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Hunt Allcott
Mark L. Egan
Paul Smeets
Hanbin Yang

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The Effects of Regulating Greenwashing: Evidence from Europe's Sustainable Finance Disclosure Regulation (SFDR)

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ABSTRACT

We examine the impact of the European Union's Sustainable Finance Disclosure Regulation (SFDR) on mutual fund flows and investment sustainability. The SFDR classifies funds into three categories to promote transparency and curb greenwashing: those with a sustainable investment objective (Article 9 or "dark green"), those that promote environmental characteristics (Article 8 or "light green"), and others (Article 6). Using a difference-in-differences design, we find that the SFDR had little effect on fund flows or portfolio sustainability. The disclosures were ineffective in part because they offered little new or clear information beyond what investors could already infer from fund names and mandates. In an experimental setting, we show that the current disclosures have minimal impact on investor decisions, but making the information more intuitive could improve the regulation's effectiveness.

Hunt Allcott
Stanford University
and NBER
allcott@stanford.edu

Mark L. Egan
Harvard University
Department of Economics
and NBER
megan@hbs.edu

Paul Smeets
University of Amsterdam
p.m.a.smeets@uva.nl

Hanbin Yang
London Business School
hyang@london.edu

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1 Introduction

The growing focus on Environmental, Social, and Governance (ESG) and impact investing has led to significant changes in the financial sector, with $6.5 trillion in assets under management in the U.S. incorporating ESG criteria as of 2025 (SIF 2025).[1] Given mounting skepticism about the true effects of ESG and impact investing and the potential for greenwashing (i.e., when funds deceptively promote their environmental commitments), a key concern is how regulators should address funds' claims about their environmental and social impact.[2]

Regulatory responses have aimed to increase transparency and accountability in ESG investing. In the U.S., the Securities and Exchange Commission (SEC) prohibits funds from using names deemed deceptive or misleading.[3] In 2023, the Biden administration extended this scrutiny to ESG-labeled funds, while the UK's Financial Conduct Authority (FCA) released a draft of its Sustainability Disclosure Requirements in 2022.

The European Union has adopted some of the most extensive reporting requirements through the Sustainable Finance Disclosure Regulation (SFDR). Implemented to enhance transparency, the SFDR classifies mutual funds into three categories: those with a sustainable investment objective (Article 9 or "dark green"), those that promote environmental characteristics (Article 8 or "light green"), and others (Article 6). In March 2021, the SFDR's disclosure requirements took effect, mandating that funds justify their classification to help mitigate greenwashing in the financial sector. While the potential benefits of the SFDR are clear, the added reporting requirements impose nontrivial costs on firms—potentially totaling upwards of €30 billion per year.[4] In addition to the implementation costs, the European Supervisory Authorities (ESA) warns that "Status as 'Article 8' or 'Article 9' products have been used since the outset in marketing material as 'quality labels' for sustainability, consequently posing greenwashing and mis-selling risks."[5]

In this paper, we examine how the SFDR influenced the behavior of mutual funds and mutual fund investors in Europe. For the SFDR to affect the real economy, several conditions must be met: (i) funds classified as greener must hold materially different assets; (ii) the disclosures must provide new information to investors; (iii) investors must act on this information by reallocating their investments; (iv) these investment shifts must influence asset prices; and (v) asset price changes must, in turn, impact the real economy. We focus on testing conditions (i),

[1] https://www.ussif.org/research/trends-reports/us-sustainable-investing-trends-2024-2025-executive-summary

[2] For further discussion, see Kölbel et al. (2020); Bonnefon et al. (2022); Hartzmark and Shue (2023); Heeb et al. (2023); Berk and Van Binsbergen (2025)

[3] U.S. Securities and Exchange Commission. (2001, January 17). *Investment Company Names,* 66 Fed. Reg. 8509 (Final Rule). https://www.sec.gov/rules/regulations/2001/01/investment-company-names#IC-24828final

[4] Source: International Sustainability Institute, 2022, "How sustainable is the EU's sustainable finance regulation." https://www.internationalsustainabilityinstitute.net/research

[5] https://www.esma.europa.eu/sites/default/files/2024-06/JC_2024_06_Joint_ESAs_Opinion_on_SFDR.pdf

(ii), and (iii), leaving the assessment of (iv) and (v) to other research. We aim to evaluate how SFDR disclosures impact investor behavior and fund composition, laying the groundwork for understanding their broader economic implications.

We assess the impact of the SFDR in two parts. First, we analyze European mutual fund data to estimate the regulation's effect on fund flows and holdings. This fund-level analysis indicates that the SFDR had a limited impact on both. In the second part of the paper, we investigate why. Is the muted response due to investor indifference toward sustainability, or is it a problem with the disclosures themselves? We find that investors care about sustainability, but the disclosures failed to convey meaningful new information. Much of the information was redundant and difficult to understand. To complement our quantitative analysis, we conduct a survey and experiment with European investors. The results show that many struggled to interpret the SFDR disclosures and suggest that making the information clearer could have significantly increased the regulation's effectiveness.

We begin our analysis by examining how mutual funds chose to classify themselves under the SFDR, using monthly European fund-level data from Morningstar. When the SFDR took effect in March 2021, approximately 7% of funds were classified as Article 9 funds, 57% as Article 8 funds, and the remaining 35% as Article 6 funds. The SFDR classifications broadly align with other measures of sustainability. Article 9 funds tend to have higher sustainability ratings, as per Morningstar and Refinitiv ratings, and lower emissions than Article 8 and 6 funds. Similarly, Article 8 funds score better in terms of sustainability and emissions than Article 6 funds. Overall, the results suggest that the SFDR classifications are in line with existing sustainability measures.

We study whether investors act on new information by changing their investments following the introduction of the SFDR. We first test for changes in flows around the SFDR's introduction in March 2021. Using a difference-in-differences research design, we assess whether the SFDR disclosures impacted flows into Article 8 and 9 funds. We find that the introduction of the SFDR in March 2021 had no impact on mutual fund flows. This finding is robust across various subsamples and whether we weight funds equally or by asset under management.

In addition to fund flows, we examine how both the announcement and the introduction of SFDR relate to changes in funds' sustainability. We focus on commonly used indicators: portfolio-weighted carbon emissions, Refinitiv environmental ratings, and Morningstar carbon risk scores. Across all specifications, the estimated effects are either statistically absent or economically small. The absence of meaningful shifts in these sustainability metrics suggests that any observed improvements likely reflect an ongoing market-wide trend of declining financed emissions rather than a distinct impact of SFDR itself.

We then test for changes in flows and sustainability in response to SFDR reclassifications. Funds occasionally reclassify themselves. Most notably in late 2022, funds with several hundred billion euros of assets under management downgraded themselves from Article 9 to Article

8 in anticipation of tightened disclosure requirements. We test whether investors responded to these classifications by examining whether funds that 'downgraded' (or 'upgraded') their environmental classification experienced a decrease (or increase) in flows compared to funds that did not. Again, we found little effect on mutual fund flows, suggesting that the disclosures had a limited impact. The sustainability of the underlying portfolios also does not materially change after the funds reclassify.

In the second half of the paper, we examine why SFDR disclosures had a limited impact on the behavior of funds and investors. One potential explanation is that investors do not care about sustainability, although this would contradict much of the recent literature. Consistent with the previous literature, we find evidence that investors care about sustainability, as funds labeled as sustainable and ESG funds experience higher flows. So, why didn't the SFDR regulations affect flows? We observe that funds classified as Article 8 and 9 funds consistently received higher flows than Article 6 funds, even before the introduction of the SFDR. These results suggest that the limited impact of SFDR disclosures on investor behavior is not due to a lack of interest in sustainability, but rather because investors were already aware of which funds were 'dark' and 'light green' before the SFDR disclosures were introduced. In other words, the SFDR disclosures did not provide any new information. Before the introduction of SFDR, 86% of Article 9 funds already had sustainability mandates, compared to only 0.3% of Article 6 funds. Article 9 funds were also five times more likely to receive a top sustainability rating from Morningstar (i.e., 5 Globe Rating) than Article 6 funds.

Another reason why SFDR disclosures had a limited effect on flows could be that the disclosures were hard to understand. For example, many funds on their website and prospectus simply list whether they are an Article 6, 8, or 9 fund, with little or no description. Investors may not understand the differences between Article 6, 8, and 9 funds. The European Supervisory Authorities are worried about this potential misunderstanding too: "The categories should be simple with clear objective criteria or thresholds, to identify which category the product falls into." The ESA therefore suggests consumer testing of the SFDR regulation, which has not taken place yet: "In this Opinion the ESAs strongly encourage the Commission to undertake consumer testing when developing policy options to have a stronger evidence basis for changing the regulatory framework and to therefore ensure more successful outcomes." [6]

To provide further insight into the mechanism, we survey European investors about the SFDR disclosure and conduct an experiment. In our experiment, investors must form a portfolio from a set of available mutual funds. We vary the information provided to investors about the set of available funds, including the funds' SFDR disclosures. Consistent with what investors report in the survey, our results indicate that simply including the type of fund as per the SFDR (i.e., Article 6, 8, or 9) has a limited impact on investors' portfolio choices. In contrast, we

[6] https://www.esma.europa.eu/sites/default/files/2024-06/JC_2024_06_Joint_ESAs_Opinion_on_SFDR.pdf

find a much larger response when we provide SFDR disclosures along with intuitive definitions describing the differences between Article 6, 8, and 9 funds. Thus, our results suggest that investors struggled to understand SFDR disclosures, and providing more detailed explanations could have increased the impact of the SFDR.

The remainder of the paper is structured as follows: In Section 2, we describe the institutional setting and our data. In Section 3, we estimate the effects of the SFDR using two difference-in-differences settings surrounding the introduction of the SFDR and fund reclassifications. Section 4 presents the results from our survey and experiment. Lastly, Section 5 concludes.

Related Literature

Our paper contributes to several streams of literature. First, it advances the literature on sustainable investment behavior. Recent finance theory includes investors' social preferences next to financial motives (Heinkel, Kraus, and Zechner, 2001; Pastor, Stambaugh, and Taylor, 2021; Pedersen, Fitzgibbons, and Pomorski, 2021; Broccardo, Hart, and Zingales, 2022; Gollier and Pouget, 2022). Empirical evidence by Riedl and Smeets (2017), Hartzmark and Sussman (2019), Barber, Morse, and Yasuda (2021), Bauer, Ruof, and Smeets (2021), Brodback et al. (2025), and Baker, Egan, and Sarkar (2022) shows that investors are willing to pay a premium for sustainable investments. Our paper focuses on Europe, where this willingness to pay for sustainable investments is prevalent across the continent (Engler, Gutsche, and Smeets, 2023). However, they also find that investors' willingness to pay higher fees is largely due to limited financial literacy. Furthermore, Bonnefon et al. (2022) and Heeb et al. (2023) show that many investors pay little attention to the actual impact they can achieve through sustainable investments. Instead, investors tend to rely on easily interpretable metrics, such as Morningstar Sustainability Globes (Hartzmark and Sussman, 2019), low-carbon labels for mutual funds (Ceccarelli, Ramelli, and Wagner, 2024), and sustainability-related fund names (Karoui and Ghoul, 2022). These papers highlight that investors respond to information voluntarily disclosed by fund managers or ratings from commercial rating agencies like Morningstar. In contrast, our paper examines the effects of the first government-mandated sustainable finance regulation, enforced by the European Union. While this regulation significantly impacts disclosure requirements, we find that its behavioral effects so far seem limited.

Several recent papers examine the effects of the SFDR regulation. Becker, Martin, and Walter (2022), Ferriani (2023), Emiris, Harris, and Koulischer (2023), Spaans et al. (2024), and Fabiani et al. (2025) find that a higher SFDR label correlates with greater fund net inflows and, in some cases, improved sustainability performance. In contrast, we find that a higher SFDR label did not lead to either an economically or statistically significant increase in fund inflows. Our baseline difference-in-differences research design is broadly similar to that used in Becker, Martin, and Walter (2022), Ferriani (2023), and Fabiani et al. (2025), although we use

a slightly longer window and focus primarily on graphical event study evidence that provides transparent evidence on parallel trends. Examining several different samples, and separately considering Article 8 and 9 funds, we find that the collective evidence suggests the SFDR did not have a material impact on fund flows. In addition to studying the effects of the introduction of the SFDR, we contribute to the literature by analyzing what happens when funds change their SFDR status. These reclassifications address some limitations of the initial event study by offering more variation over time and reducing the influence of contemporaneous trends at the time of the SFDR's introduction.

Our results on fund flows are consistent with Emiris, Harris, and Koulischer (2023), although we offer a somewhat different interpretation. Emiris, Harris, and Koulischer (2023) show, focusing just after the introduction of the SFDR, that Article 8 and 9 funds experienced higher flows than Article 6 funds. We find similar results; however, we show that these Article 8 and 9 funds already had higher flows prior to the introduction of the SFDR. Thus, the SFDR itself did not boost flows into Article 8 and 9 funds relative to Article 6.

Consistent with prior work on the effects of regulation, we find some evidence that the SFDR regulations changed the sustainability of portfolios. However, the results are highly sensitive to the specific sustainability metric studied. Moreover, the economic magnitudes of the changes in portfolio composition are quite modest.

Overall, our comprehensive approach reveals that, contrary to prior findings, SFDR's introduction had no effect on fund flows and a potentially minimal effect on sustainability performance in both our event study and investigation of fund downgrades. Building on this earlier work and our findings, we contribute new evidence to the literature on why the SFDR had only a limited effect on fund flows and fund portfolios. In short, much of the information provided was redundant and not salient for investors. In our experimental setting, we show how modest changes to the regulations could enhance their impact on both investors and fund managers.

Third, our paper contributes to the literature on the impact of sustainable finance. Becker, Martin, and Walter (2022), as well as Ceccarelli, Ramelli, and Wagner (2024), find that sustainability labels can lead to improved ESG scores for funds. However, Scheitza, Busch, and Metzler (2022) reveal that only 37 percent of Article 9 funds meet the outlined impact requirements. Similarly, Chesney and Lambillon (2023) note that Article 9 funds often do not go beyond screening and ESG integration approaches, despite being expected to have a clearer sustainability objective according to the SFDR classification. Moreover, Berk and Van Binsbergen (2025) and Eskildsen et al. (2024) show that the effects of sustainable investments on the cost of capital for green versus brown firms are too small to meaningfully improve sustainability performance. Hartzmark and Shue (2023) even argue that sustainable finance may be counterproductive, as brown firms reduce their investments in new green production when they face financial tightening. Regulation could in theory increase the impact of sustainable finance. Yet, our paper demonstrates that the large-scale European Sustainable Finance Disclosure Regula-

tion has not yet succeeded in influencing investment decisions or motivating fund managers to revise their funds to be more sustainable.

2 Data and Background

2.1 Sustainable Finance Disclosure Regulation

To achieve the targets outlined in the Paris Agreement and fulfill the Sustainable Development Goals, the European Union (EU) launched a comprehensive Sustainable Finance Regulation package. This package is an integral part of the overarching European Green Deal. Key pillars of these regulations include the incorporation of sustainability preferences in MiFID II, the creation of an EU taxonomy, and the Sustainable Finance Disclosure Regulation (SFDR). The SFDR was designed to standardize disclosure requirements related to the sustainability of investment products, aiming to streamline how sustainability risks are integrated and how adverse sustainability impacts are considered. According to the EU (2019), the inconsistency in existing disclosure standards and market practices 'makes it very difficult to compare different financial products,' leading to a fragmented market and hindering informed investment decisions.

The SFDR was enacted by the EU on November 27, 2019, with implementation required by March 10, 2021. This deadline mandated that asset managers classify investment funds into specific categories based on their sustainability objectives. These categories are as follows:

- Article 6: The financial product does not incorporate any form of sustainability into the investment process.
- Article 8: The financial product promotes social and environmental characteristics, with a wide range of sustainability levels.
- Article 9: The financial product significantly contributes to sustainable objectives, requiring a 100% investment in companies deemed sustainable by the asset manager, following internal criteria that must be substantiated.

Under the SFDR, financial market participants are required to disclose on their websites, in product prospectuses, and in key investor information documents (KIID) information about their sustainability-related procedures and the principal adverse impacts of their activities. The regulation applies to financial market participants within the EU, including but not limited to investment firms, venture capital funds, asset managers, financial advisers, and banking and credit institutions offering portfolio management, provided they employ at least 500 people.

Figure 1 displays the number of articles written about the SFDR and Google search volume for the SFDR around the time it was implemented in March 2021. There were almost no articles or searches on the SFDR before its implementation. After its implementation, attention to the SFDR, as measured by both the number of articles written and Google Trends, remains elevated

for three years afterwards. This evidence helps motivate the difference-in-differences research design we implement in Section 3.

2.2 Data

Our base dataset comes from Morningstar Direct, which provides monthly data on mutual funds and exchange-traded funds (ETFs). This data includes financial information for each fund, such as total net assets and returns, along with other details like whether the fund is active or passive, the expense ratio, management company, and Morningstar Investment category. Observations in our base dataset are at the fund-by-month level from February 2019 through December 2023.[7] We focus on mutual funds and ETFs available for sale in Europe, excluding the United Kingdom. We also drop funds without information on Article classification and funds with total net assets below 1 million euro. For robustness, we also look at subsamples of equity funds and euro-denominated funds.[8] In total, we have an unbalanced panel of 20,501 different mutual funds and ETFs. We restrict to a balanced panel for our event study with 13,582 different mutual funds and ETFs.

We classify funds into Article 6, 8 and 9 using data from Morningstar.[9] At the implementation of the SFDR, approximately 45% of the funds are Article 6 funds, 50% are Article 8 funds, and 5% are Article 9 funds. For the period prior to the implementation of the SFDR in March 2021, we classify funds based on how they were initially classified in March 2021, although that information was not available to investors prior to March 2021.

Morningstar also provides fund-level data on several sustainability metrics. Similar to its star rating system, Morningstar offers a Sustainability Rating, which measures the sustainability of each fund on a scale of one to five globes, with a higher number indicating greater sustainability (i.e., lower ESG risk). Using data from Sustainalytics, Morningstar constructs these globe ratings based on the sustainability of the fund's underlying portfolio. Hartzmark and Sussman (2019) show that, following the introduction of Morningstar's Sustainability Rating, the highest rated funds experienced an increase in flows. In addition to the overall Sustainability Rating, Morningstar also reports carbon risk score, which is again a weighted average of carbon-risk ratings of underlying positions from Sustainalytics. Morningstar also provides

[7] Following the literature such as Hartzmark and Sussman (2019), we aggregate across share classes and conduct our analyses at the fund level.

[8] Equity funds include those with the following global category from Morningstar: "Europe Emerging Markets Equity", "Europe Equity Large Cap", "Global Equity Large Cap", "Global Equity Mid/Small Cap", "Long/Short Equity", "UK Equity Large Cap", "UK Equity Mid/Small Cap", "US Equity Large Cap Blend", "US Equity Large Cap Growth", "US Equity Large Cap Value", "US Equity Mid Cap", "US Equity Small Cap", and "Europe Equity Mid/Small Cap". We exclude sector or country specific funds. This definition is similar to that in (Ceccarelli, Ramelli, and Wagner, 2024). Euro-denominated funds are funds whose largest share class is denominated in euro and we only include euro-denominated share classes of these funds.

[9] Morningstar provides monthly updates on fund classifications. For missing observations, we assume that a fund's classification remains the same as in the previous period. If there is no data from preceding periods, we use data from the next available period.

details on whether a fund has an ESG or sustainability mandate. At the time the SFDR was implemented in March 2021, approximately 20% of the funds in our sample had a sustainability mandate.

We also construct our own measures of sustainability based on the funds' holdings. Using data from FactSet, we determine the portfolio holdings of the funds in our sample. We then merge this holdings data with security-level environmental ratings and carbon emissions data from Refinitiv. These emissions and sustainability ratings measures allow us to differentiate between Article 6, 8, and 9 funds and understand how the portfolios of funds changed surrounding the implementation of the SFDR.

2.3 Descriptive Facts

Table 1 displays the summary statistics for our base dataset by classification. Figure 2 displays the share of Article 6, 8, and 9 funds over our sample period. The composition of fund types has remained relatively constant over time, although there has been an uptick in the share of Article 8 funds near the end of our sample period. Table 1 shows that on average, Article 8 funds tend to have the largest Total Net Assets (TNA), followed by Article 9 and 6 funds.

2.3.1 Flows

We are primarily interested in how the introduction of the SFDR impacted both the flows and sustainability of funds across SFDR articles. Although Article 8 funds have the highest TNA, Article 9 funds have experienced the highest flows as a proportion of TNA in our sample period, followed by Article 8 funds and then Article 6 funds. We measure monthly flows into fund j at time t as the percentage change in return-adjusted total net assets:

$$Flow_{jt} = \frac{AUM_{jt} - AUM_{jt-1}(1 + r_{jt})}{AUM_{jt-1}}, \tag{1}$$

where AUM_{jt} represents the total net assets of fund j at time t, and r_{jt} is the fund's return over the period $t-1$ to t. Figure 3 displays the average flows by Article 6, 8, and 9 funds over our sample period.

Figure 3 illustrates that, consistently over the full sample period, Article 9 funds experienced higher flows than Article 8 funds, which in turn experienced higher flows than Article 6 funds. Importantly, this pattern holds even before the introduction of the SFDR in March 2021. These results suggest that flows systematically varied across Article 6, 8, and 9 funds even prior to the implementation of the SFDR. Moreover, the differences in flows between Article 6, 8, and 9 funds do not appear to change systematically around the introduction of the SFDR. This evidence is consistent with our findings from the difference-in-differences regression design presented in Section 3.1, where we show that the SFDR sustainability disclosures did not im-

pact fund flows. The fact that Article 9 funds attracted more flows than Article 8 funds, and Article 8 funds more than Article 6 funds—even before the SFDR—suggests that investors already perceived meaningful differences among these fund classifications, perhaps due to their underlying sustainability characteristics, as we discuss below. Furthermore, the introduction of the SFDR does not appear to have altered these perceptions.

2.3.2 Sustainability

We are also interested in how sustainability varies across Article 6, 8, and 9 funds. We examine the sustainability of funds across several dimensions as of February 2021, just prior to the introduction of the SFDR, and present the results in Figure 4. Figure 4a displays how the distribution of Morningstar Sustainability (i.e., Globe) Ratings varies across fund types. The dark green line plots the distribution of Globes for Article 9 funds. The results indicate that approximately 30% of Article 9 funds receive the highest sustainability ratings (i.e., 5 Globes), whereas roughly 10% of Article 6 funds receive the highest sustainability rating. The distribution of Morningstar Globes among Article 9 funds stochastically dominates the distribution among Article 8 funds, which in turn dominates the distribution among Article 6 funds. Thus, the SFDR classifications broadly agree with Morningstar Sustainability Ratings.

Figures 4b, 4c, and 4d display the distributions of carbon emissions, Refinitiv environmental ratings, and Morningstar carbon risk scores across fund types. We compute carbon emissions and Refinitiv environmental ratings at the fund level based on the funds' underlying holdings. The results again suggest that Article 9 funds tend to have lower emissions than Article 8 funds, which have lower emissions than Article 6 funds. Similarly, Article 9 funds have higher environmental ratings than Article 8 funds, which have higher ratings than Article 6 funds. These results suggest that publicly available emissions data and environmental ratings are correlated with the SFDR disclosures, although not perfectly correlated.

Lastly, we examine whether the funds explicitly had a sustainability mandate prior to the introduction of the SFDR. Figure 4e shows the share of Article 6, 8, and 9 funds that already had a sustainability mandate prior to the SFDR's introduction. The figure illustrates that 86% of Article 9 funds had an explicit sustainability mandate before the SFDR was introduced. Conversely, only 0.3% of Article 6 funds did. These findings suggest that much of the information in the SFDR disclosures, particularly for Article 9 funds, was potentially redundant.

Figure 4 implies that some—although certainly not all—of the information in the SFDR disclosures about sustainability was already available to market participants through publicly available ratings and emissions data. This potential redundancy may help explain why the SFDR disclosures did not materially impact fund flows: investors likely already had a sense of which funds were sustainable based on fund names, ESG ratings, and the presence of a sustainability mandate.

3 Impact of the SFDR

We examine the impact of the SFDR using a difference-in-differences framework surrounding two sets of events. First, we investigate how the initial introduction of the SFDR disclosures in March 2021 affected mutual fund flows and portfolios. To the extent that investors value sustainability and struggle to discern which funds are truly sustainable, one would expect the SFDR disclosures to increase flows into Article 8 and Article 9 funds. Moreover, one might ask if the SFDR had a causal effect of changing holdings for funds that classify themselves as more green.

Second, we explore how flows and portfolio holdings change when funds reclassify. Specifically, we focus on when funds downgrade from either Article 9 to Article 8, or Article 8 to Article 6. In late 2022, there was a wave of funds downgrading from Article 9 to Article 8 in anticipation of tightened disclosure requirements. Following such downgrades, one might expect that funds experience lower flows and shift their portfolios away from sustainable investments.

3.1 March 2021 Event Studies

We examine how the introduction of SFDR disclosures in March 2021 impacted fund flows and sustainability using a difference-in-differences framework. Our baseline specification is

$$y_{jt} = \sum_{t\in[-9 \text{ or } -25,9].t\neq -1} \gamma_t^{Art8} D_j^{Art8} + \gamma_t^{Art9} D_j^{Art9} + X_{jt}'\Gamma + \mu_j + \epsilon_{jt}, \tag{2}$$

where observations are at the fund (j) by month (t) level. In our baseline analysis, we restrict the event window to nine months before (June 2020) and nine months after (December 2021) the introduction of the SFDR in March 2021, such that $t = 0$ signifies March 2021. We examine outcome variables y_{jt} related to fund flows and sustainability. We focus on this event window because Figure 1 shows limited public attention prior to the implementation of SFDR.

The independent variables of interest are the sets of dummy variables $\{D_j^{Art8}\}$ and $\{D_j^{Art9}\}$. The variable D_j^{Art8} (or D_j^{Art9}) is a dummy variable indicating whether the fund is an Article 8 (or Article 9) at time $t = 0$. We are interested in the coefficients γ_t^{Art8} (or γ_t^{Art9}), which measure the time-varying treatment effect of Article 8 (or 9). The variable γ_t^{Art8} (or γ_t^{Art9}) captures the difference between Article 8 (or 9) and Article 6 funds at time t.

We also include several controls in our main specification. Fund fixed effects (μ_j) control for time-invariant fund characteristics. The vector X_{jt} includes additional fund characteristics: the fund's monthly and annual past returns (lagged by one month), the log of fund age, and an interaction between whether the fund has a sustainability mandate and time fixed effect. This interaction term accounts for time-varying preferences for ESG that are unrelated to SFDR disclosures. For instance, one might worry that the introduction of the SFDR coincided with a broader backlash against ESG funds. We find that controlling for potentially time-varying ESG

preferences has little impact on our main conclusions. Finally, we include Morningstar global category-by-month fixed effects. These fixed effects account for potential shifts in demand driven by a fund's investment style and asset class. We restrict to a balanced panel of funds and cluster standard errors at fund level.

3.1.1 Flows

We start by examining how the introduction of the SFDR affected flows. Figure 5 panel (a) displays the estimates corresponding to the effect of the SFDR on flows into Article 8 funds$\{\gamma^{Art8}\}$. If the SFDR had a positive impact on flows, one would expect to see the coefficient estimates shift upwards after March 2021 $(t = 0)$. However, the results suggest that the introduction of the SFDR had no effect on flows into Article 8 funds. In other words, we do not observe a differential change in flows into Article 8 funds relative to Article 6 funds after the introduction of the SFDR disclosures. We estimate a relatively precise zero effect for Article 8 funds.

Figure 5 panel (b) presents the corresponding estimates for the effect of the SFDR on flows into Article 9 funds $\{D_j^{Art9}\}$. Consistent with our results for Article 8 funds, we do not find any evidence suggesting that flows into Article 9 funds increased after the introduction of the SFDR.

Appendix Figure A2 displays estimates of the effects of the SFDR on Article 8 and Article 9 funds across different subsamples. Specifically, we restrict the sample to equity funds, euro-denominated funds, and euro-denominated equity funds. Consistent with our baseline results, the findings are broadly similar across subsamples and indicate that the SFDR did not materially affect fund flows into Article 8 or Article 9 funds.

We also report the corresponding regression specification in Table 2, where we keep the treatment effect fixed within the post-treatment period rather than allowing it to vary by month. The post-treatment coefficients are insignificant, except for the effect on Article 8 funds when restricting the sample to equity funds. The point estimate is only marginally significant at the 10% level, and the economic magnitude is small, amounting to 0.03 of the standard deviation of fund flows. These results reinforce what we observe in Figure 5: the implementation of the SFDR did not lead to a significant increase in flows into Article 8 or 9 funds relative to Article 6 funds.[10]

3.1.2 Sustainability

The other channel through which the SFDR could have affected mutual funds is the sustainability of their holdings. Even though the introduction of the SFDR did not affect fund flows, it

[10]In these analyses, we equal-weight observations to obtain more precise estimates. One concern might be that effects on larger funds are more relevant for assessing the SFDR's impact. To address this, in Appendix Figure A1, A3, and Table A7, we weight each observation by the fund's total net assets in the month before the SFDR's implementation and obtain similar estimates.

is possible that the additional disclosures improved the sustainability of Article 8 and 9 funds. We examine the SFDR's impact on fund sustainability in our baseline difference-in-differences specification (Eq. 2) where we measure sustainability using greenhouse gas emissions, Refinitiv environmental scores, and Morningstar carbon risk scores. We focus on these measures because they rely on objective criteria and are based solely on the fund's underlying portfolio.

Here we extend our dynamic difference-in-differences sample back to February 2019, which is nine months prior to the announcement of the SFDR in November 2019. We are interested in the potential effects that both the announcement of the SFDR in November 2019 and its implementation in March 2021 had on fund portfolios. Given that the SFDR was announced in November 2019, it is possible that fund managers reacted and began adjusting their portfolios in response to this news after the announcement but before implementation. By contrast, investors were less likely to be aware of the SFDR, as evidenced by media coverage and Google searches (Figure 1). Even if they were aware, they did not know how funds would be classified prior to its introduction, which is why we focus only on the introduction of the SFDR in our flows analysis.

Figure 6 panel (a) displays the coefficient estimates for the effect of the SFDR on greenhouse gas emissions of Article 8 funds from our difference-in-differences specification (Eq. 2). Panel (b) displays the corresponding estimates for Article 9 funds. Figure 6 panels (a) and (b) indicate that the implementation of the SFDR did not have a statistically significant impact on the sustainability of Article 8 or Article 9 portfolios as measured by greenhouse gas emissions. Consistent with our results for flows, we estimate a relatively precise zero effect for both fund types.

However, panel (a) shows that the greenhouse gas emissions of Article 8 fund portfolios began to decline after the announcement of the SFDR in November 2019 and continued to fall until its introduction in March 2021. The results suggest that portfolio greenhouse gas emissions fell by roughly 5 percent. Equivalently, log portfolio greenhouse gas emissions fell by roughly 0.05, which is modest relative to its standard deviation of 1.10.[11] This pattern suggests that Article 8 fund managers might have made modest adjustments to the composition of their portfolios in anticipation of the SFDR's implementation. However, the downward trend in panel (a) seems to have begun even before the SFDR was announced, and it may have been driven by broader long-term trends in the industry. Our conversations with industry experts suggest that this decline in emissions may not reflect a causal effect of the SFDR announcement. Instead, it may be driven by a separate trend in which these funds were already reducing the carbon content of their portfolios.

By contrast, we do not observe a similar effect on greenhouse gas emissions for Article 9 funds: Figure 6 panel (b) indicates that the greenhouse gas emissions of Article 9 portfolios

[11] Appendix Figure A7 shows that this decline in greenhouse gas emissions is driven by funds removing companies with high emissions intensity (those emitting more than 2,500 tonnes of CO2 per million in revenue).

remained constant over the sample period.

We report the corresponding regression specification in the top panel of Table 3, where, rather than estimating dynamic effects, we include only two dummies: post-announcement and post-implementation. Consistent with the evidence in Figure 6, we find that the greenhouse gas emissions of Article 9 funds did not change following either the announcement or the implementation of the SFDR. Also consistent with the figure, the announcement and implementation of the SFDR are associated with lower greenhouse gas emissions of Article 8 fund portfolios. Although the coefficients for Article 8 funds are statistically significant, the magnitudes are modest. For example, the estimates in column (1) indicate that the combined effect of the announcement and implementation led to a 0.086 decline in log portfolio greenhouse gas emissions, which is less than 0.1 standard deviations.

Figure 6 panels (c) and (d) display the coefficient estimates for the effect of the SFDR on the sustainability of Article 8 and 9 funds, as measured by the funds' Refinitiv environmental scores. The results in panel (c) indicate that the sustainability of Article 8 fund portfolios did not change following either the announcement or the implementation of the SFDR. The results in panel (d) suggest that the sustainability of Article 9 fund portfolios increased after both the announcement and the implementation of the SFDR. Again here, the economic magnitudes are quite modest. The corresponding regression specification is reported in the middle panel of Table 3. The combined change in portfolio sustainability for Article 9 funds after the announcement and implementation of the SFDR amounts to less than 0.1 of the score's standard deviation.

Figure 6 panels (e) and (f) display the estimates for the effect of the SFDR as measured by log Morningstar carbon risk scores, which are updated at a quarterly rather than monthly frequency. The results indicate that both the announcement and the implementation of the SFDR are associated with lower Morningstar carbon risk scores for both Article 8 and Article 9 funds. Similar to greenhouse gas emissions and environmental scores, the changes in Morningstar carbon risk scores are small in magnitude, with the combined change after the announcement and implementation of SFDR less than 0.1 of its standard deviation. The corresponding regression estimates are reported in the bottom panel of Table 3. Once again, the combined effect of the announcement and implementation of the SFDR on portfolio carbon risk scores for both Article 8 and 9 funds amounts to less than 0.1 of the corresponding standard deviation.[12]

Overall, the findings presented in Figures 5 and 6 indicate that the SFDR did not affect fund flows and, to the extent it influenced the sustainability of fund portfolios, the effect was minimal. The negligible effect on fund flows suggests that the disclosures may not have provided investors with new, actionable information. Similarly, the limited impact on fund sustainability implies either that greenwashing was not prevalent prior to the SFDR's implementation or that

[12]In Appendix Figure A5 and Table A8, we weight each observation by the fund's total net assets in the month before the SFDR's implementation and obtain similar estimates.

the SFDR has been ineffective in curbing greenwashing.

3.2 Reclassifications

We also conduct a separate set of tests based on funds that reclassify to understand how the SFDR disclosures impact fund flows and holdings. Figure 7 displays the frequency of downgrades (panel a) and upgrades (panel b) over time. The green shaded bars in panel (a) represent the share of funds that reclassify from Article 9 to Article 8 in each month. The number of funds downgrading from Article 9 to Article 8 spikes near the end of 2022, possibly due to expected increases in compliance costs. At its peak, approximately 1% of funds downgraded from Article 9 to Article 8 in January 2023. The brown shaded bars in panel (a) represent the share of funds that reclassify from Article 8 to Article 6, which occurs less frequently than downgrades from Article 9 to Article 8. Panel (b) displays the share of funds that upgraded over time. The figure illustrates that upgrades from Article 6 to 8 were the most common. Comparing panels (a) and (b) illustrates that while 1% of funds downgraded from Article 9 to Article 8, 0.70% of funds simultaneously upgraded from Article 6 to Article 8.

In our reclassification difference-in-differences analysis, we examine funds that experience upgrades (Article 6 to 8, 8 to 9, and 6 to 9) and downgrades (Article 9 to 8, 8 to 6, and 9 to 6). Here, our control group comprises funds that are never reclassified, and the treatment group consists of those that are reclassified only once during our sample period.[13] We explore how fund flows and holdings change using the following regression specification, where observations are at the fund j by month t level:

$$y_{jt} = \sum_{\tau \in [-9,9], \tau \neq -1} 1[D_{jt}^{\text{reclassify}} = \tau] \gamma_{\tau}^{\text{reclassify}} + X_{jt}' \Gamma + \mu_j + \epsilon_{jt}, \tag{3}$$

The data is in event time such that $\tau = 0$ when the reclassification happened and τ is the elapsed time after treatment. The variable $D_{jt}^{\text{reclassify}}$ measures the elapsed time at t after reclassification. The set of coefficients $\{\gamma_{\tau}^{\text{reclassify}}\}$ measures the treatment effect of reclassification, allowed to vary month-to-month. We estimate separate regressions for $\{\gamma_{\tau}^{\text{upgrade}}\}$ and $\{\gamma_{\tau}^{\text{downgrade}}\}$. We include the same set of controls and fixed effects in Eq.2. Additionally, we also control for original Article-by-time fixed effects to allow for differential time trends for funds with different classifications.

3.2.1 Flows

Figure 8 panel (a) displays the estimated treatment effects corresponding to Eq. (3), where we examine the effects of upgrades in panel (a) and downgrades in panel (b). One might

[13] We drop funds that are reclassified multiple times to avoid overlapping event windows and their potential confounding effects.

expect that, to the extent investors value sustainability and place a premium on funds classified as green or dark green (i.e., Article 8 or 9), upgrading from Article 6 would cause a fund to experience an increase in flows relative to other Article 6 funds. However, the results in Figure 8 panel (a) suggest that the upgrades had minimal effects on fund flows. Similarly, in panel (b), we also find no effects of downgrades on fund flows. We report the corresponding regression estimates in column (1) of Table 4, where we assume the treatment effect of upgrading and downgrading to be constant over time instead of allowing it to vary month-to-month. Again, we find that downgrading had no impact on flows.

These results are broadly consistent with our earlier findings from Section 3.1, where we saw that the introduction of the SFDR did not lead to an increase in flows into Article 8 or 9 funds. Collectively, the findings suggest that investors may not value the SFDR disclosures, possibly because they did not fully understand the disclosures.

3.2.2 Sustainability

If the SFDR disclosures reflect material information about the sustainability of the funds, then one might expect the sustainability of funds downgrading from Article 9 to Article 8, and from Article 8 to Article 6, to materially decrease after the downgrade. Using our difference-in-difference framework, we examine how funds' greenhouse gas emissions, Refinitiv environmental scores, and Morningstar carbon risk scores changed following upgrades and downgrades.

Figure 9 panels (a) and (b) display the estimated treatment effects of upgrades and downgrades on greenhouse gas emissions. The results suggest that downgrading firms potentially tilt their portfolio towards 'dirtier' firms when downgrading, although the estimated effect is not statistically significant. Panel (b) illustrates that log greenhouse gas emissions increase modestly following a downgrade, and the change in portfolio composition starts a few months before the firm announces the downgrade. We do not see a similar effect on upgrades (panel a). Column (2) of Table 4 displays the corresponding regression estimates.

Figure 9 panels (c) and (d) display the estimated treatment effects of upgrades and downgrades on environmental scores. We do not find any significant effects either before or after classifications. Panels (e) and (f) show results for Morningstar carbon risk scores. Here, we detect a modest decreasing trend around upgrades but no discernible effects from downgrades. Columns (3) and (4) of Table 4 report the corresponding regression estimates for environmental and carbon risk scores. Overall, and consistent with our findings in Section 3.1, we find limited evidence that changes in SFDR classification—whether upgrades or downgrades—lead to material changes in fund sustainability. To the extent portfolio adjustments occur, their economic magnitudes are modest (i.e., less than 0.10 of a standard deviation).[14]

[14]Appendix Table A9 displays results on each type of Article reclassifications. Similar to above, we find that funds downgraded from Article 9 to 8 tilt their portfolio compositions to firms with more greenhouse gas emissions, and funds upgraded from Article 6 to 8 tilt to firms with lower Morningstar carbon risk scores. We also construct a

Overall, and consistent with our findings in Section 3.1, we find limited evidence that changes in SFDR classification—whether upgrades or downgrades—lead to material changes in fund sustainability. To the extent portfolio adjustments occur, their economic magnitudes are modest. This suggests that the reason funds downgraded is not because they intended to change their underlying portfolios or the focus of the funds. Rather, it suggests that funds may be responding to a lack of response from investors. Our results indicate that investors, and consequently fund flows, did not change in response to either the introduction of the SFDR or when funds downgraded. Consequently, firms may not have been incentivized to maintain their Article 9 or Article 8 classifications. Classifying as either an Article 9 or Article 8 fund carries potentially more regulatory and legal risk than classifying as an Article 6 fund, and our results suggest that funds may have seen little benefit in keeping a higher classification. These findings also potentially explain why a number of Article 9 funds decided to downgrade to Article 8 funds after the SFDR was rolled out.

4 Survey and Experimental Evidence

Our empirical analysis indicates that investment flows do not respond to SFDR classifications. One possible explanation for this is that investors may struggle to process SFDR classification information. We therefore conducted a survey experiment and questionnaire to explore the mechanisms behind our empirical findings.

The survey aims to learn more about how investors deal with SFDR classifications in practice. It includes questions such as, "Before taking this survey, were you familiar with the Morningstar Sustainability Globes for assessing the sustainability of investment funds?" and "How did you hear about the SFDR Article 6/8/9 classifications?" The full instructions are provided in a supplementary appendix to the paper.

The survey experiment aims to test under which conditions investors do respond to SFDR classifications. We hypothesize that providing more intuitive information about SFDR classifications will increase allocations to funds rated as greener, whereas presenting the regular SFDR classification in the typical current industry format will not have a significant impact.

4.1 Survey Experiment

Our survey experiment uses a combination of between-subjects and within-subjects design to investigate the impact of different information sets on investment decisions. At the beginning of the experiment participants provided informed consent and were randomly assigned to one of the five treatment groups. Figure 10 displays an overview of the experimental design.

continuous measure equal to one for any upgrades and negative one for any downgrade. Appendix Table A10 shows similar results on greenhouse gas emission and Morningstar carbon risk scores.

Participants made two investment decisions of €1,000 each. To incentivize thoughtful decisions, participants were informed that their investment decisions could result in actual purchases, with two randomly selected participants having one of their choices enacted, held for one year, with the final value returned after the deduction of fees.

The primary focus was to observe the fraction allocated to Article 8 or Article 9 funds. In the first decision (baseline), participants made choices between investment funds without information about SFDR classifications or Morningstar Globes. In the second decision (endline), participants made choices between different investment funds with additional sustainability information provided according to their treatment group.

The between-subject variation comes from the five different sets of sustainability information provided in the second choice, which we will describe below. The within-subject aspect of the design comes from the fact that investors make two decisions: one with and one without sustainability information. This ensures that each participant serves as their own control, enhancing statistical precision by reducing between-subject variability, as in Allcott and Taubinsky (2015) and many other papers.

4.1.1 Treatment Groups

The first treatment group to which an investor could be randomly assigned received information on Sustainability Globes only. The second group received information on SFDR in standard format only. The third group received information on both Sustainability Globes and standard SFDR. The fourth group received information on SFDR in intuitive format only. The fifth group received information on both Sustainability Globes and intuitive SFDR.

The SFDR classifications (Article 6, 8, or 9) were presented in either a standard industry format (Figure 11 panel (a)) or an intuitive format (Figure 11 panel (b)). We designed the intuitive presentation with colors (orange, yellow, and green) to indicate whether a fund had an Article 6, 8, or 9 classification, respectively. Additionally, the intuitive treatment used much less information, thereby reducing cognitive load. The central idea of the Intuitive Treatment is that investors typically have a hard time understanding complex information (Beshears et al., 2008; Campbell et al., 2011; Choi, Laibson, and Madrian, 2010; Loewenstein, Sunstein, and Golman, 2014; Lusardi and Mitchell, 2014). Investors rather respond to easy metrics such as Morningstar Globes instead of underlying ESG screening data (Hartzmark and Sussman, 2019). The Intuitive Treatment should make the SFDR information actionable for investors. We benchmark the effect of providing SFDR information to the effect of providing Morningstar Sustainability Globes, another industry standard. Decision screen screenshots are available in the supplementary appendix to the paper.

4.1.2 Fund Selection Criteria

We used several selection criteria to identify eight suitable funds for the experiment. We retrieved screenshots from the Dutch Morningstar website, translated to English, therefore all funds needed to be accessible on this platform. They required appropriate combinations of SFDR Article classification, Morningstar Globes ratings, and whether the fund had a sustainability mandate, according to Morningstar. We selected funds that allowed investing smaller amounts (<€5,000) with one-year liquidity. We chose funds with generic names without specific country or industry information to avoid biasing participants. For example, we avoided specific investments in industries such as "Renewable Energy" or "Water", because investors might have specific beliefs about such industries.

Each participant viewed two different fund sets (fund set A and fund set B in Figure 12), with presentation order randomized to control for order effects. So, this means that in half of the cases fund set A served as the baseline choice and in the other half of the cases fund set A served as the endline choice, in which the investor received one of the five sustainability information treatments. Each fund set comprised two Article 6 funds (not sustainable, 3 Morningstar Globes), one Article 8 fund (sustainable, 4 Morningstar Globes), and one Article 9 fund (sustainable, 5 Morningstar Globes). In treatment groups with intuitive SFDR information, investors receive an additional screenshot displayed in Figure 11 panel (b), and the intuitive SFDR information is also included in the fund set table, as shown in Figure 12 panel (c).

4.1.3 Procedure

We conducted the study in July 2024. The study was approved by the ethics committee of Harvard and pre-registered at the Open Science Foundation (link: https://osf.io/ruz2s). The survey was administered via Prolific and conducted using Qualtrics survey software, targeting European participants where SFDR applies. Participants consented to the study, were screened based on their investment experience, English fluency, and location, and were required to pass two attention checks. Countries that were selected for location were Germany, France, Spain, Austria, Belgium, Denmark, Italy, Luxembourg, the Netherlands, Poland, and Portugal.

Our final sample consisted of 1,465 participants, after excluding those who did not complete the survey (102 participants) and those who failed the attention and screening checks (133 participants). Details of the exclusion process are provided in the supplementary appendix to the paper.

At the beginning of the survey, respondents received general information about compensation, privacy, and confidentiality. They then reported which types of securities they currently invest in. In case they answered that they did not invest in anything or were not sure, they were excluded from the survey. Afterwards, they received instructions about the two investment decisions, followed by two examples.

For each investment decision, participants allocated €1,000 across the four funds based on information displayed in a table that included the fund name, last year's return, and the fund's total expense ratio (TER). Participants could retrieve more detailed fund attributes by clicking on links for additional information. These attributes gave more context to the information that was shown in the table and included performance and total expense ratio performance and manager information, and risk profile and fund holdings.

The additional information was presented via screenshots taken from the Morningstar website for each fund. This information was only visible when participants deliberately clicked to access it. Investment amounts had to be entered as integers, ensuring the total equaled €1,000.

4.1.4 Participant Characteristics

The median time to complete the survey was 16.8 minutes. Table A1 in the Appendix presents the demographic characteristics of our survey and experimental study participants. The sample consists of individuals with an average age of 33 years, predominantly male (77%), highly educated (78% with college degrees), and with an average monthly income of approximately $3,774. These characteristics reflect the fact that we screened for a sample of investors. We tested whether randomization into the five treatments was successful. We expect to find no difference in investor characteristics across treatments. Statistical tests across our five treatment groups yielded p-values exceeding 0.33 for all characteristics, suggesting successful randomization.

4.2 Results

4.2.1 Survey: SFDR Awareness

Our survey findings reveal a critical gap in investor awareness of SFDR classifications. Tables A2–A6 in the Appendix display summary statistics corresponding to various measures of investor awareness of SFDR classifications. Only 23.5% of participants reported familiarity with the Sustainable Finance Disclosure Regulation prior to participating in our study (Table A2). This low level of awareness represents a significant barrier to the regulation's effectiveness in redirecting capital flows toward sustainable investments.

Among respondents familiar with SFDR, information sources varied substantially, as reported in Table A3. Only 9.3% encountered SFDR information through fund prospectuses, while 8.7% learned about it via fund websites or banking platforms. Notably, approximately one-third (32.5%) of participants reported media sources as their primary information channel, highlighting the critical role of general media in disseminating financial regulatory information.

Investors familiar with SFDR reported moderate perceived usefulness (Table A4). Approximately half of these participants found SFDR classifications "somewhat useful." A smaller pro-

portion (29.3%) considered them "very" or "extremely" useful, similar to the 32.5% who reported similar levels of usefulness for Morningstar Globes.

Critically, we identified a significant knowledge gap even among participants claiming familiarity with SFDR. Only 42.3% correctly identified Article 9 funds as representing the highest sustainability classification under SFDR (Table A5). This is substantially lower than the 67.5% who correctly recognized five-Globe funds as the highest sustainability rating in the Morningstar system (Table A6). This finding suggests that even among investors aware of SFDR, comprehension of the classification system remains limited.

4.2.2 Experiment

Table 5 presents our main experimental findings, examining how different presentations of sustainability information influence investor allocations. Our experiment specifically contrasts current SFDR disclosure practices against a more intuitive presentation format we developed, using Morningstar Sustainability Globes as a benchmark. Define T_i^{SFDR}, $T_i^{Intuitive}$, and T_i^{Globe} as indicator variables for whether participant i is in the respective treatment condition. Define B_i as an indicator variable for whether fund set B (instead of A) is used for the second choice. Finally, define y_i and $y_i^{baseline}$ as the outcome variable in the second choice and first choice, respectively. We run the following regression:

$$y_i = \tau^{SFDR} T_i^{SFDR} + \tau^{Intuitive} T_i^{Intuitive} + \tau^{Globe} T_i^{Globe} + \beta B_i + \rho y_i^{baseline} + \epsilon_i. \quad (4)$$

We use three outcome variables: the percent of the €1,000 investments allocated to Article 9 funds, the percent allocated to Article 8 or Article 9 funds, and a weighted sum equal to the percent invested in Article 8 funds plus twice the percent invested in Article 9 funds.

Our results demonstrate that SFDR classifications, as currently presented by mutual funds, do not significantly influence investor allocations to Article 8 or Article 9 funds. The coefficients on the SFDR treatment indicators shown an increase of 0.7 percentage points in our weighted measure of sustainable investments, an increase of 1.3 percentage points in allocations specifically to Article 9 funds, and a decrease of -0.7 percentage points for both Article 8 and 9 fund allocations ($p = 0.77$). This aligns with our empirical fund-flow analysis, suggesting that the current implementation of SFDR disclosures fails to effectively guide sustainable investment decisions.

In stark contrast, when SFDR information was presented in our intuitive format, participants significantly increased allocations to sustainable funds. The economic effect is substantial, ranging from a 10.1 percentage point increase in allocations specifically to Article 9 funds (Column 2, $p<0.01$) to a 21.5 percentage point increase in our weighted measure of sustainable investments (Column 1, $p<0.01$). This finding demonstrates that while the content of SFDR classifications may be valuable, the presentation format critically determines their effectiveness

in influencing investment behavior.

Our experiment also successfully replicates Hartzmark and Sussman's (2019) findings regarding Morningstar Globes, confirming that these sustainability ratings significantly impact allocations to sustainable investments across all specifications. Interestingly, while the effect of current SFDR presentation approaches is negligible compared to Morningstar Globes, our intuitive SFDR presentation format demonstrated an even stronger effect ($p < 0.01$ across all three specifications). This suggests substantial untapped potential in SFDR's ability to guide sustainable investment if presented more effectively.

These findings have important implications for regulatory policy and investment product design. While SFDR aims to increase transparency in sustainable finance, its current implementation appears to fall short of achieving its intended effect on investor behavior. The significant difference between current and intuitive presentation formats highlights the critical importance of information design in determining financial regulation efficacy.

5 Conclusion

We examine the impact of the European Union's Sustainable Finance Disclosure Regulation (SFDR), which was designed to provide investors with additional information on the sustainability of investments and limit greenwashing. Using a difference-in-differences research design, we investigate the effects of both the introduction of the SFDR and fund reclassifications on mutual fund flows and the sustainability of fund holdings. Our results suggest that the SFDR was ineffective in influencing the behavior of investors and mutual funds. The introduction of the SFDR did not result in higher flows into either light or dark green mutual funds, nor did it materially alter the sustainability of their portfolios.

The data suggest that part of the reason the SFDR disclosures were ineffective is that they did not provide new information to investors. Even prior to the introduction of the SFDR, those funds that were eventually classified as Article 9 experienced higher flows compared to Article 8 funds, and Article 8 funds experienced higher flows than Article 6 funds. This suggests that investors were already aware of which funds were sustainable before the SFDR was introduced. Moreover, our experimental results suggest that many investors were both unaware of and struggled to understand the SFDR disclosures. The impact of the SFDR could potentially be increased by making the information more intuitive for investors.

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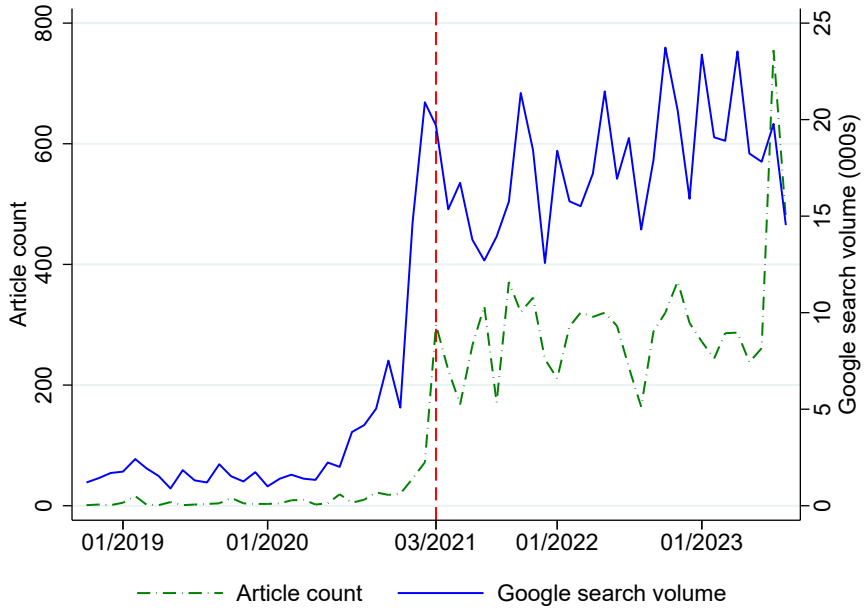
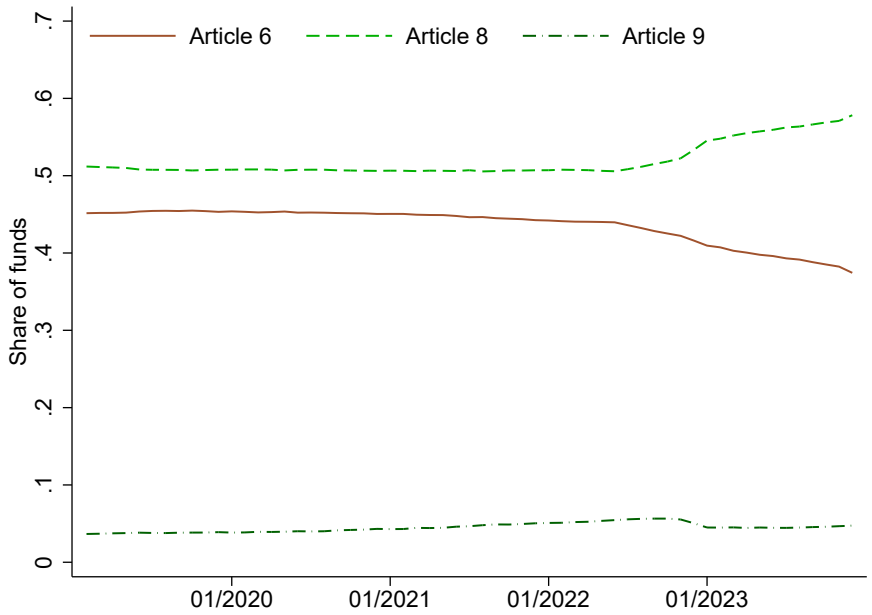
Tables and Figures

Figure 1: Public Attention and Media Coverage



Notes: Figure 1 displays a time-series plot of the number of articles written about the SFDR alongside the Google search volume for the SFDR. Observations are at the weekly level.

Figure 2: Share of Funds by Article Classification



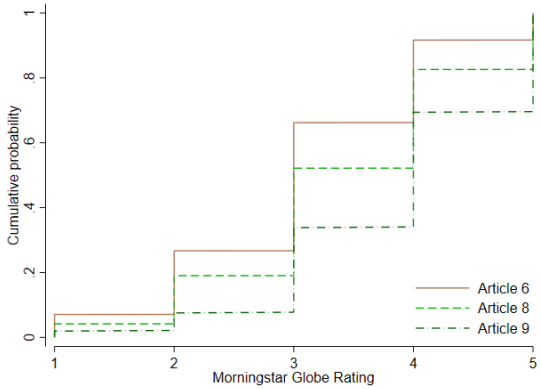
Notes: Figure 2 displays the share of funds classified as Article 6, 8, and 9 funds. Observations are monthly.

Figure 3: Average Flows by Month and Article Classification

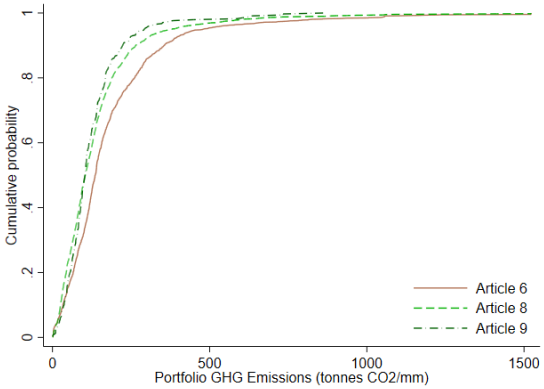
Notes: Figure 3 displays average monthly flows by SFDR article.

Figure 4: ESG Ratings and Emissions

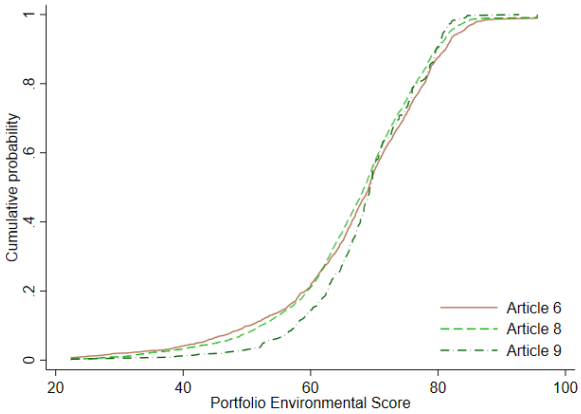
(a) Morningstar Sustainability Rating (i.e., Globes)



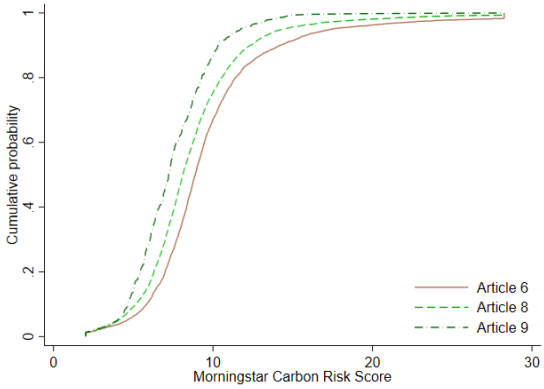
(b) Greenhouse Gas Emissions



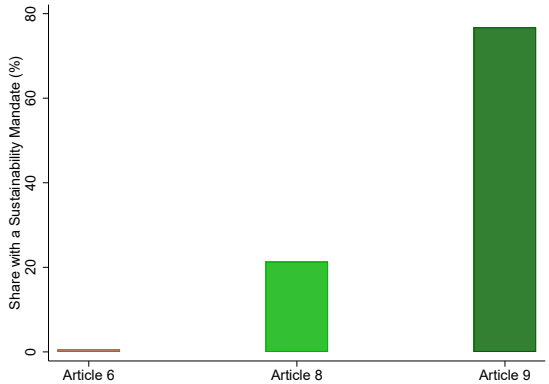
(c) Refinitiv Environmental Scores



(d) Morningstar Carbon Risk Score

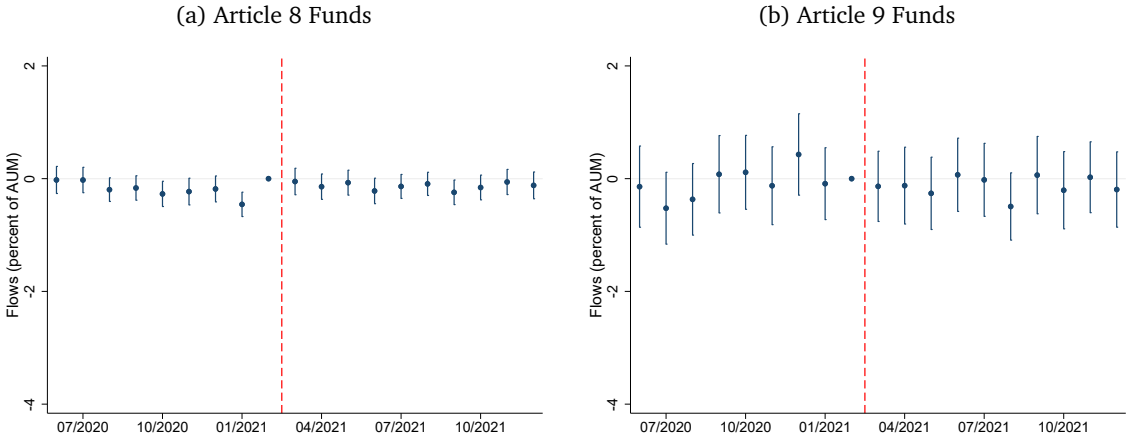


(e) Sustainability Mandate



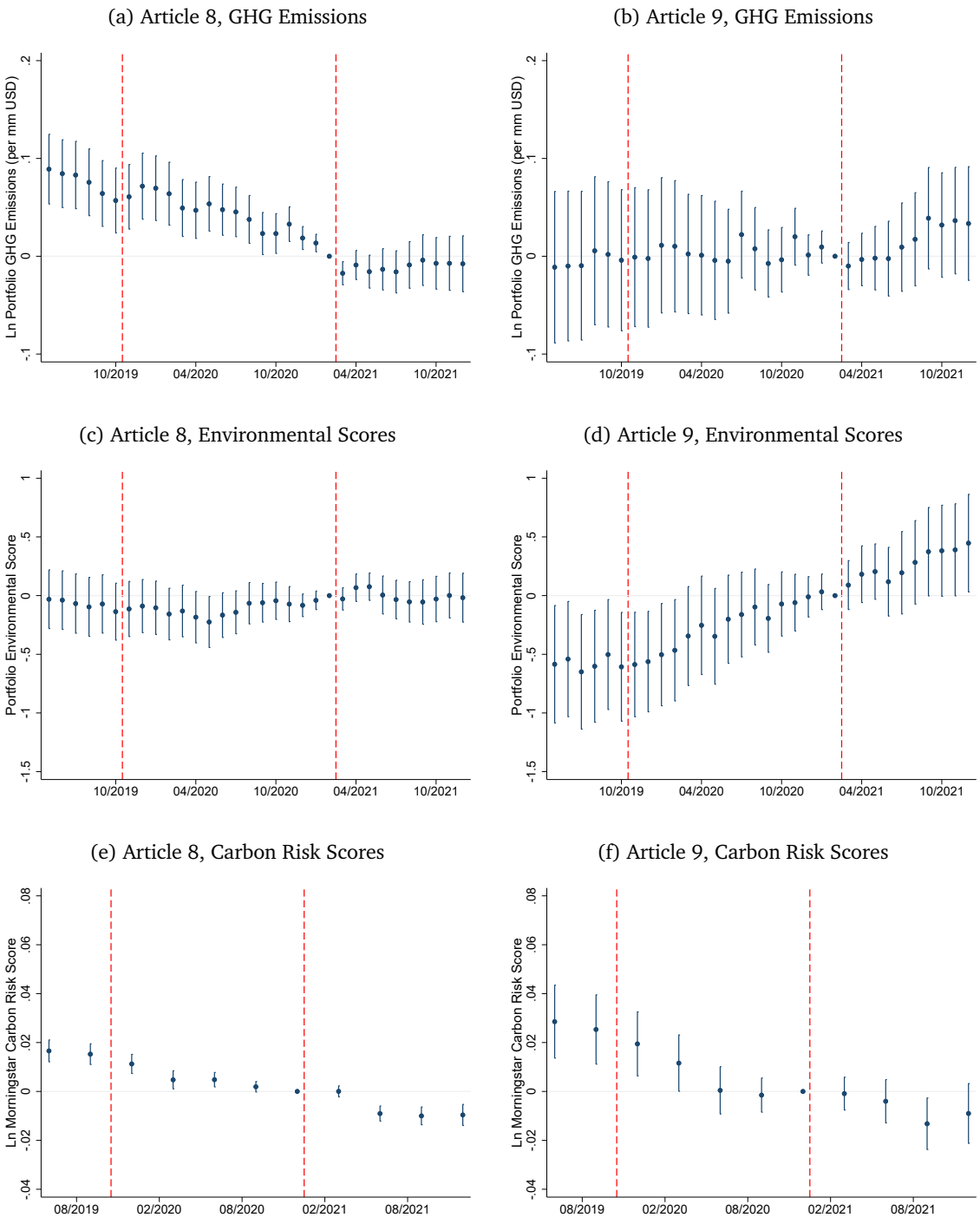
Notes: Figure 4 shows the distributions of sustainability metrics by SFDR classification. Panel (a) reports Morningstar sustainability ratings, (b) greenhouse gas emissions, (c) Refinitiv environmental scores, (d) Morningstar carbon risk scores, and (e) the share of funds with a sustainability mandate. Observations at the fund level as of February 2021.

Figure 5: 2021 Event Study - Flows



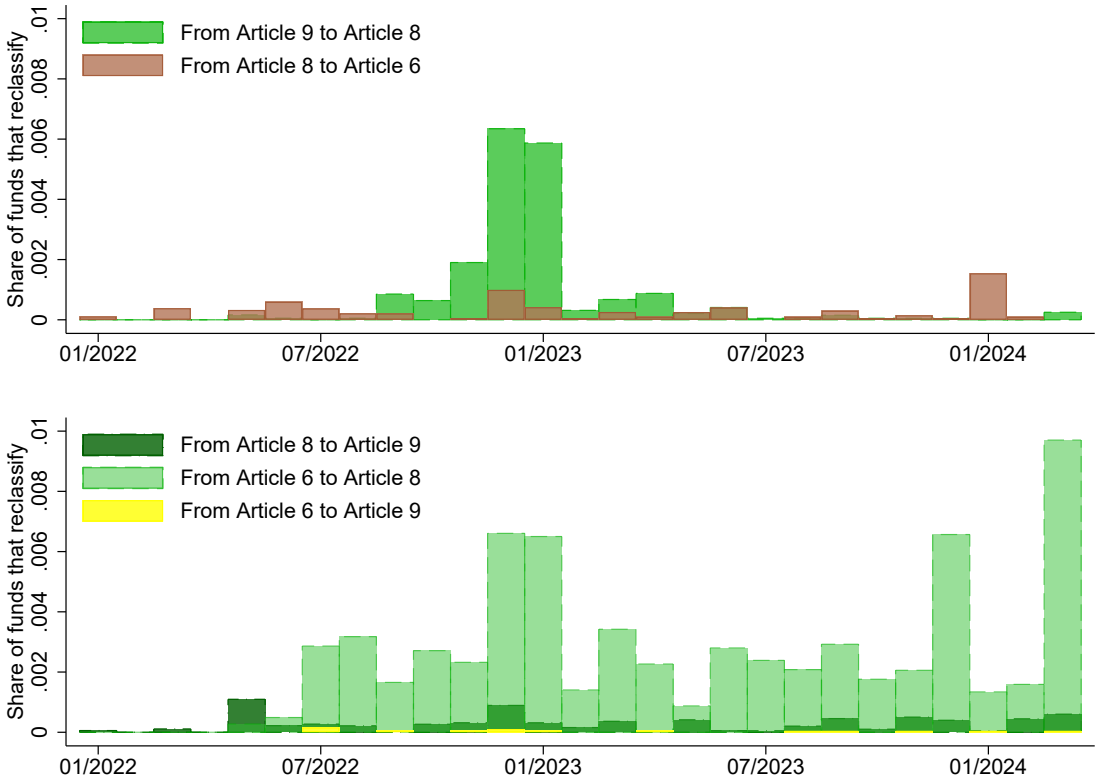
Notes: Figure 5 displays the estimated treatment effect of the SFDR on fund flows corresponding to our difference-in-differences research design (Eq. 2) surrounding the implementation of SFDR.

Figure 6: Event Study - Sustainability



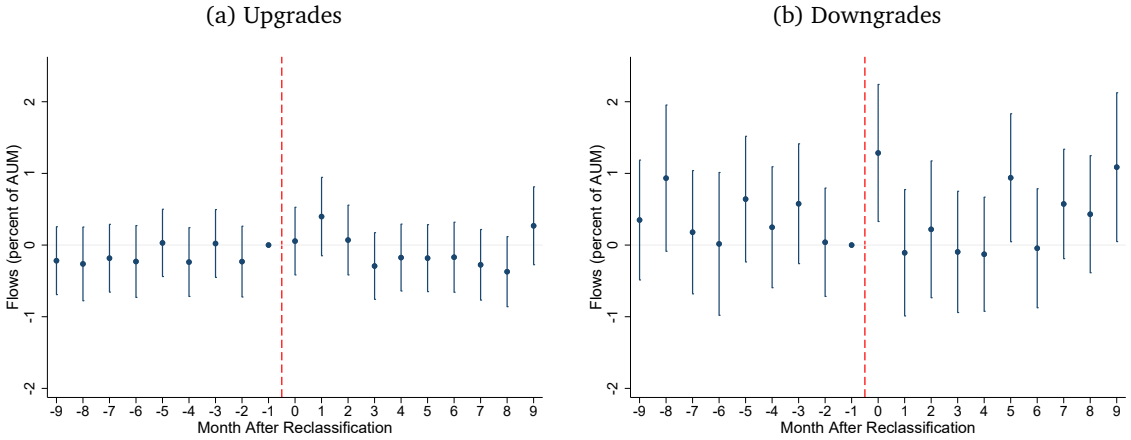
Notes: Figure 6 displays the estimated treatment effect of the SFDR on fund portfolio log greenhouse gas emissions (tonnes CO2 per million USD in revenue) in the first row, environmental scores in the second, and log Morningstar carbon risk score in the final row. The estimates correspond to our difference-in-differences research design (Eq. 2) surrounding the implementation of the SFDR. Vertical red lines indicate the date of SFDR announcement and implementation.

Figure 7: Reclassifications



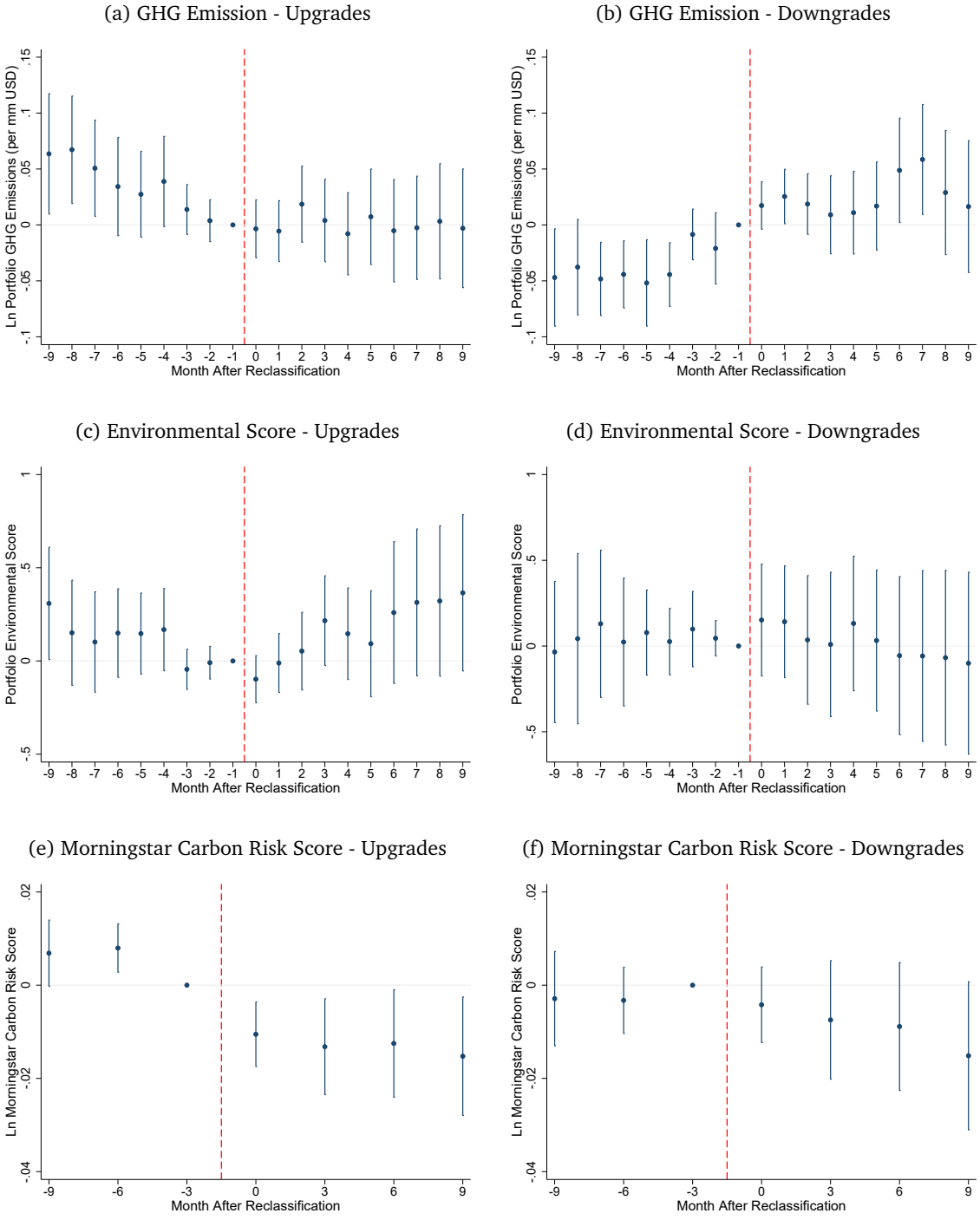
Notes: Figure 7 displays the share of funds that reclassified over our sample period. Observations are monthly.

Figure 8: Reclassification Event Study - Flows



Notes: Figure 8 displays the estimated treatment effect of fund reclassifications on fund flows. The estimates correspond our difference-in-differences research design (Eq. 3) surrounding fund upgrades and downgrades. We include all funds in the estimation sample.

Figure 9: Reclassification Event Study - Portfolio Sustainability Measures



Notes: Figure 9 displays the estimated treatment effect of fund reclassifications on fund sustainability measures. The estimates correspond our difference-in-differences research design (Eq.3) surrounding fund upgrades and downgrades. We include all funds in the estimation sample.

Figure 10: Experimental Design

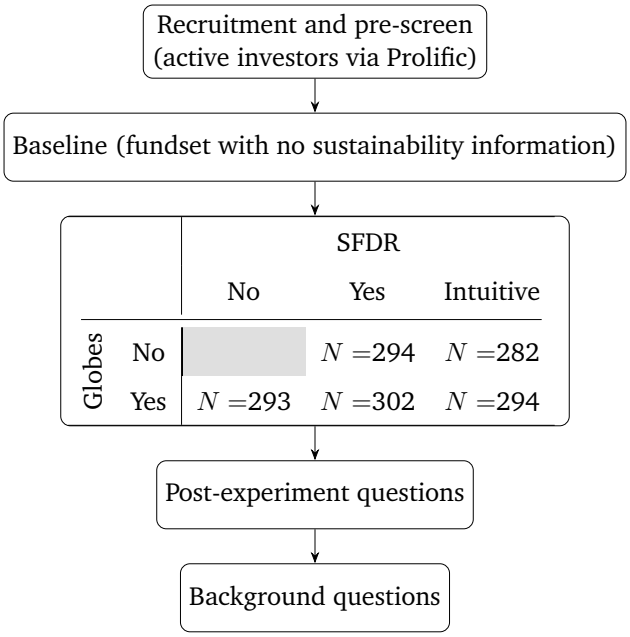


Figure 11: SFDR Disclosure Treatments

(a) Standard SFDR

SFDR Classification: Shows classification given to each fund as part of the EU Sustainable Finance Disclosure Regulation (SFDR).
Article 9 Funds aim to achieve an ESG outcome and are product with ESG objectives.
Article 8 funds focus on promoting ESG characteristics and this most be a primary focus of the product.
Article 6 funds integrate and declare sustainability risks (unless specified otherwise in the prospectus) into investment analysis and decision-making, without the funds promoting environmental or social characteristics or having sustainable investments as their objective.

(b) Intuitive SFDR

Figure 12: Fund Sets

(a) Fund Set A

Fund Name	Last Year Return	Yearly Expenses
Xtrackers MSCI World ETF 1C	20,20%	0,19%
iShares Core MSCI World UCITS ETF USD	19,90%	0,20%
Xtrackers MSCI Europe ESG UCITS ETF 1C	16,40%	0,20%
Fidelity Funds - Sustainable US Equity Fund A	19,80%	1,93%

(b) Fund Set B

Fund Name	Last Year Return	Yearly Expenses
SPDR® MSCI World UCITS ETF	20,10%	0,12%
iShares Core S&P 500 UCITS ETF USD	22,50%	0,07%
Xtrackers MSCI World ESG UCITS ETF 1C	22,80%	0,20%
RobecoSAM Smart Energy Equities D	9,00%	1,76%

(c) Fund Set B with Information on Sustainability Globes and Intuitive SFDR

Fund Name	Last Year Return	Yearly Expenses	Sustainability Globes	SFDR Classification
SPDR® MSCI World UCITS ETF	20,10%	0,12%		Least sustainable disclosure (Article 6)
iShares Core S&P 500 UCITS ETF USD	22,50%	0,07%		Least sustainable disclosure (Article 6)
Xtrackers MSCI World ESG UCITS ETF 1C	22,80%	0,20%		Medium sustainable disclosure (Article 8)
RobecoSAM Smart Energy Equities D	9,00%	1,76%		Most sustainable disclosure (Article 9)

Table 1: Summary Statistics

	Article 6			Article 8			Article 9		
	Obs.	Mean	Std dev	Obs.	Mean	Std dev	Obs.	Mean	Std dev
Total Net Assets (billion)	214,445	0.80	6.15	243,460	1.66	10.02	17,465	1.15	5.72
Flows (pp)	214,397	0.25	6.31	243,433	0.46	5.93	17,457	1.27	6.35
Monthly Return (pp)	214,397	0.80	3.34	243,433	0.91	3.45	17,457	1.18	3.73
Morningstar Globe Rating	185,605	3.11	1.04	217,892	3.42	1.07	16,100	3.88	0.99
Morningstar Carbon Risk Score	181,300	9.84	4.32	222,647	8.83	3.61	16,100	7.69	2.80
Ln Morningstar Carbon Risk Score	181,300	2.20	0.41	222,647	2.10	0.39	16,100	1.98	0.37
Portfolio Environmental Score	67,095	67.63	12.60	117,495	67.36	11.45	12,180	69.11	9.26
Portfolio GHG Emissions (tonnes CO2/mm)	58,835	193.87	209.96	109,060	150.83	172.67	11,830	133.12	126.26
Ln Portfolio GHG Emissions	58,835	4.80	1.10	109,060	4.56	1.05	11,830	4.58	0.84

Notes: Table 1 displays summary statistics for our base data set. We focus on mutual funds and ETFs available for sale in Europe, excluding the United Kingdom. We drop funds without information on Article classification and funds with total net assets below 1 million euro. We also restrict to a balanced panel of funds during our longest event window from February 2019 to December 2021. Portfolio environmental score and greenhouse gas (GHG) emissions are constructed at firm level and then aggregated to fund level based on fund holding. We only keep funds where over 67% of holdings have environmental scores or GHG emission data on average.

Table 2: Event Study on Fund Flows

	(1) All Funds	(2) Equity Funds	(3) Euro Funds	(4) Euro Equity Funds
1(Article 8) x Post Implementation	0.043	0.208*	0.084	0.158
	(0.058)	(0.115)	(0.067)	(0.135)
1(Article 9) x Post Implementation	-0.057	-0.053	0.017	0.097
	(0.170)	(0.257)	(0.198)	(0.302)
N	257,908	71,355	188,103	49,980
Adjusted R^2	0.131	0.128	0.132	0.126
Fund FE	X	X	X	X
Global Category $\times$ Year-Month FE	X	X	X	X
Sustainability $\times$ Year-Month FE	X	X	X	X

Notes: Table 2 displays the estimation results corresponding to our difference-in-differences research design (Eq. 2) surrounding the implementation of the SFDR. The dependent variable is percentage fund flows. In column (1), we include all funds in our estimation sample. In column (2), we restrict to equity funds. In column (3), we restrict to euro-denominated funds. Specifically, we restrict to funds whose largest share class is in euro and only include euro-denominated share classes. In column (4), we restrict to euro-denominated equity funds. Standard errors are clustered at fund level are reported in parentheses. *** p<0.01, ** p<0.05, *p<0.1.

Table 3: Event Study on Portfolio Sustainability Measures

	(1) All Funds	(2) Equity Funds	(3) Euro Funds	(4) Euro Equity Funds
Panel A. GHG Emission				
1(Article 8) x Post Announcement	-0.034***	-0.028*	-0.028*	-0.016
	(0.012)	(0.014)	(0.015)	(0.017)
1(Article 9) x Post Announcement	0.009	-0.008	-0.010	-0.007
	(0.027)	(0.031)	(0.032)	(0.038)
1(Article 8) x Post Implementation	-0.052***	-0.045***	-0.047***	-0.031*
	(0.014)	(0.017)	(0.016)	(0.019)
1(Article 9) x Post Implementation	0.011	-0.023	0.026	-0.003
	(0.029)	(0.029)	(0.033)	(0.035)
N	162,311	83,498	116,130	58,097
Adjusted R^2	0.891	0.860	0.882	0.836
Panel B. Environment Scores				
1(Article 8) x Post Announcement	-0.033	0.143	-0.063	0.147
	(0.095)	(0.117)	(0.112)	(0.144)
1(Article 9) x Post Announcement	0.337*	0.507**	0.195	0.509**
	(0.189)	(0.205)	(0.223)	(0.249)
1(Article 8) x Post Implementation	0.099	0.088	-0.003	0.051
	(0.109)	(0.123)	(0.121)	(0.142)
1(Article 9) x Post Implementation	0.509**	0.370*	0.353	0.229
	(0.226)	(0.220)	(0.273)	(0.250)
N	177,738	89,870	125,379	61,859
Adjusted R^2	0.942	0.966	0.938	0.960
Panel C. Morningstar Carbon Risk Score				
1(Article 8) x Post Announcement	-0.011***	-0.017***	-0.011***	-0.020***
	(0.002)	(0.005)	(0.002)	(0.005)
1(Article 9) x Post Announcement	-0.021***	-0.032***	-0.022***	-0.038***
	(0.006)	(0.011)	(0.008)	(0.013)
1(Article 8) x Post Implementation	-0.012***	-0.013***	-0.011***	-0.003
	(0.002)	(0.005)	(0.002)	(0.006)
1(Article 9) x Post Implementation	-0.013*	-0.008	-0.007	0.002
	(0.006)	(0.011)	(0.007)	(0.012)
N	130,624	38,832	93,672	26,854
Adjusted R^2	0.959	0.910	0.953	0.904
Fund FE	X	X	X	X
Global Category × Year-Month FE	X	X	X	X
Sustainability × Year-Month FE	X	X	X	X

Notes: Table 3 displays the estimation results corresponding to our difference-in-differences research design (Eq. 2) surrounding the announcement and implementation of the SFDR. The dependent variable in the top panel corresponds to the log of portfolio average greenhouse gas emissions (tonnes CO2 per million USD in revenue), in the middle panel portfolio average environmental score, and in the bottom panel log Morningstar carbon risk score. Each column is based on different estimation samples as described in Table 2. Standard errors are clustered at fund level are reported in parentheses. *** p<0.01, ** p<0.05, *p<0.1.

Table 4: Reclassification Event Study - Upgrade and Downgrade

	(1) Flows	(2) GHG Emissions	(3) Env. Score	(4) Carbon Risk
1(Upgrade) x Post	0.079	-0.032	0.057	-0.018***
	(0.123)	(0.025)	(0.177)	(0.006)
1(Downgrade) x Post	0.119	0.057**	-0.018	-0.007
	(0.220)	(0.024)	(0.233)	(0.007)
N	533,600	192,120	210,986	159,820
Adjusted R^2	0.098	0.909	0.956	0.925
Fund FE	X	X	X	X
Global Category $\times$ Year-Month FE	X	X	X	X
Sustainability $\times$ Year-Month FE	X	X	X	X
Original Article $\times$ Year-Month FE	X	X	X	X

Notes: Table 4 displays the estimation results corresponding to difference-in-differences research design (Eq. 3) surrounding fund upgrades and downgrades. The dependent variable in column (1) is fund flows, in column (2) is greenhouse gas emissions (tonnes CO2 per million USD in revenue), in column (3) is environmental score, and in column (4) is Morningstar carbon risk score. We include all funds in the estimation sample. Standard errors are clustered at fund level are reported in parentheses. *** p<0.01, ** p<0.05, *p<0.1.

Table 5: Effect of Information on Investment Decisions

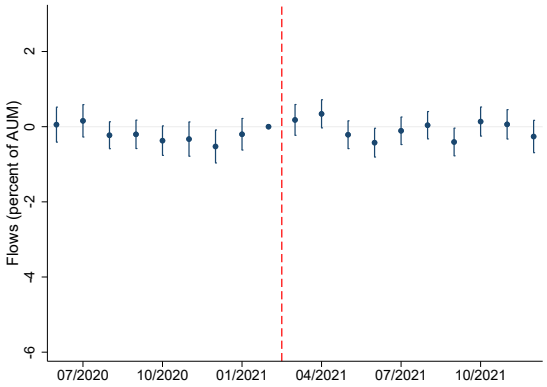
Variable	(1) Sustainble investment (weighted sum)	(2) Share Article 9	(3) Share Article 8 or 9
SFDR	0.667	1.265	-0.676
	(3.307)	(1.479)	(2.340)
SFDR intuitive	21.48***	10.07***	11.43***
	(3.573)	(1.651)	(2.422)
Morningstar Globes	9.417***	2.763**	6.577***
	(2.730)	(1.276)	(1.803)
Fund set B	-1.944	-9.482***	7.782***
	(2.406)	(1.125)	(1.600)
Baseline	0.501***	0.394***	0.430***
	(0.0403)	(0.0466)	(0.0382)
Constant	26.52***	11.48***	18.03***
	(4.046)	(1.795)	(2.744)
Observations	1,465	1,465	1,465
R-squared	0.181	0.148	0.145

Notes: The outcome in column (1) is a weighted sum of the percent allocated to sustainable investments (amount invested in Article 8 funds + 2 * amount invested in Article 9 funds). The outcome in column (2) is the percent of funds allocated to Article 9 funds. The outcome in column (3) is the percent of funds allocated to Article 8 or 9 funds. "SFDR," "SFDR intuitive," and "Morningstar globes" are indicator variables for the respective information treatments. Fund set B is an indicator variable for whether fund set B (as opposed to fund set A) was presented to the respondent post treatment. Baseline is the value of the outcome variable computed on the pre-treatment survey responses (i.e. how the respondent allocated funds in the other fund set). Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

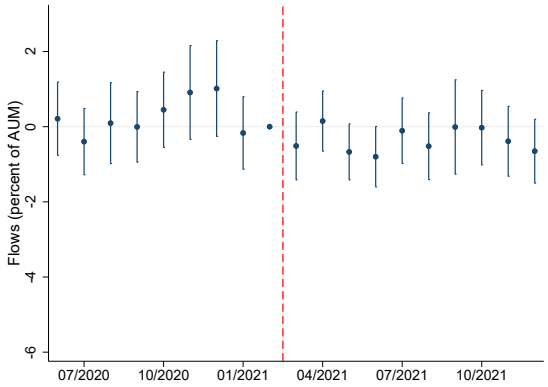
A Appendix: Additional Tables and Figures

Figure A1: 2021 Event Study - Flows, Weighted by Fund Assets

(a) Article 8 Funds

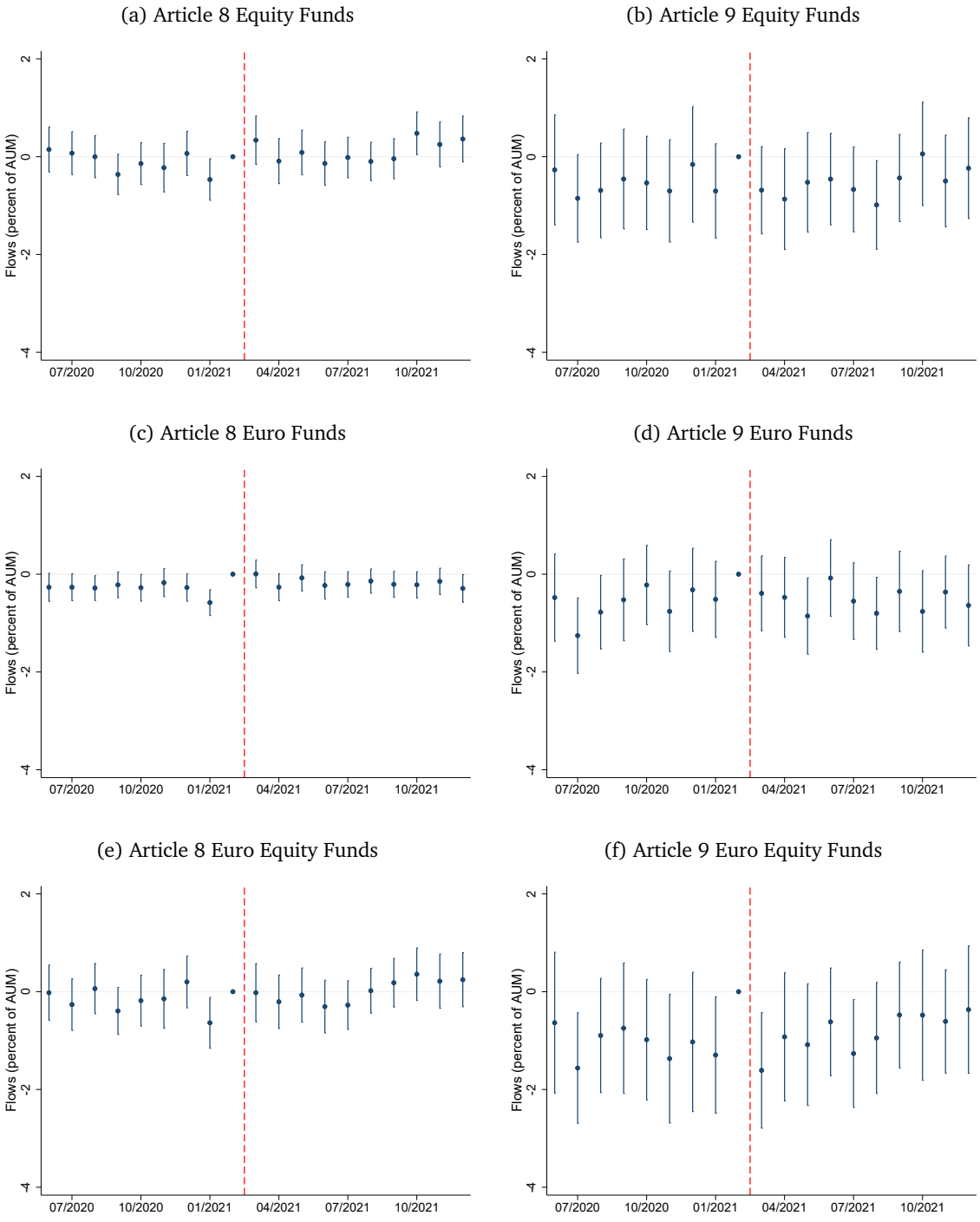


(b) Article 9 Funds



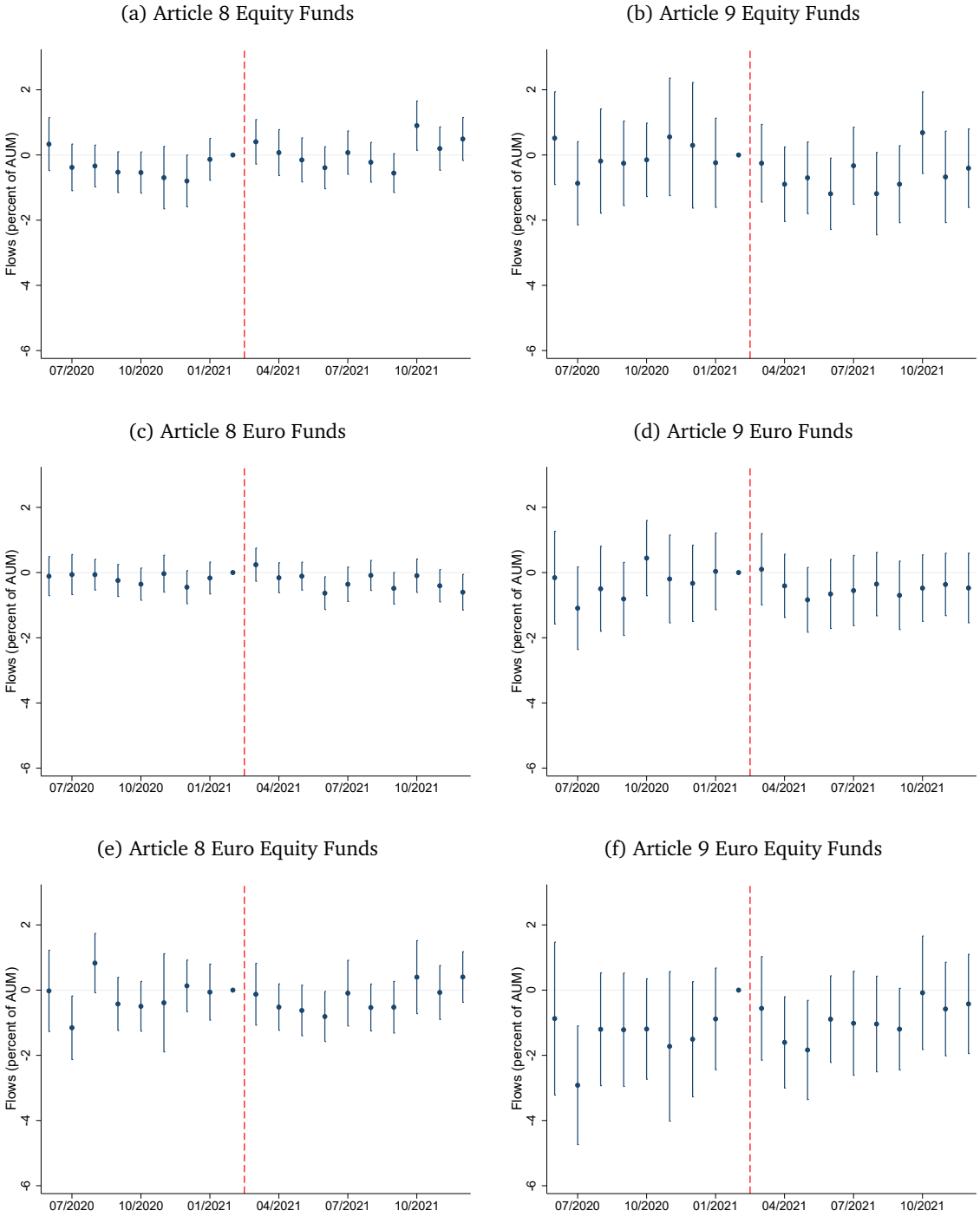
Notes: Figure A1 displays the estimated treatment effect of the SFDR on fund flows corresponding to our difference-in-differences research design (Eq. 2) surrounding the implementation of SFDR. We weight each fund by its total net assets the month before SFDR implementation.

Figure A2: 2021 Event Study - Flows, Subsamples



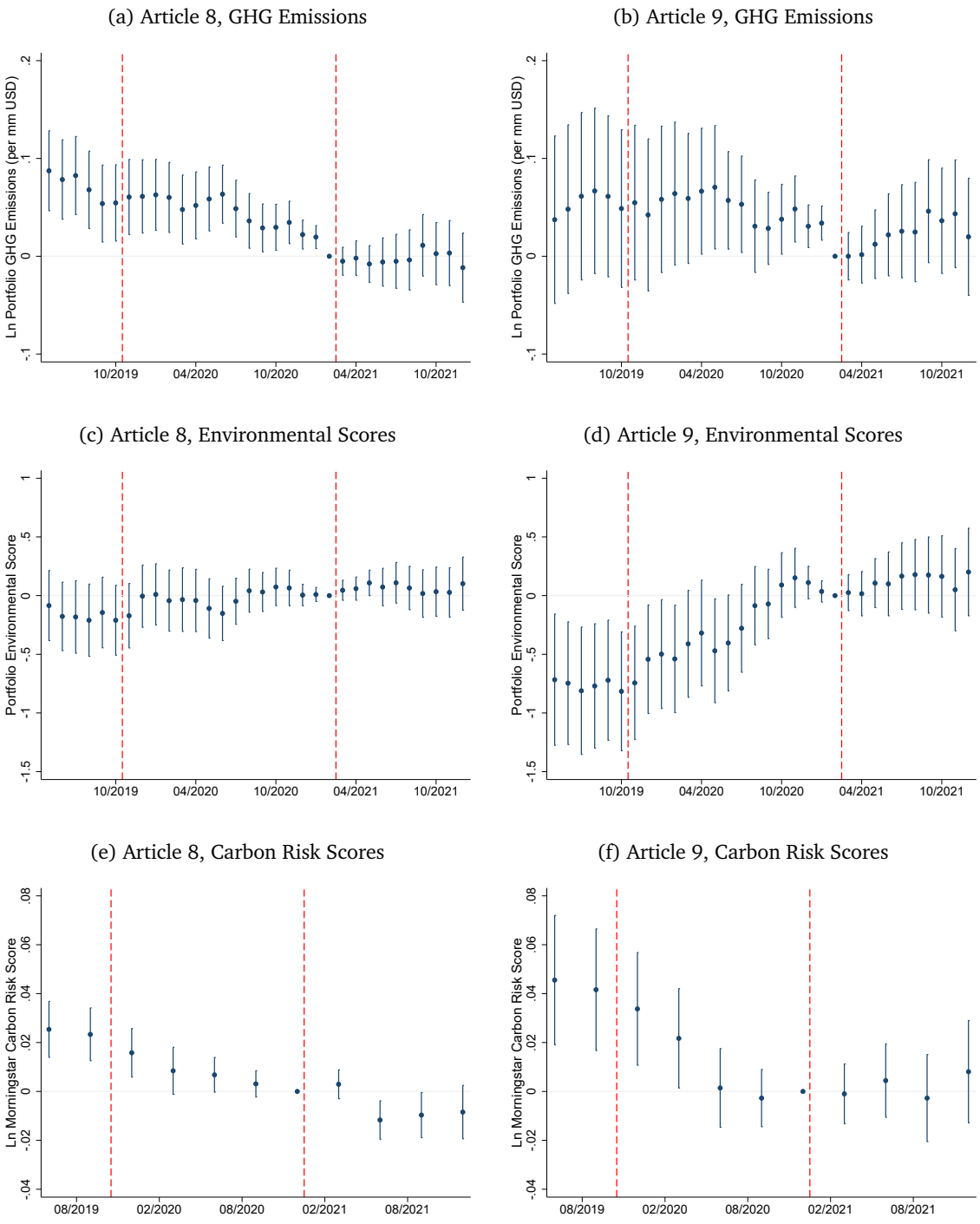
Notes: Figure A2 displays the estimated treatment effect of the SFDR on fund flows corresponding to our difference-in-differences research design (Eq. 2) surrounding the implementation of SFDR. We restrict to equity funds in the first row, euro-denominated funds (euro share classes of funds whose largest share classes are in euro) in the second row, and euro-denominated equity funds in the last row.

Figure A3: 2021 Event Study - Flows, Subsamples Weighted by Fund Assets



Notes: Figure A3 displays the estimated treatment effect of the SFDR on fund flows corresponding to our difference-in-differences research design (Eq. 2) surrounding the implementation of SFDR. We restrict to equity funds in the first row, euro-denominated funds (euro share classes of funds whose largest share classes are in euro) in the second row, and euro-denominated equity funds in the last row. We weight each fund by its total net assets the month before SFDR implementation.

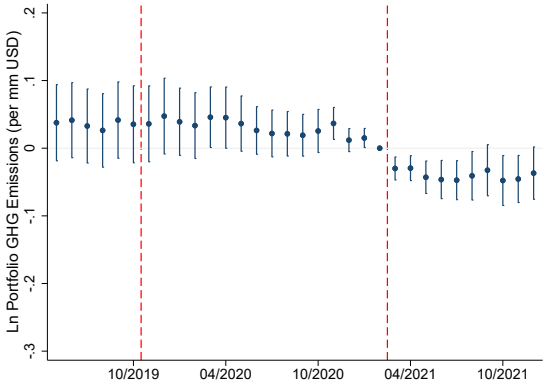
Figure A4: Event Study - Sustainability, Equity Funds



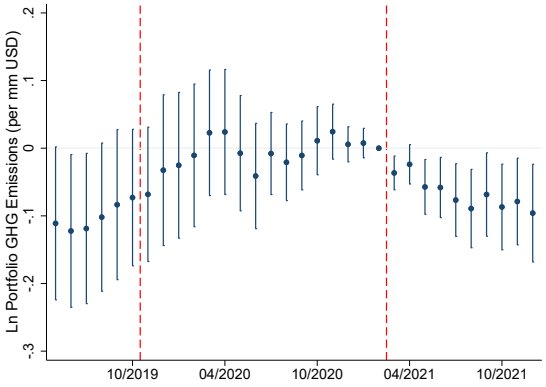
Notes: Figure A4 displays the estimated treatment effect of the SFDR on fund portfolio log greenhouse gas emissions (tonnes CO2 per million USD in revenue) in the first row, environmental scores in the second, and log Morningstar carbon risk score in the final row. The estimates correspond to our difference-in-differences research design (Eq. 2) surrounding the implementation of the SFDR. Vertical red lines indicate the date of SFDR announcement and implementation. We restrict to equity funds.

Figure A5: Event Study - Sustainability, Weighted by Fund Assets

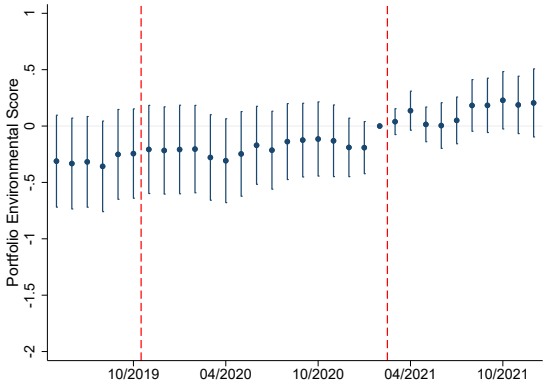
(a) Article 8, GHG Emissions



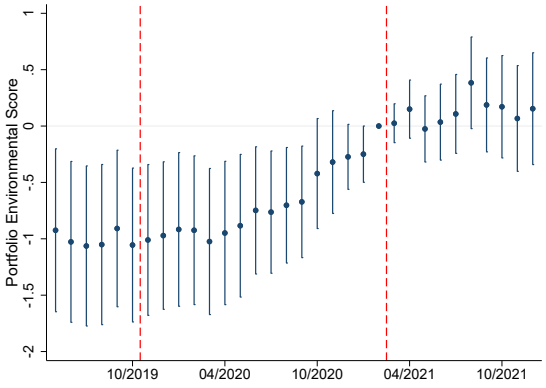
(b) Article 9, GHG Emissions



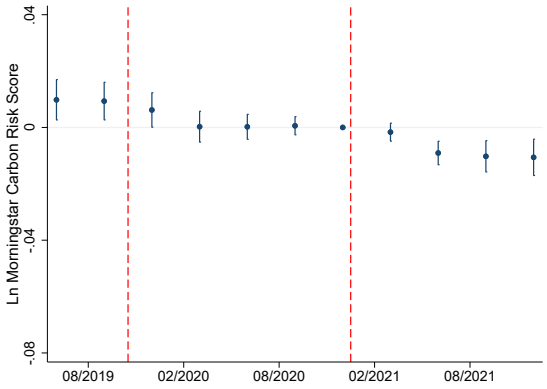
(c) Article 8, Environmental Scores



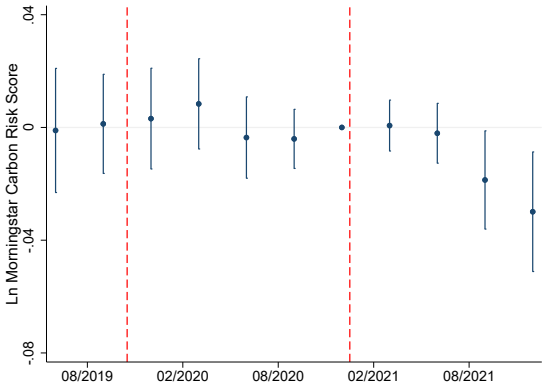
(d) Article 9, Environmental Scores



(e) Article 8, Carbon Risk Scores



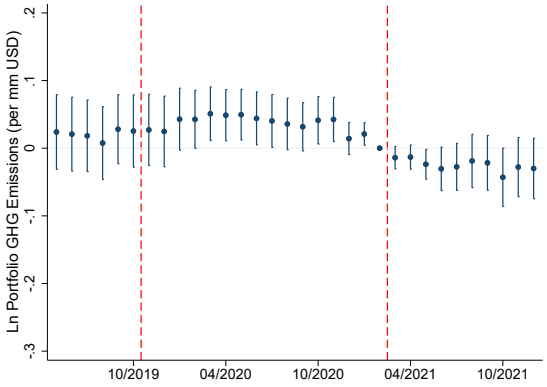
(f) Article 9, Carbon Risk Scores



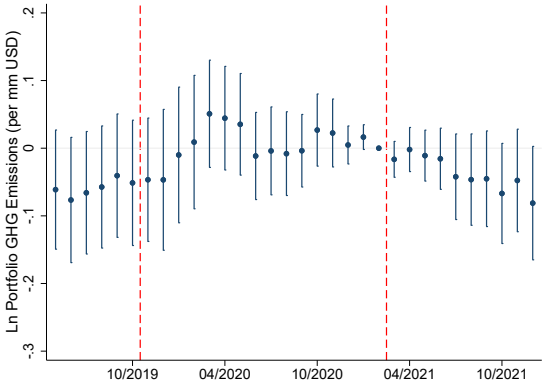
Notes: Figure A5 displays the estimated treatment effect of the SFDR on fund portfolio log greenhouse gas emissions (tonnes CO2 per million USD in revenue) in the first row, environmental scores in the second, and log Morningstar carbon risk score in the final row. The estimates correspond to our difference-in-differences research design (Eq. 2) surrounding the implementation of the SFDR. Vertical red lines indicate the date of SFDR announcement and implementation. We weight each fund by its total net assets the month before SFDR implementation.

Figure A6: Event Study - Sustainability, Equity Funds Weighted by Fund Assets

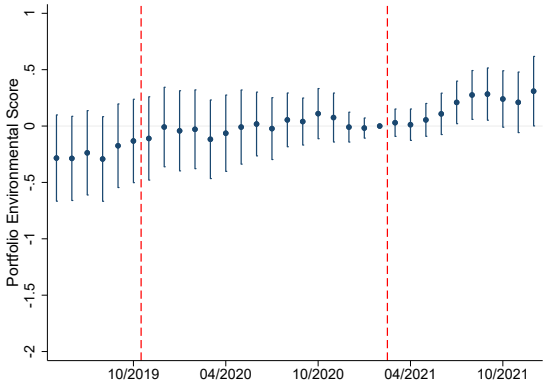
(a) Article 8, GHG Emissions



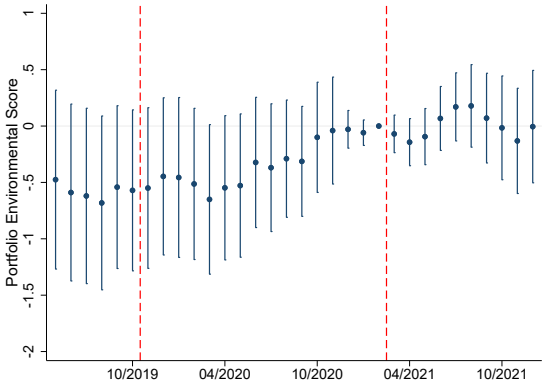
(b) Article 9, GHG Emissions



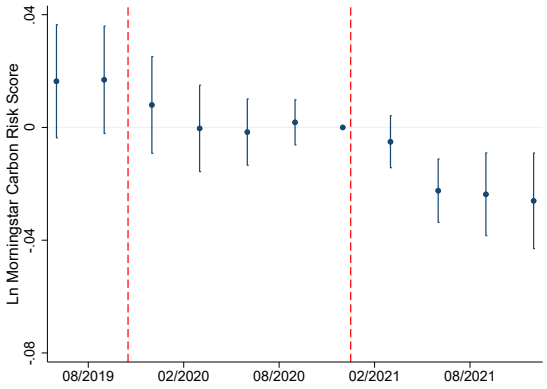
(c) Article 8, Environmental Scores



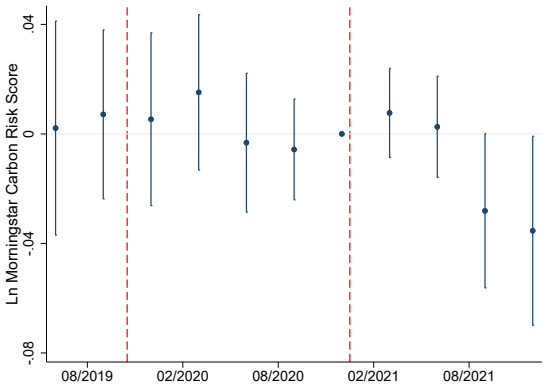
(d) Article 9, Environmental Scores



(e) Article 8, Carbon Risk Scores



(f) Article 9, Carbon Risk Scores

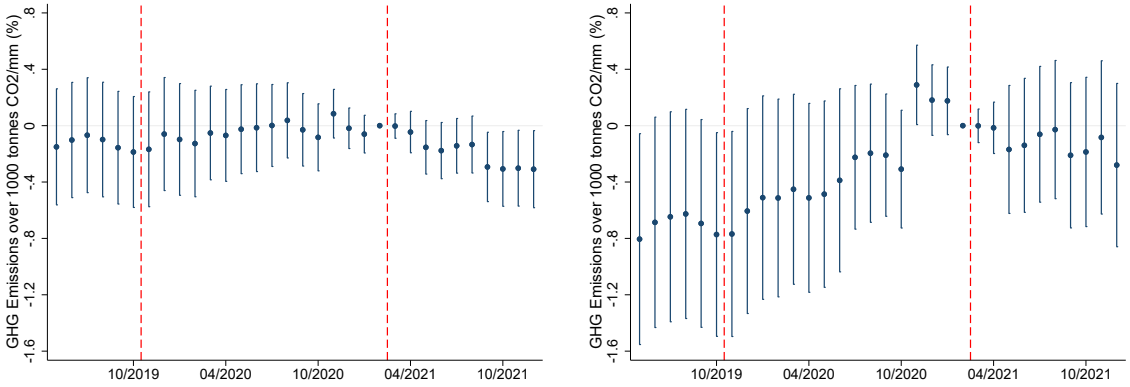


Notes: Figure A6 displays the estimated treatment effect of the SFDR on fund portfolio log greenhouse gas emissions (tonnes CO2 per million USD in revenue) in the first row, environmental scores in the second, and log Morningstar carbon risk score in the final row. The estimates correspond to our difference-in-differences research design (Eq. 2) surrounding the implementation of the SFDR. Vertical red lines indicate the date of SFDR announcement and implementation. We restrict to equity funds and weight each fund by its total net assets the month before SFDR implementation.

Figure A7: Event Study - Large GHG Emissions

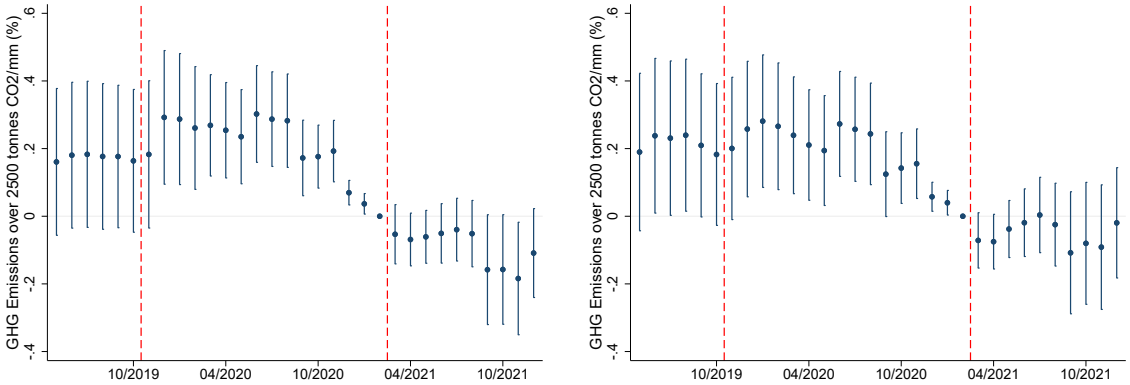
(a) Article 8, GHG Emissions over 1000

(b) Article 9, GHG Emissions over 1000



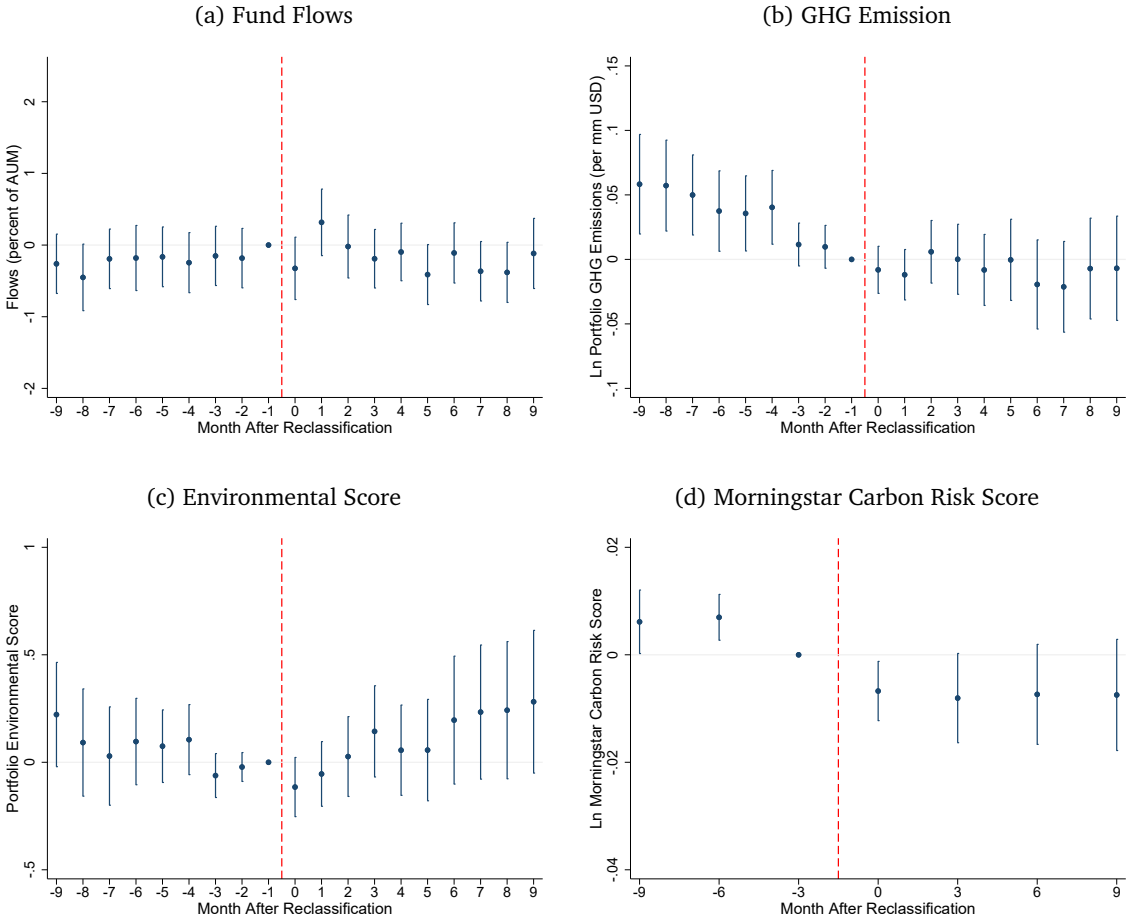
(c) Article 8, GHG Emissions over 2500

(d) Article 9, GHG Emissions over 2500



Notes: Figure A7 displays the estimated treatment effect of the SFDR on the percentage of portfolios invested in companies with greenhouse gas emissions greater than 1000 tonnes CO2 per million USD in revenue in the top row and greater than 2500 tonnes CO2 per million revenue in the bottom row. The estimates correspond to our difference-in-differences research design (Eq. 2) surrounding the implementation of the SFDR. Vertical red lines indicate the date of SFDR announcement and implementation.

Figure A8: Reclassification Event Study - Continuous Measure



Notes: Figure A8 displays the estimation results corresponding to difference-in-differences research design (Eq. 3) surrounding fund reclassificaation. We construct a continuous measure of reclassification that is equal to one for all upgrades and negative one for all downgrades.

Table A1: Investor Characteristics by Treatment

Investor Characteristic	Treatment Group					F-statistic
	1	2	3	4	5	(p-value)
Age	32.27	32.81	31.91	32.35	33.52	1.16
						(0.33)
Male	0.76	0.76	0.77	0.78	0.77	0.14
						(0.97)
College	0.77	0.79	0.77	0.79	0.76	0.27
						(0.90)
Income	3,929.33	3,756.97	3,744.90	3,826.36	3,618.47	0.75
						(0.56)

Notes: The table displays the average of investor characteristics by treatment group. The F-statistic corresponds to the test that the treatment group means are all identical.

Table A2: Baseline Knowledge of SFDR Classifications and Morningstar Globes

	SFDR	Morningstar
No	76.5%	75.4%
Yes	23.5%	24.6%
N	1465	1465

Notes: Column (1) of the table displays the response to the question: “Under the EU Sustainable Finance Disclosure Regulation (SFDR), investment funds are categorized into three distinct classes based on their sustainability levels: Article 6, Article 8, and Article 9. Before taking this survey, were you familiar with these specific classifications for assessing the sustainability of investment funds?" Column (2) displays the response to the question: “Before taking this survey, were you familiar with the Morningstar Sustainability Globes for assessing the sustainability of investment funds?"

Table A3: Sources of Investor Awareness on SFDR Article Classifications

	(1)
Bank’s website	5.8%
Investment fund prospectus	9.3%
Investment fund website	8.7%
Media	32.5%
Other	31.0%
N	345

Notes: The table displays the response to the question: “How did you hear about the SFDR Article 6/8/9 classifications?" The sample only includes respondents who were familiar with the SFDR classification system.

Table A4: Usefulness of SFDR Classifications and Morningstar Globes

	SFDR	Morningstar
No	3.2%	2.5%
Slightly	16.8%	18.1%
Moderately	50.7%	46.9%
Very	26.7%	29.2%
Extremely	2.6%	3.3%
N	345	360

Notes: The table displays the response to the question, "To what extent do you think that the SFDR classifications (Morningstar Sustainability Globes) are a valid and trustworthy measure of a fund's sustainability?" The sample only includes respondents who were familiar with the relevant classification system (SFDR articles or Morningstar globes).

Table A5: Investor Beliefs About Sustainability of SFDR Classifications

	(1)
Article 6	6.4%
Article 8	5.0%
Article 9	42.3%
All are equally sustainable	10.3%
Unsure	36.1%
N	1237

Notes: The table displays the response to the question: "Which of these funds do you think is rated as most sustainable?"

Table A6: Investor Beliefs About Sustainability of Morningstar Globes

	(1)
1 globe	1.4%
3 globes	4.2%
5 globes	67.5%
All are equally sustainable	6.9%
Unsure	20.0%
N	1004

Notes: The table displays the response to the question: "Which of these funds do you think is rated as most sustainable?"

Table A7: Event Study on Fund Flows Weighted by Fund Assets

	(1) All Funds	(2) Equity Funds	(3) Euro Funds	(4) Euro Equity Funds
1(Article 8) x Post Implementation	0.120	0.419**	-0.098	-0.085
	(0.111)	(0.211)	(0.129)	(0.252)
1(Article 9) x Post Implementation	-0.584**	-0.557	-0.171	0.345
	(0.272)	(0.379)	(0.318)	(0.457)
N	257,908	71,355	188,103	49,980
Adjusted R^2	0.161	0.166	0.175	0.166
Fund FE	X	X	X	X
Global Category $\times$ Year-Month FE	X	X	X	X
Sustainability $\times$ Year-Month FE	X	X	X	X

Notes: Table A7 displays the estimation results corresponding to our difference-in-differences research design (Eq. 2) surrounding the implementation of the SFDR. We weight each fund by its total net assets the month before SFDR implementation. The dependent variable is percentage fund flows. In column (1), we include all funds in our estimation sample. In column (2), we restrict to equity funds. In column (3), we restrict to euro-denominated funds. Specifically, we restrict to funds whose largest share class is in euro and only include euro-denominated share classes. In column (4), we restrict to euro-denominated equity funds. Standard errors are clustered at fund level are reported in parentheses. *** p<0.01, ** p<0.05, *p<0.1.

Table A8: Event Study on Portfolio Sustainability Measures Weighted by Fund Assets

	(1) All Funds	(2) Equity Funds	(3) Euro Funds	(4) Euro Equity Funds
Panel A. GHG Emission				
1(Article 8) x Post Announcement	-0.007	0.014	-0.004	0.020
	(0.022)	(0.022)	(0.029)	(0.028)
1(Article 9) x Post Announcement	0.093**	0.063**	0.047	0.054
	(0.043)	(0.032)	(0.049)	(0.045)
1(Article 8) x Post Implementation	-0.068***	-0.060***	-0.035	-0.022
	(0.022)	(0.022)	(0.028)	(0.034)
1(Article 9) x Post Implementation	-0.059	-0.042	0.036	0.025
	(0.041)	(0.045)	(0.063)	(0.081)
N	162,311	83,498	116,130	58,097
Adjusted R^2	0.927	0.908	0.911	0.855
Panel B. Environment Scores				
1(Article 8) x Post Announcement	0.116	0.224	0.228	0.357*
	(0.125)	(0.145)	(0.157)	(0.192)
1(Article 9) x Post Announcement	0.320	0.250	0.372	0.396
	(0.223)	(0.262)	(0.295)	(0.383)
1(Article 8) x Post Implementation	0.306*	0.181	-0.063	-0.142
	(0.176)	(0.179)	(0.176)	(0.237)
1(Article 9) x Post Implementation	0.803***	0.328	0.635*	-0.163
	(0.301)	(0.327)	(0.382)	(0.341)
N	177,738	89,870	125,379	61,859
Adjusted R^2	0.951	0.971	0.954	0.963
Panel C. Morningstar Carbon Risk Score				
1(Article 8) x Post Announcement	-0.008***	-0.015*	-0.011***	-0.027**
	(0.003)	(0.008)	(0.003)	(0.011)
1(Article 9) x Post Announcement	0.001	-0.002	-0.008	-0.026
	(0.010)	(0.017)	(0.014)	(0.029)
1(Article 8) x Post Implementation	-0.009***	-0.020**	-0.010***	-0.003
	(0.003)	(0.008)	(0.004)	(0.011)
1(Article 9) x Post Implementation	-0.013	-0.015	-0.009	0.003
	(0.010)	(0.018)	(0.013)	(0.026)
N	130,624	38,832	93,672	26,854
Adjusted R^2	0.968	0.918	0.967	0.909
Fund FE	X	X	X	X
Global Category × Year-Month FE	X	X	X	X
Sustainability × Year-Month FE	X	X	X	X

Notes: Table A8 displays the estimation results corresponding to our difference-in-differences research design (Eq. 2) surrounding the announcement and implementation of the SFDR. We weight each fund by its total net assets the month before SFDR implementation. The dependent variable in the top panel corresponds to the log of portfolio average greenhouse gas emissions (tonnes CO2 per million USD in revenue), in the middle panel portfolio average environmental score, and in the bottom panel Morningstar carbon risk score. Each column is based on different estimation sample as described in Table 2. Standard errors are clustered at fund level are reported in parentheses. *** p<0.01, ** p<0.05, *p<0.1.

Table A9: Reclassification Event Study

	(1) Flows	(2) GHG Emissions	(3) Env. Score	(4) Carbon Risk
1(Article 6→ 8) x Post	0.071	-0.028	0.057	-0.017***
	(0.124)	(0.026)	(0.165)	(0.006)
1(Article 8→ 9) x Post	0.221	-0.067	0.053	-0.028
	(0.659)	(0.092)	(1.071)	(0.026)
1(Article 8→ 6) x Post	0.331	0.009	-1.966*	-0.012
	(0.579)	(0.027)	(1.078)	(0.022)
1(Article 9→ 8) x Post	0.093	0.060**	0.085	-0.006
	(0.237)	(0.025)	(0.236)	(0.008)
N	533,562	192,101	210,967	159,806
Adjusted R^2	0.098	0.909	0.956	0.925
Fund FE	X	X	X	X
Global Category × Year-Month FE	X	X	X	X
Sustainability × Year-Month FE	X	X	X	X
Original Article × Year-Month FE	X	X	X	X

Notes: Table A9 displays the estimation results corresponding to difference-in-differences research design (Eq. 3) surrounding fund reclassifications from article 6 to 8 (upgrade), from article 8 to 9 (upgrade), from article 8 to 6 (downgrade) and article 9 to 8 (downgrade). We do not report reclassification results from article 6 to 9 and from 9 to 6 due to limited observations. The dependent variable in column (1) is fund flows, in column (2) is greenhouse gas emissions, in column (3) is environmental score, and in column (4) is Morningstar carbon risk score. We include all funds in the estimation sample. Standard errors are clustered at fund level are reported in parentheses. *** p<0.01, ** p<0.05, *p<0.1.

Table A10: Reclassification Event Study - Continous Measure

	(1) Flows	(2) GHG Emissions	(3) Env. Score	(4) Carbon Risk
1(Reclassify) x Post	0.031	-0.040**	0.045	-0.012**
	(0.108)	(0.018)	(0.143)	(0.005)
N	533,600	192,120	210,986	159,820
Adjusted R^2	0.098	0.909	0.956	0.925
Fund FE	X	X	X	X
Global Category × Year-Month FE	X	X	X	X
Sustainability × Year-Month FE	X	X	X	X
Original Article × Year-Month FE	X	X	X	X

Notes: Table A10 displays the estimation results corresponding to difference-in-differences research design (Eq. 3) surrounding fund reclassificaation. We construct a continuous measure of reclassification that is equal to one for all upgrades and negative one for all downgrades. The dependent variable in column (1) is fund flows, in column (2) is greenhouse gas emissions, in column (3) is environmental score, and in column (4) is Morningstar carbon risk score. We include all funds in the estimation sample. Standard errors are clustered at fund level are reported in parentheses. *** p<0.01, ** p<0.05, *p<0.1.