table 13: Morningstar Sustainability Rating Random Effects Regression by SFDR Article**

This table presents the results of a random effects panel regression for funds by SFDR classification. The dependent variable is the Morningstar Sustainability Rating. The covariates are EU, announce, EUxAnnounce, log net assets, age, monthly return, and flow. The second row shows the results for funds that do not have to comply with SFDR. The third row shows the results for Article 6 funds, the fourth for Article 8 funds, and the fifth for Article 9 funds. Standard errors are clustered on the fund level and reported in parentheses. The statistical significance at the 10%, 5%, and 1% levels are respectively denoted by *, **, and ***.

| MSR | Art. 0 | Art. 6 | Art. 8 | Art. 9 |
|---|---|---|---|---|
| EU | 0 | 0.0021*** | 0.0397*** | 0.0159*** |
| | (0) | (0.0009) | (0.0014) | (0.0027) |
| Announce | 0.0184*** | 0.0042* | 0.0673*** | 0.0325*** |

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|  | | | | |
|---|---|---|---|---|
|  | (0.0017) | (0.0025) | (0.0023) | (0.0068) |
| EUxAnnounce | 0 | 0.0023* | 0.0365*** | 0.0171*** |
|  | (0) | (0.0009) | (0.0011) | (0.0031) |
| Lognetasset_w | 0.0136*** | 0.0047*** | 0.0112*** | 0 |
|  | (0.0013) | (0.0013) | (0.0013) | (0) |
| Age_w | 0.0036*** | -0.0064*** | 0.0772*** | 0.0422*** |
|  | (0.0006) | (0.0011) | (0.0010) | (0.0032) |
| Monthlyreturn_w | 0 | -0.0007* | 0 | -0.0019* |
|  | (0) | (0.0003) | (0) | (0.0011) |
| Flow_w | -0.0032*** | 0 | -0.0035*** | 0.0042 |
|  | (0.0010) | (0) | (0.0013) | (0.0035) |
| Constant | 2.3769*** | 2.6802*** | 2.8470*** | 3.5190*** |
|  | (0.0247) | (0.0239) | (0.0261) | (0.0564) |
| Within $R^2$ | 0.0008 | 0.0004 | 0.0392 | 0.0124 |
| Between $R^2$ | 0.0000 | 0.0021 | 0.0011 | 0.0109 |
| Overall $R^2$ | 0.0000 | 0.0014 | 0.0001 | 0.0057 |
| Wald $X^2$ | . | 52.48 | 6,733.16 | 239.53 |
| Prob > $X^2$ | . | 0 | 0 | 0 |
| # of obs. | 495,348 | 196,487 | 246,052 | 30,731 |

The introduction of the SFDR had a positive, minor impact on the sustainability ratings of Article 6 funds and a positive, major impact on the sustainability ratings of Article 8 and 9 funds. The SFDR had a bigger impact on the ratings of Article 8 funds than on Article 9 funds. A potential reason is that Article 9 funds have higher ratings than Article 8 funds on average, so there is more room for the ratings of Article 8 funds to increase. Fund size is positively correlated with the ratings of Article 0, 6, and 8 funds while net assets do not impact the ratings of Article 9 funds. A possible explanation is that larger funds can dedicate more resources to managing ESG risks. Given that most Article 9 funds have 4 or 5 globe ratings, it is not surprising that net assets and flows do not affect the ratings of Article 9 funds. Older funds tend to have higher ratings, perhaps because they had more time to screen and purchase assets with higher ESG ratings. Monthly returns have no impact on the sustainability ratings of funds. Monthly flow is uncorrelated with the ratings of Article 6 and 9 funds while it is negatively correlated with the ratings of Article 0 and 8 funds.

## Table 14: Flow Random Effects Regression by SFDR Article

This table presents the results of a random effects panel regression for funds by SFDR classification. The dependent variable is monthly flow. The covariates are EU, comply, EUxComply, log net assets, age, and monthly return. The second row shows the results for funds that do not have to comply with SFDR, the third for Article 6 funds, the fourth for Article 8 funds, and the fifth for Article 9 funds. Standard errors are clustered on the fund level and reported in parentheses. The statistical significance at the 10%, 5%, and 1% levels are respectively denoted by *, **, and ***.

| Flow | Art. 0 | Art. 6 | Art. 8 | Art. 9 |
|---|---|---|---|---|
| EU | 0 | 0.4693*** | 0.5097*** | 0.6400*** |
| | (0) | (0.0399) | (0.1303) | (0.1723) |
| Comply | -0.2469*** | -0.2564*** | -0.2219*** | -0.2207*** |
| | (0.0023) | (0.0047) | (0.0117) | (0.0038) |
| EUxComply | 0 | -0.2246*** | -0.1988*** | -0.1899*** |
| | (0) | (0.0047) | (0.0038) | (0.0117) |
| Lognetasset_w | -0.0083*** | -0.0109*** | -0.0048*** | -0.0016 |
| | (0.0005) | (0.0011) | (0.0008) | (0.0026) |
| Age_w | 0 | 0.0026*** | 0 | 0.0036** |
| | (0) | (0.0006) | (0) | (0.0015) |
| Monthlyreturn_w | 0.0045*** | 0.0089*** | 0.0079*** | 0.0220*** |
| | (0.0002) | (0.0004) | (0.0003) | (0.0010) |
| Constant | 0.3915*** | 0.5462*** | 0.5732*** | 0.6456*** |
| | (0.0068) | (0.0103) | (0.0123) | (0.0283) |
| Within $R^2$ | 0.0257 | 0.0196 | 0.0181 | 0.0302 |
| Between $R^2$ | 0.0135 | 0.0307 | 0.0544 | 0.0498 |
| Overall $R^2$ | 0.0249 | 0.0201 | 0.0186 | 0.0303 |
| # of obs. | 496,951 | 197,949 | 246,830 | 30,897 |

Funds that are required to comply with SFDR had outflows after March 2021. Based on the value of the EUxComply coefficient, the introduction of SFDR had a negative, statistically significant impact on the net flows of EU funds. Article 6 funds had greater outflows than Article 8 funds while Article 8 funds had greater outflows than Article 9 funds. Older funds classified as Article 6 or Article 9 tend to have higher flows. However, age does not impact the flow of Article 0 and 8 funds. Not surprisingly, monthly return is positively correlated with flows, especially for Article 9 funds.

**Table 15: Flow Random Effects Regression by Morningstar Sustainability Rating**

This table presents the results of a random effects panel regression for funds categorized by Morningstar Sustainability Ratings. The dependent variable is monthly flow. The covariates are EU, comply, EUxComply, log net assets, age, and monthly return. Standard errors are clustered on the fund level and reported in parentheses. The statistical significance at the 10%, 5%, and 1% levels are respectively denoted by *, **, and ***.

| Flow | MSR 1 | MSR 2 | MSR 3 | MSR 4 | MSR 5 |
|---|---|---|---|---|---|
| EU | -0.0382*** | 0.0396*** | 0.0232*** | 0.0195*** | 0.0550*** |
|  | (0.0095) | (0.0058) | (0.0041) | (0.0045) | (0.0077) |
| Comply | -0.3063*** | -0.2639*** | -0.2443*** | -0.2149*** | -0.1842*** |
|  | (0.0119) | (0.0056) | (0.0040) | (0.0053) | (0.0101) |
| EUxComply | 0.0289* | 0.0062 | 0.0025 | -0.0008 | -0.0032 |
|  | (0.0169) | (0.0085) | (0.0058) | (0.0073) | (0.0028) |
| Lognetasset_w | -0.0127*** | -0.0067*** | -0.0086*** | -0.0060*** | -0.0070*** |
|  | (0.0015) | (0.0009) | (0.0006) | (0.0007) | (0.0011) |
| Age_w | -0.0019*** | 0 | 0.0005** | -0.0009*** | -0.0014*** |
|  | (0.0056) | (0) | (0.0002) | (0.0002) | (0.0004) |
| Monthlyreturn_w | 0.0109*** | 0.0023*** | 0.0054*** | 0.0111*** | 0.0132*** |
|  | (0.0007) | (0.0004) | (0.0003) | (0.0003) | (0.0006) |
| Constant | -0.6442*** | -0.4583*** | 0.4532*** | 0.4713*** | 0.4743*** |
|  | (0.0250) | (0.0121) | (0.0108) | (0.0191) | (0.0084) |
| Within $R^2$ | 0.0259 | 0.0195 | 0.0186 | 0.0202 | 0.0203 |
| Between $R^2$ | 0.0261 | 0.0203 | 0.0531 | 0.0492 | 0.0565 |
| Overall $R^2$ | 0.0257 | 0.0201 | 0.0226 | 0.0241 | 0.0243 |
| Wald $X^2$ | 1,735.36 | 4,236.23 | 8,310.22 | 5,595.91 | 2,030.31 |
| Prob > $X^2$ | 0 | 0 | 0 | 0 | 0 |
| # of obs. | 65,672 | 211,530 | 381,097 | 228,954 | 81,365 |

All variables except for EUxComply and age are statistically significant at the 1% level. As seen in the EU coefficient, investors shifted money from EU funds with a rating of 1 to funds with higher ratings, especially with 5 globe ratings. After March 2021, funds with higher ratings had smaller outflows than funds with lower ratings. The impact of SFDR on the net flow of EU funds after March 2021 is minimal given that the EUxComply interaction term is

not statistically significant. Higher monthly returns lead to higher inflows while larger funds saw outflows.

## 6.4 Hypotheses

*Hypothesis 1: Funds affected by the SFDR have higher sustainability ratings than funds unaffected by SFDR after November 2019.*

The results of the time fixed effects regression in Table 10 and the random effects regression in Table 13 support the hypothesis. The SFDR has a positive, statistically significant effect on the sustainability ratings of EU funds, especially on Article 8 funds. Funds that need to comply with the SFDR have higher ratings than funds that do not need to comply before and after November 2019.

*Hypothesis 2: Funds with higher Morningstar Sustainability Ratings receive higher inflows than funds with lower Morningstar Sustainability Ratings after March 2021.*

The results of the time fixed effects regression in Table 12 and the random effects regression in Table 15 support the hypothesis. Based on the value of the EU coefficient, funds with higher sustainability ratings had larger inflows than funds with lower ratings. Based on the value of the comply coefficient, funds with higher sustainability ratings had lower outflows than funds with lower ratings after March 2021. Given that funds with higher ratings were more likely to be classified as Article 8 or 9, investors might have believed that such funds were more likely to be compliant with the SFDR and therefore bought funds with higher ratings while selling funds with lower ratings.

According to the results of Table 12, the coefficient of comply is negative and statistically significant at the 1% level. Funds across all sustainability ratings saw outflows after March 2021. Funds with lower ratings had larger outflows than funds with higher ratings. However, it appears that the requirement to comply with the SFDR had a minimal impact on fund flows as the EUxComply interaction term is not statistically significant for all ratings besides for the lowest rating.

According to the results of Table 15, the coefficient of comply is negative and statistically significant at the 1% level. Looking at the comply coefficient, funds with higher ratings had smaller outflows than funds with lower ratings after March 2021. The EUxComply interaction term is not statistically significant. Thus, the SFDR had minimal impact on flows. Based on

the values of the constant and the EU coefficients, it appears that investors tended to buy funds with higher ratings and sell funds with lower ratings.

*Hypothesis 3: Among all funds compliant with SFDR, Article 8 or Article 9 funds receive higher inflows than Article 6 funds after March 2021.*

The results of the fund fixed effects regression in Table 11 and the random effects regression in Table 14 do not support the hypothesis. Given that the EUxComply interaction term is negative and statistically significant at the 1% level for Article 6, 8, and 9 funds, it appears that the requirement to comply led to outflows from EU funds. According to Tables 11 and 14, Article 9 funds had lower outflows than Article 8 funds and Article 8 funds had lower outflows than Article 6 funds. Perhaps investors withdrew less money from Article 9 funds given that Article 9 funds tended to have higher sustainability ratings than Article 6 and 8 funds.

## 7. Conclusion

This paper aims to assess the impact of the Sustainable Finance Disclosure Regulation on the Morningstar Sustainability Rating and monthly net flows of mutual funds in the EU and the US from January 2019 to March 2022 using ordinary least squares regressions, fixed effects regressions, and random effects panel regressions. Funds with larger assets tend to have higher sustainability ratings and lower inflows. Not surprisingly, funds with higher monthly returns have larger inflows. Fund flows tend to have no effect on sustainability ratings.

I find evidence that the announcement of SFDR on November 2019 led to higher sustainability ratings for EU funds. Based on the value of the EUxComply interaction term, the requirement to comply had minimal impact on the flows of EU funds after March 2021. The effect of the SFDR on sustainability ratings and net flows depends on a fund's SFDR Article classification. The SFDR has a positive, statistically significant effect on the sustainability ratings of EU funds. Article 8 funds had larger rating increases than Article 6 or 9 funds. The average sustainability rating of US funds did not change from November 2019 to March 2021 while the average rating of EU funds rose. Article 6 funds saw larger outflows than Article 8 funds, while Article 8 funds saw slightly larger outflows than Article 9 funds.

Regardless of the domicile or sustainability rating, funds saw outflows after March 2021. Funds with higher ratings had smaller outflows than funds with lower ratings. Perhaps outflows from EU funds may be attributed to the need for investors to adjust to the SFDR. Given that funds with higher ratings were more likely to be classified as Article 8 or 9 funds, investors might have thought that such funds were more likely to comply with the SFDR and therefore did not withdraw as much money compared to non-compliant funds or funds with lower ratings. A greater percentage of Article 9 funds had 5 globe ratings than Article 6 funds, Article 8 funds, and funds that did not need to comply with SFDR. Investors withdrew less money from funds with higher ratings or Article 9 funds. Overall, the SFDR had a minor impact on flows but a greater impact on sustainability ratings.

### 7.1 Suggestions for Further Research

My study has several data limitations that prevented me from adding variables that impact fund flows and conducting a more comprehensive analysis. First, Morningstar does not show expense ratios for EU funds. Data on the turnover ratio is available on different dates for different funds, which prevents me from making a consistent comparison. Second, data on fund Standard Deviation, Sharpe Ratio, Alpha, Beta, Morningstar Rating Overall, Return

Rating, Risk Rating, Risk-Adjusted Return were available only for the latest month, making it difficult to conduct panel regressions.

For further research, I recommend collecting data over a longer period starting from 2016, the year the Morningstar Sustainability Ratings became available. Given that Morningstar Direct only provided data on the fund SFDR classification assigned on March 2021, my analysis did not account for any subsequent changes in the SFDR classification. Future studies could investigate the impact of changing regulatory labels on fund flows.

## 7.2 Future of ESG Funds

I anticipate that inflows into ESG investment products will continue to rise for various reasons. First, rising investor interest in and demand for ESG funds is accompanied by the development of more sophisticated measures to assess ESG risks. Second, increasing regulatory and societal support for sustainable investments will accelerate flows. Governments across the world are passing regulations to clarify the definitions and scope of ESG investments and to ensure that ESG investments are comparable for and accessible to a wider range of investors.

Changes in sustainability ratings and fund flows in the first year after the introduction of SFDR suggest that financial market participants adjust their portfolios in response to new regulations. The long-term impact of the SFDR and other accompanying measures such as the EU Taxonomy for sustainable activities on investor behavior is an open question, especially considering challenges such as greenwashing from financial market participants, the robustness and reliability of ESG risk data and methodology, volatile macroeconomic and market environments, and a lack of disclosure from companies on how climate considerations will impact their profitability and operations. Given that the SFDR appeared to have a moderate, positive impact on the sustainability ratings of EU funds and an insignificant impact on the flows of EU funds within the first year since the compliance date, it will be interesting to see whether the long-term impact will mirror the short-term impact.

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# 9. Appendix

**Table A.1: Variables**

This table lists and defines all variables used in the study.

| Variable | Code | Definition | Data Source |
|---|---|---|---|
| Morningstar Sustainability Rating | $MSR_{i,t}$ | The Morningstar Sustainability Rating of fund $i$ at month $t$ | Morningstar Direct |
| EU fund | $EU_i$ | Dummy variable for fund jurisdiction:<br>• Equals 1 if the fund is based in the EU and<br>• Equals 0 if the fund is based outside of the EU | Morningstar Direct |
| Month after November 2019 | $Announce_t$ | Dummy variable for month:<br>• Equals 1 if the month is after November 2019 and<br>• Equals 0 if the month is before November 2019 | Morningstar Direct |
| EU fund after November 2019 | $EU_i$ x $Announce_t$ | The difference-in-differences estimator for observations of EU funds after the announcement of the SFDR | Morningstar Direct |
| Month after March 2021 | $Comply_t$ | Dummy variable for month:<br>• Equals 1 if the month is after March 2021 and<br>• Equals 0 if the month is before March 2021 | Morningstar Direct |
| EU fund after March 2021 | $EU_i$ x $Comply_t$ | The difference-in-differences estimator for observations of EU funds after the SFDR becomes effective | Morningstar Direct |
| Total Net Assets | $TNA_{i,t-1}$ | The total net assets of fund $i$ at month $t-1$ | Morningstar Direct |
| Log Net Assets | $LogNA_{i,t-1}$ | The logarithm of a fund's total net assets at month $t-1$ | Calculation from Total Net Assets |
| Fund Age | $Age_{i,t-1}$ | The difference between month $t-1$ and the inception month of fund $i$ | Morningstar Direct |

| Fund Net Flow | $Flow_{i,t}$ | The net flows of fund $i$ at month $t$ expressed in percentage terms | Formula calculation from Morningstar Direct |
|---|---|---|---|
| Fund Monthly Return | $Return_{i,t-1}$ | The return of fund $i$ at month $t-1$ expressed in percentage terms. A fund's total return is calculated by dividing the change in the monthly net asset value, which includes reinvested income and capital gains distributions, by the net asset value at the beginning of the month. | Morningstar Direct |
| Fund is not required to comply with SFDR | $Article0_{i,t}$ | Dummy variable:<br>• Equals 1 if the fund does not comply with SFDR and<br>• Equals 0 if the fund complies with SFDR | Morningstar Direct |
| Article 6 Classification | $Article6_{i,t}$ | Dummy variable:<br>• Equals 1 if the fund is classified as Article 6 and<br>• Equals 0 if the fund is not classified as Article 6 | Morningstar Direct |
| Article 8 Classification | $Article8_{i,t}$ | Dummy variable:<br>• Equals 1 if the fund is classified as Article 8 and<br>• Equals 0 if the fund is not classified as Article 8 | Morningstar Direct |
| Article 9 Classification | $Article9_{i,t}$ | Dummy variable:<br>• Equals 1 if the fund is classified as Article 9 and<br>• Equals 0 if the fund is not classified as Article 9 | Morningstar Direct |