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Light Green is the New Black: The EU SFDR as a Driver for Greenwashing in the Mutual Fund Industry?

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ABSTRACT

In March 2021, the European Commission enacted the Sustainable Finance Disclosure Regulation (SFDR), which requires mutual fund managers in the EU to disclose ESG-relevant information and to classify their products either as light green (Art. 8), dark green (Art. 9), or others (Art. 6). This thesis serves to examine the impact of the SFDR on mutual fund flows, to understand the drivers for fund managers to declare their products as green, and to investigate potential greenwashing behaviour regarding the labelling. We find that equity funds labelled as Art. 8 receive more fund flows than Art. 6 funds after the SFDR introduction, while Art. 9 funds attract relatively less investor interest. Furthermore, we identify an underperformance of Art. 8 funds before the SFDR launch, indicating a potential use of the label as a tool to compensate for adverse return effects on fund inflows. Lastly, we find that SFDR labelled funds have a higher sustainability rating than Art. 6 funds and improve their ESG performance after the labelling on the fund and portfolio level. Notably, such improvement occurs only in portfolio characteristics that are subject to the SFDR disclosure requirements. To conclude, the policy intervention seems successful in promoting greener financial products. However, it raises concerns regarding the shift from Art. 9 funds towards less ESG-focused Art. 8 funds and the negligence of ESG criteria that are not required by the SFDR.

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List of Abbreviations

Art. 8	Article 8 SFDR
Art. 9	Article 9 SFDR
AUM	Assets under management
ESA	European Supervisory Authorities
ESG	Environmental, Social, and Governance
EU	European Union
FAs	Financial Advisers
FMPs	Financial Market Participants
LCD	Low Carbon Designation
PAIs	Principal Adverse Impacts on Sustainability Factors (Art. 4 SFDR)
PRI	Principles for Responsible Investment
RTS	Regulatory Technical Standards
SFDR	Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector (Sustainable Finance Disclosure Regulation)
SRI	Socially Responsible Investing
LTM	Last Twelve Months
US	United States of America

1 Introduction

Sustainable investing is the most relevant investment theme in recent times. Between 2016 and 2020 the global sustainable investing assets grew by 55% and reached circa USD 35.3 trillion in 2020, which corresponds to 36% of total assets under management (GSIA, 2020). This growing market for sustainable assets raises questions about the comparability of sustainable financial products and potential greenwashing resulting from a lack of uniform sustainability-related disclosure standards (International Monetary Fund, 2021). One effort to increase the transparency and comparability of ESG information for investors and to minimise the risk of greenwashing in the financial sector is the EU's Sustainable Finance Disclosure Regulation (SFDR)[1] (The European Parliament and the Council, 2019).

Since its effective date of 10 March 2021, the SFDR stipulates disclosure requirements for all financial market participants (FMPs) and financial advisers (FAs) on the entity level as well as for the financial products they manage and/or advise on. One central aspect of the SFDR is the segmentation of the product universe into three distinct types, depending on the aspired ESG integration in the investment process: dark green (Article 9), light green (Article 8), and others (Article 6). As specified in the respective article of the regulation text, the categories require different degrees of supplemental public information disclosure. Art. 9 products shall *pursue* sustainable investment strategies and thus aim to create measurable environmental and/or societal impact in addition to financial returns. In contrast, Art. 8 products shall *promote* environmental and/or social characteristics and hence reflect a lower degree of ESG integration than Art. 9 funds. All financial products not specified as Art. 8 or Art. 9 are referred to as Art. 6 products. Notably, Art. 6 is a default category and FMPs can opt to declare their products as Art. 8 or Art. 9, if they are willing to comply with the stricter disclosure requirements. (The European Parliament and the Council, 2019; Becker et al., 2021; Morningstar, 2021a).

In this thesis, we examine the implications of the SFDR classification into Art. 6, Art. 8, and Art. 9 in the context of mutual equity funds and their managers. Specifically, we analyse the incentives and drivers for asset managers to label their funds as Art. 8 or Art. 9 as well as the consequences of such labelling on fund flows and potential greenwashing behaviour in the mutual fund industry. Studying these aspects is of special interest within the context of the SFDR because of the unique circumstances of the regulation.

[1] Official name: *Regulation (EU) 2019/2088 of the European Parliament and Council of 27 November 2019 on sustainability-related disclosures in the financial services sector*.

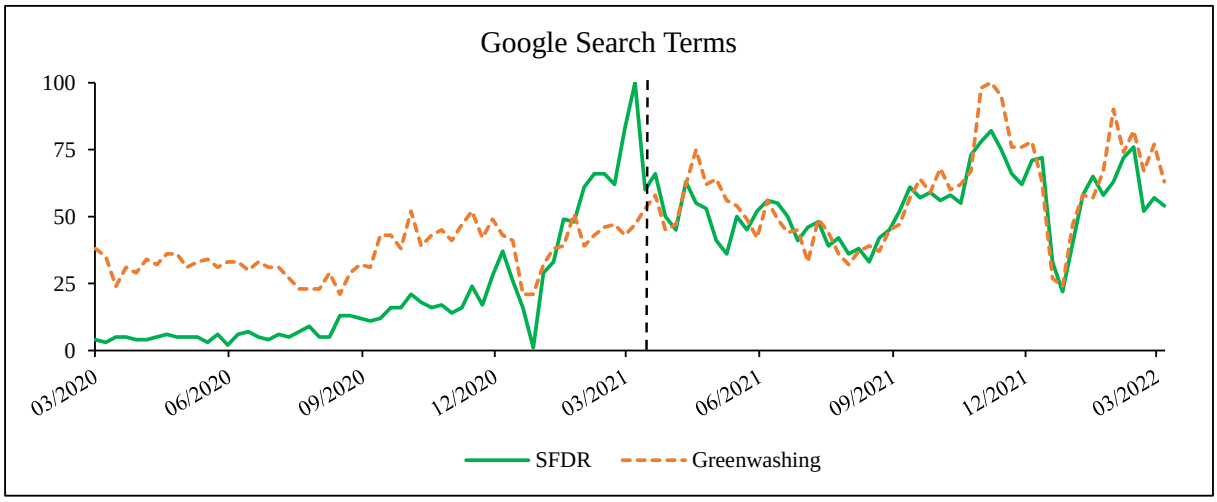
First, the SFDR leaves much discretion to the fund managers about the self-classification of their funds as Art. 6, Art. 8, and Art. 9. The SFDR constitutes a guideline for transparent and homogenous sustainability reporting, rather than a framework for ESG investing. The regulation does not stipulate tangible sustainable investment requirements, i.e. fund managers do not have to meet minimum thresholds on certain metrics to classify their funds as Art. 8 or Art. 9. (ESA, 2021a; ESA, 2021b; ESA, 2022). Although not intended, the SFDR has become a self-assigned label for supposedly green funds (Morningstar, 2022). This self-labelling character distinguishes the SFDR from more objective and industry-accepted ESG labels such as the Morningstar globe rating.

Second, the SFDR is criticized for being too vague in the definition of Art. 8 funds. For example, Victor Van Hoorn, Executive Director at the European Sustainable Investment Forum described the EU's approach as "putting words in the dictionary but not including what they mean." (Meager, 2021) This confusion combined with the FMPs' discretion in self-classifying their funds results in differences in the interpretation of the SFDR and a discrepancy in terms of ESG compliance within the group of Art. 8 funds (Morningstar, 2022). Art. 8 turned into a catch-all category with a low threshold for fund managers to declare their funds as such. Consequently, regulators, FMPs, and investors are concerned about potential greenwashing behaviour induced by the SFDR's "light-touch and business-as-usual approaches" (Morningstar, 2022). The self-labelling character combined with the vague SFDR definitions could tempt fund managers to illegitimately classify their funds as green and thus exploit the SFDR for marketing purposes (Meager, 2021).

These concerns arise as a large and increasing fraction of the fund universe is declared as Art. 8 or Art. 9. Within the first 20 days of the SFDR, 21% of EU-domiciled funds were labelled as either light green or dark green, which corresponds to 25% in AUM. Nine months later, the fraction of SFDR-labelled (i.e. Art. 8 and Art. 9) funds increased to 29% and 43% in AUM, respectively. Over the same period, almost half of the newly-launched EU-domiciled funds were labelled as either light green or dark green, which indicates a trend towards greener investments (Morningstar, 2021b, 2022). *Figure 1* shows the relative Google search interest in the SFDR, which peaked around the introduction in March 2021 and stayed at an elevated level afterwards. This highlights great attention to the SFDR around the effective date as well as during subsequent months. Furthermore, we notice an increased average interest in "Greenwashing" after the SFDR launch and identify a co-movement between both terms.

Figure 1. Google search interest in "SFDR" and "Greenwashing"

This figure shows the weekly relative Google search interest in the terms "SFDR" and "Greenwashing". The black vertical line marks the effective date of the EU SFDR (Google Trends, 2022).



Because of the vast increase in SFDR-labelled funds, the overall high interest in the regulation, and the prevalent greenwashing concerns, we see a need to comprehend the SFDR's impact on investor demand and fund manager reaction with regard to ESG alignment. Especially, insights into potential greenwashing behaviour are of interest to policy makers to understand potential flaws of the regulation and to make appropriate adjustments if necessary. Thus, we study the implications of the SFDR introduction by exploring three hypotheses which are described in the following.

The general relationship between green labels and investor inflows has been well-researched in the mutual fund literature. Multiple studies consistently find that funds with sustainability labels attract more net fund flows than conventional funds after receiving the label (e.g. Białkowski and Starks, 2016; Ammann et al., 2019; Hartzmark and Sussman, 2019; Ceccarelli et al., 2021). Using difference-in-differences regressions, we explore whether the relationship between sustainability labels and investor flows exists in the context of the SFDR, i.e. whether SFDR-labelled funds receive more fund flows than their Art. 6 peers. In line with the consent in literature, we find that Art. 8 funds attract significantly more fund flows after the SFDR introduction. Interestingly, we find a significant negative relation for Art. 9 funds. Most of these funds had already been marketed as sustainable through green fund names before the SFDR launch and the SFDR labelling increased the competition among these green-labelled funds. Hence, we suspect that the SFDR may lead to a reallocation of flows from Art. 9 funds to Art. 8 funds after the launch of the regulation and that the Art. 9 classification of green-labelled funds does not provide additional signalling value to investors.

The sustainability-flow relationship is of special interest as fund managers have monetary incentives to increase their fund inflows to boost their management compensation, which is a function of assets under management (Chevalier and Ellison, 1997). In addition, literature has shown that fund managers take actions, such as window-dressing or changing fund names, to attract fund flows and increase management fees (e.g. Cooper et al., 2005; Agarwal et al., 2014). These actions were especially observed for funds with lacking investor interest and lower financial returns, which seem to be the main drivers for non-performance-related changes in fund characteristics (Cooper et al., 2005; Ghoul and Karoui, 2021). Using logistic regressions, we find that fund managers tend to classify their funds as Art. 8 when they earned lower returns during the year before the labelling. We argue that fund managers might anticipate a potential positive labelling effect on investor demand and thereby use a green label to mitigate potential adverse fund flow effects resulting from disappointing fund returns.

Combining both the benefits of and the drivers for the (self-)labelling of funds as ESG-friendly raises the question of whether asset managers exploit this practice by marketing their funds as greener than they fundamentally are. There is evidence indicating greenwashing behaviour in the fund industry in a sense that self-labelled green funds have inferior sustainability ratings to conventional funds (e.g. Brandon et al., 2021), do not improve their ESG performance after committing to sustainable initiatives (e.g. Kim and Yoon, 2021), or are exposed to ESG-unfriendly industries (e.g. Kaustia and Yu, 2021). Within the context of the SFDR, recent reports point out that there is a high fraction of Art. 8 funds with low Morningstar sustainability ratings (e.g. Morningstar, 2022). We investigate potential greenwashing behaviour regarding the SFDR-labelling decision on the fund level and the portfolio level, using graphical evidence and difference-in-differences regressions. We find that at the time of the SFDR introduction, Art. 8 and Art. 9 funds are more sustainable than comparable Art. 6 funds, as indicated by the Morningstar globe rating and portfolio holdings of ESG-unfriendly companies. Furthermore, SFDR-labelled funds tend to improve their ESG performance after the labelling. However, we point out that these funds predominantly become greener in portfolio characteristics that are subject to the disclosure requirements while non-SFDR variables are neglected by fund managers. Therefore, we do not identify greenwashing activities but find indications for the problem in multitasking models, in which people focus on certain variables while neglecting others (e.g. Bebchuk and Tallarita, 2022). Within the context of the SFDR, fund managers have incentives to improve variables that are required for disclosure rather than undisclosed characteristics.

We contribute to the existing literature in multiple ways. First, we provide new evidence on the sustainability-flow relationship, especially for funds with self-assigned ESG labels. Thus far, related analyses have been based on objective sustainability ratings (e.g. Hartzmark and Sussman, 2019), name changes towards sustainability-related appellations (e.g. Ghoul and Karoui, 2021), or manually collected lists of SRI funds based on prospectus descriptions (e.g. Kaustia and Yu, 2021). In contrast, we offer a significantly larger sample size and thereby provide more robust results. This is due to the unique circumstances of a policy intervention, which requires fund managers to assign their funds to one SFDR category and thereby offers an underlying data set covering all EU-domiciled funds. Because of the regional scope of the regulation, we focus exclusively on EU funds and thereby provide alternative evidence to previous studies that mostly cover US funds. This is valuable since both regions differ regarding the level of ESG acceptance, which consequently might affect the sustainability-flow relationship (e.g. Brandon et al., 2021; Kaustia and Yu, 2021).

Second, we investigate the drivers for fund managers to self-assign labels to their funds and extend very limited existing literature (e.g. Cooper et al., 2005; Ghoul and Karoui, 2021) by offering a larger data sample and identifying the drivers for labelling in the context of policy intervention. Unlike previous studies on self-labelling through fund names or commitment to initiatives such as the Principles of Responsible Investment (PRI), the SFDR reflects a uniform and regulation-based label affecting all EU-domiciled funds. We examine which funds are labelled as green and whether self-assigned labels might be used as a tool to mitigate potential losses in investor demands in response to adverse developments in relevant characteristics, such as fund performance.

Third, the self-labelling character of the SFDR offers ideal circumstances for analysing greenwashing behaviour in the mutual fund industry, i.e. managers labelling and marketing funds as green without reflecting it in their portfolio. Unlike previous literature on mutual fund greenwashing within the context of green fund names (e.g. Ghoul and Karoui, 2021), ESG-related investment profiles (e.g. Kaustia and Yu, 2021), or voluntary commitment to ESG initiatives and reporting (e.g. Kim and Yoon, 2021), the SFDR is an EU regulation and thereby provides a higher level of credibility. By examining ESG performance on both the fund and portfolio level, we offer a detailed analysis and provide new evidence on potential greenwashing behaviour within the mutual fund industry, for which no clear consent is established within the literature. Our findings are in line with studies that find that self-designated ESG funds either have higher sustainability scores than their conventional

counterparts (e.g. Kempf and Osthoff, 2008; Białkowski and Starks, 2016) or improve their ESG performance after the labelling (e.g. Ghoul and Karoui, 2021; Kaustia and Yu, 2021).

By contributing to these streams in literature we provide one of the first studies examining the implications of the SFDR introduction on investor demand and fund manager reaction with regard to ESG performance. We extend the only other related working paper on the SFDR, Becker et al. (2021), by studying the drivers for SFDR labelling and by analysing greenwashing behaviour on both the fund and portfolio level. Combining these aspects allows for a first holistic evaluation of the short-term effectiveness of the SFDR concerning its main objectives and thereby creates valuable insights for policy makers.

The rest of this thesis is structured as follows. Section 2 describes the SFDR regarding disclosure requirements, timeline, and criticism. Section 3 presents findings in related literature from which we derive three hypotheses. Section 4 describes the data set and sample construction. Sections 5, 6, and 7 provide methodologies, empirical results, and robustness tests for each hypothesis. Section 8 critically interprets the results and discusses the analysis regarding implications and limitations. Section 9 concludes.

2 Sustainable Finance Disclosure Regulation (SFDR)

2.1 Institutional background and disclosure requirements

In March 2018, The European Commission adopted a 10-point Sustainable Finance Action Plan directed at the financial sector to channel capital flows towards more sustainable investments and to foster low greenhouse gas emissions as well as climate-resilient development, among other goals. On 27 November 2019, the European Parliament and Council announced Regulation (EU) 2019/2088 on sustainability-related disclosures in the financial sector, which is commonly known as the Sustainable Finance Disclosure Regulation (SFDR) and reflects the core of the Sustainable Finance Action Plan. In general, the SFDR provides sustainability disclosure requirements for financial market participants (FMPs) and financial advisers (FAs) (The European Parliament and the Council, 2019; Morningstar, 2021c).

The text of Regulation (EU) 2019/2088 reflects 'Level 1' disclosure requirements, which became effective on 10 March 2021. Moreover, the regulation authorized the European Supervisory Authorities (ESA) to develop draft regulatory technical standards (RTS), which complement the initial SFDR by outlining the reporting of principal adverse impacts for sustainability (PAIs). The 18 PAIs are a central concept of the SFDR and can be described as negative impact factors that investments have on environmental and social aspects, such as greenhouse gas emissions, water pollution, or weapon production (Morningstar, 2021a). In the following, RTS will be referred to as 'Level 2' disclosure requirements. Depending on the context, we refer to 'SFDR' either as the initial Level 1 requirements or as the entirety of SFDR and RTS. The regulation's main objective is to increase the transparency and comparability of ESG information. Furthermore, by providing ESG disclosure guidelines the European Commission aims to promote sustainable investments while minimising opportunities for FMPs to engage in greenwashing (The European Parliament and the Council, 2019).

2.1.1 Level 1 disclosure requirements (SFDR)

In general, the SFDR specifies sustainability-related disclosure requirements for all FAs and FMPs, such as investment management firms or providers of pension funds. In line with the scope of this thesis, we will in the following only refer to requirements for FMPs. The regulation covers three areas of reporting on the entity and product level. Entity level disclosure primarily refers to information on the FMPs' websites (Art. 3-5), while product level information will be provided in pre-contractual documents (e.g. prospectus) and in periodic reports, such as annual and quarterly publications (Art. 6-11) (The European Parliament and the Council, 2019; Morningstar, 2021a).

First, FMPs are required to disclose how they integrate sustainability risks into their investment decision processes. This ranges from publishing their sustainability risk policies on their websites (Art. 3) to including detailed descriptions about the integration of sustainability risks in pre-contractual documents (Art. 6). Notably, FMPs must link the sustainability risk to potential impacts on the returns of their financial products. Second, the SFDR requires FMPs to disclose whether and how their products consider the 18 PAIs on the entity level (Art. 4) as well as on the product level (Art. 7) in pre-contractual documents. The regulation requires clear reasoning why or why not certain PAIs were considered and a description of how they are included in the due diligence processes (The European Parliament and the Council, 2019).

Importantly, the transparency on the integration of sustainability risk in the investment process as well as on the consideration of PAIs applies to all FMPs and financial products. The SFDR require additional disclosures for sustainable financial products as specified in Art. 8 and Art. 9 of the regulation text. Art. 9 refers to financial products that pursue sustainable investment strategies. Art. 2 (17) defines sustainable investments as investments in companies or other economic activities that (a) directly *contribute* to an environmental or social objective, (b) do not significantly harm any of these objectives, and (c) pursue good governance. Hence, these products aim to actively create environmental and/or societal impact. In contrast, Art. 8 applies to financial products that *promote* environmental and/or social characteristics. However, the SFDR does not define how to *promote* environmental or social objectives and hence leaves discretion to the FMPs in the classification decision. *Promoting* environmental or social objectives can, for example, be achieved by applying tools such as screening, exclusion, and best-in-class investing (ESA, 2021b). Within the additional disclosures for Art. 8 and Art. 9 funds, FMPs must report how their products fulfil these non-financial objectives and apply metrics to underline the products' compliance with sustainability indicators, which are defined in the Level 2 disclosure requirements (ESA, 2021a).

To determine the degree of required ESG disclosure, sustainable financial products can be assigned to either Art. 8 or Art. 9, which are commonly referred to as light green and dark green by the industry (Wilkes, 2021). The main difference between both articles is the lower aspired degree ESG integration and the less strict reporting requirements in Art. 8 funds. Art. 8 funds must explain how their portfolios adversely affect environmental and social objectives, while Art. 9 funds are required to disclose how they engage in sustainable investments and how they contribute to reaching common goals such as the reduction of carbon emissions (ESA, 2021a). All funds not specified as either Art. 8 or Art. 9 are referred to as Art. 6 funds.

2.1.2 Level 2 disclosure requirements (RTS)

The regulatory technical standards (RTS) are referred to as SFDR Level 2 disclosure requirements. The first version of the RTS was initially published in February 2021 and was amended by a second and definitive version in October 2021. The second RTS came as a response to criticism about unclear and ambiguous descriptions in the first RTS (e.g. Jones, 2021; Rust, 2021). The Level 2 requirements amend the SFDR by specifying disclosure requirements and providing guidelines about the presentation and content of the reporting of PAIs. For example, the RTS define relevant PAIs and their appropriate metrics, as well as provide reporting templates for the quarterly PAI statements. In these reports, FMPs are required to reveal how their investment decisions affected the social and environmental factors using quantitative metrics. Since the RTS update in October 2021, the PAI reporting became also mandatory on a product level and hence, FMPs must now explicitly reason why their financial products were classified as Art. 8 or Art. 9 by using the respective templates and metrics (ESA, 2021a, 2021b).

2.2 Timeline

The SFDR Level 1 requirements became effective as of 10 March 2021. As of then, FMPs and FAs had to provide information on their websites and pre-contractual documents about the integration of sustainability risk, explain the consideration of PAIs in their investment decision processes on entity level, and classify their funds as Art. 6, Art. 8, or Art. 9. As of 1 January 2022, FMPs shall include these entity-level disclosures in periodic reports. As of 30 December 2022, FMPs also must be transparent about the integration of PAIs on product level, i.e. they must outline whether and how their financial products consider PAIs. Notably, this disclosure is qualitative and does not require an evaluation of the current portfolio impact on PAIs or the respective metrics (ESA, 2022; ESMA, 2022).

Initially, the RTS were planned to become effective as of 1 January 2022. However, the standards were delayed twice due to confusion among FMPs and subsequent clarifications in form of official letters and Q&As of the ESA (ESA, 2021b, 2022). The RTS shall now apply as of 1 January 2023, requiring FMPs to disclose PAIs and sustainability features of their financial products for the first time on 30 June 2023. As of this date, FMPs must update their PAI website disclosures in compliance with the dedicated RTS templates. Consequently, FMPs are not only required to explain whether and how they integrate sustainability risk and PAIs in their investment decision processes (Level 1), but to describe how their investment decisions directly affected the PAIs using quantitative metrics (Level 2). In addition to templates for

entity-level PAI reporting, ESA provided mandatory templates for product-level disclosures for Art. 8 and Art. 9 products in the final RTS update in October 2021 (ESA, 2021a). Notably, the reference period for the first PAI reporting lasts from 1 January 2022 to 31 December 2022, which implies that FMPs must collect data as of January 2022 (ESA, 2022; ESMA, 2022).

2.3 Limitations of the SFDR and greenwashing concerns

The adoption of the SFDR in November 2019 as well as the publication of the first RTS in February 2021 was accompanied by confusion and criticism from FMPs, FAs, and the media (e.g. Meager, 2021; Wilkes, 2021; Rust, 2022). A major concern arises from the classification of financial products, especially regarding the definition of Art. 8 funds since the SFDR does not define what is meant by *promoting* environmental and/or social activities. ESA explicitly highlights the neutral character of the SFDR, leaving discretion to FMPs about the interpretation of the regulation and the classification of their products (ESA, 2021b). This self-labelling character combined with the vague SFDR definitions could tempt fund managers to illegitimately obtain a green label and thus exploit the SFDR for marketing purposes (Meager, 2021). Consequently, financial products classified as Art. 8 vary significantly in their level of sustainability. Hence, the label itself is not very meaningful without the supporting information. However, FMPs are not required to provide such information until January 2023. Moreover, until the definitive version of the RTS in October 2021, FMPs had not been aware of the requirement to disclose PAI metrics and other quantitative data on product level for financial products declared as Art. 8 or Art. 9. Hence, many FMPs already classified their products as green before knowing about the stricter disclosure requirements as of October 2021. It is criticised that these funds might benefit from marketing themselves as sustainable for almost two and a half years without providing justifying evidence (ESA, 2021a; Meager, 2021).

These concerns are further intensified by the fact that the SFDR does not serve as an ESG framework for products in the financial sector and that the classification into Art. 6, Art. 8, and Art. 9 is not intended to serve as a sustainability label (Rust, 2021). For example, the regulation neither requires any minimum values or thresholds on quantitative metrics nor prescribes investment styles that may be considered sustainable. Instead, the SFDR provides transparency guidelines on the degree of sustainability-related disclosures, contingent on the aspired ESG level of financial products. This difference in stated disclosure intention creates a labelling character for Art. 8 and Art. 9, which investors may mistakenly understand as quality labels for ESG compliance. This perception might be used by FMPs to label their products as green and attract investors with respective investment preferences

3 Hypotheses development and literature review

3.1 Hypothesis 1: Investor preference for green labelled investment funds

Past academic research has shed light on the determinants of fund flows and identified past financial performance as the main driver for mutual fund in- and outflows. There is convincing evidence that the fund's past performance significantly impacts subsequent purchase and redemption activity (e.g. Berk and Green, 2004; Chevalier and Ellison, 1997; Guercio and Tkac, 2002; Sirri and Tufano, 1998).

However, there exists evidence that investment decisions and hence fund flows are not solely driven by return-related variables but also by non-financial characteristics (Massa, 2003), such as the level of sustainability integration into the fund's policy. In interviews with investors in socially responsible investments (SRI), Statman (2008) finds that such investors combine risk and return characteristics with the social responsibility profile of investments in their decision processes. SRI investors are heterogenous and pursue diverse ethical, societal, and religious goals. Linking administrative data to survey responses in experiments, Riedl and Smeets (2017) find that financial motives are less important to SRI investors, who are willing to forgo financial return to incorporate their social preferences in their investment decisions.

Due to the increasing relevance of ESG in investment decisions, research is concerned with the role of ESG in the return-flow relationship and the impact of the level of sustainability on fund demand. Using a small sample of US ESG funds based on the ESG list from the Social Investment Forum, Bollen (2007) analyses the relationship between mutual fund returns and fund flows. He finds that SRI fund inflows are more sensitive to past positive returns than conventional funds and that cash outflows from SRI funds are less sensitive to past negative returns. For net investor cash flows, he finds that the monthly volatility is generally lower in SRI funds. These findings are supported by Benson and Humphrey (2008) and Renneboog et al. (2011) who find that SRI net flows are less sensitive to past returns than traditional fund flows and that SRI flows are generally more persistent. Renneboog et al. (2011) argue that SRI investors take into account and value social and ethical attributes in addition to past performance, which mitigates the importance of (negative) fund returns. Białkowski and Starks (2016) study SRI investor behaviour in the context of exogenous shocks in form of corporate environmental disasters (i.e. a major oil spill and a nuclear disaster). They find that such nonfinancial information has a significant impact on investor interest in SRI funds since green funds receive more fund flows compared to conventional funds in the aftermath of these disasters.

In March 2016, Morningstar launched its Morningstar sustainability rating ("globe rating") which represents the first freely accessible, reliable, and objective source of information on the ESG level of mutual funds. The globe rating classifies each fund share class in categories between one (low sustainability) and five (high sustainability), based on the fund's ESG performance relative to its peer funds with a similar investment strategy. The launch of the rating reflected a meaningful change for retail investors, who – unlike institutional investors – only had limited informational resources and limited access to underlying fund holding data. The Morningstar sustainability rating turned the complexity of sustainability assessment into a comprehensive and easy-to-grasp figure. It further provided researchers with a market-wide accepted third-party measure to approximate fund ESG performance, while past literature had been grounded on inconsistent, subjective, and hand-collected ESG data.

Ammann et al. (2019) make use of this exogenous information shock to study the existence of a causal link between sustainability and mutual fund flows. They find compelling evidence that investors divest from low-rated funds and reallocate money to high-rated funds in the first year after the introduction of the globe rating. The impact of the sustainability rating on fund flows is much stronger for retail share classes compared to institutional share classes, indicating a larger marginal information improvement for retail investors. Ammann et al. (2019) further underline that the effect is more visible for inflows in high-rated funds than for outflows from low-rated funds and thereby show an asymmetric sensitivity to levels of sustainability. The causal impact of sustainability on mutual fund flows is supported by Hartzmark and Sussman (2019) who conclude that investor demand for mutual funds is a function of their sustainability ratings. Sustainability, measured by the globe rating, is perceived as a positive attribute, resulting in higher cash inflows to five globe funds and outflows from one globe funds. Notably, funds rated with two, three, and four globes were not significantly impacted by the introduction of the Morningstar sustainability rating. They further point out that the globe rating is a simple repackaging and labelling of ESG information. Hence, the impact on fund flows is triggered by the rating itself, not by new underlying information. Furthermore, investors do not react to the more detailed fund sustainability scores, which were simultaneously published with the globe rating, indicating that investors are prone to simple ratings and labels instead of the underlying information. Ceccarelli et al. (2021) conduct a similar analysis using Morningstar's Low Carbon Designation (LCD) label, which was introduced in April 2018 and measures the funds' climate performance based on the underlying portfolio holdings' exposure to fossil fuels and the portfolio's carbon risk score. It is an easy-to-understand label in form of a green leaf icon, helping investors to identify funds with

portfolios aligned with the Paris Agreement to foster a carbon-efficient economy. After the introduction, funds with LCD labels received significantly more fund inflows than funds without a label. This causal relationship further holds for subsequent changes in the LCD status, i.e. receiving or losing the label in quarterly updates. In addition, Ceccarelli et al. (2021) point out that funds that were not declared as low-carbon at the launch of the LCD in April 2018 subsequently reduced their portfolio carbon risk in an attempt to receive the label. Simple labels, such as the LCD label, are particularly important to asset managers because investors pay more attention to simple ESG labels than to the underlying reasoning (Rzéznik et al., 2021).

In addition to the literature about objective ESG labels, recent literature acknowledges the increasing use of fund names related to socially or sustainably responsible investing and analyses the impact of green fund names on the attraction of fund flows. For example, Ghoul and Karoui (2021) study the consequences of fund name changes to a sustainability-related appellation. They find that greening fund names, thus labelling them as sustainable, attracts investor demand, resulting in increasing fund flows. A comparable effect is described by Kaustia and Yu (2021) who analyse the drivers and consequences of (re-)labelling mutual funds as ESG, SRI, or CSR. They find that self-designated ESG funds experience higher monthly fund inflows than non-ESG funds with similar profiles. Notably, this effect was also evident for ESG-labelled funds with inferior ESG profiles, measured by the Morningstar globe rating.

We interpret name changes towards a sustainability-related appellation as a practice of fund managers to self-assign green labels to their mutual funds and thereby relate it to the self-labelling character of the SFDR. Although the SFDR has the intention to focus on the disclosure of ESG information, the label character of Art. 8 and Art. 9 became the centre of attention. As of March 2021, fund managers have been able to assign their funds to one of the categories without disclosing justifying evidence until January 2023. Hence, the introduction of the SFDR can be compared to the launch of the Morningstar sustainability rating since both do not reflect the publication of new information but are a simple and understandable differentiation among levels of sustainability. Thus, we expect that the introduction of the SFDR and the subsequent labelling of funds as light green and dark green leads to a similar observable investor reaction in form of stronger cash inflows into Art. 8 and Art. 9 funds. This is supported by Becker et al. (2021) who find significantly higher fund inflows for European Art. 8 and Art. 9 funds compared to Art. 6 funds in the first four months after the introduction of the SFDR.

Hypothesis 1: Since the introduction of the SFDR in March 2021, funds classified as Art. 8 or Art. 9 receive higher net fund flows than funds classified as Art. 6.

3.2 Hypothesis 2: Low fund returns and fund inflows as drivers for fund labelling

As mentioned in *Section 3.1*, past research identified previous financial performance as the main driver for mutual fund in- and outflows, i.e. superior returns lead to higher future fund inflows and vice versa (e.g. Chevalier and Ellison, 1997; Guercio and Tkac, 2002; Sirri and Tufano, 1998). This performance-flow relationship is in line with both investors' and fund managers' objectives. While investors strive for high returns at low expense, fund managers aim for high fund inflows since their compensation in form of management fees is a function of fund size, which is driven by both fund flows and returns (Sirri and Tufano, 1998). Thus, fund managers have an incentive to perform well to grow their assets under management organically and inorganically by attracting new money inflows.

This compensation structure incentivises fund managers to take actions aiming at maximizing the inflows from investors. Since past performance is the main driver for future fund flows, fund managers attempt to opportunistically improve their (under)performance towards the end of the reporting period or even engage in activities distorting investor perceptions. For example, Brown et al. (1996) and Chevalier and Ellison (1997) find that underperforming fund managers gamble with investors' money by taking additional risks towards the end of the year to catch up with their benchmarks and prevent fund outflows. Similarly, Agarwal et al. (2014) show that poor-performing fund managers engage in window-dressing activities, i.e. they distort their portfolio holdings towards the end of the reporting period by buying winners and selling losers to mislead investors about their true stock picking abilities. Due to a portfolio reporting delay of up to 60 days after quarter-end, such performance-enhancing rebalancing activity may result in a false perception of security selection skills. The underperforming fund managers put their investors' money at stake to prevent fund outflows and even benefit from additional inflows in case of satisfactory performance post-quarter-end.

Although poor returns may adversely affect fund inflows and thus management compensation, fund managers are rather limited in their toolbox to improve returns by integrating ESG in their portfolio. Admittedly, they might pursue ESG strategies if they believe in the outperformance of green funds over conventional funds. Likewise, investors could be convinced by superior future returns of ESG funds and direct more capital towards them. However, most literature does not identify a significant difference in the performance of ESG and conventional funds (e.g. Revelli and Viviani, 2015; Statman, 2000). Since fund managers are primarily worried about lagging investor demand (Chevalier and Ellison, 1997), we steer our analysis away from the performance-flow relationship and focus on non-financial actions

driving the capital flows from investors. For example, Sensoy (2009) shows that only circa 30% of equity funds in the US self-select a performance benchmark that adequately reflects the fund's investment style and risk profile. The underlying rationale is that a perceived superior fund performance attracts investor capital, which is especially attractive for funds with underperformance relative to the actual benchmark. Moreover, Cooper et al. (2005) examine the implications of fund name changes to names reflecting current hot investment styles. They identify negative fund inflows before the name change as well as inferior financial performance as major drivers for such change. By shifting the fund name towards hot investment styles, fund managers take advantage of trends and experience abnormal fund inflows without subsequent performance improvements. Notably, the increase in flows is not subject to underlying changes in the investment style but can be interpreted as a reaction to cosmetic changes. This is in line with previously mentioned literature about investors' reaction to ESG labels instead of the underlying ESG performance (e.g. Hartzmark and Sussman, 2019; Ghoul and Karoui, 2021).

Following Cooper et al. (2005), Ghoul and Karoui (2021) analyse the drivers for changes in fund names to a sustainability-related appellation. Funds that changed their names tend to experience negative fund flows during the months before the name change, while the matched set of non-name changing funds realized positive flows. Hence, Ghoul and Karoui (2021) assume that the name changes may be (at least partly) motivated by the lack of investor attraction and the belief in increasing investor demand for ESG-labelled funds. This is in line with, Kaustia and Yu (2021) who examine the implications of self-designated ESG funds based on prospectus descriptions. They find that funds with lagging fund inflows are significantly more likely to be re-labelled as ESG funds, presumably to increase their marketing appeal. Hence, they attribute the ESG self-labelling to lagging fund inflows and interpret the greening as a tool to improve fund flows and management compensation.

As previously mentioned, we interpret the classification of mutual funds into Art. 6, Art. 8, and Art. 9 as a labelling process. So far, no significant amount of information has been introduced, and fund managers will not be obliged to disclose justifying evidence for their classification until January 2023. Thus, we expect fund managers to anticipate this signalling effect and expect higher fund inflows for green funds. Fund managers with lacking financial performance or fund flows may be inclined to take action to mitigate adverse effects on investor demand and increase their fund inflows by making changes to the fund's non-financial attributes (e.g. fund name, investment style) that attract investors and meet current market trends. This mitigation effect is shown by previous literature highlighting that net fund flows

of SRI and ESG funds are less volatile than conventional funds (e.g. Benson and Humphrey, 2008; Bollen, 2007; Renneboog et al., 2011). The SFDR offers fund managers the opportunity to self-assign a label, which is based on an EU regulation and hence provides a certain level of credibility. The regulatory fundament of the SFDR sets the label apart from other forms of self-assigned labelling such as ESG-related fund names, prospectus descriptions, or SRI initiatives. Hence, we assume that FMPs anticipate the trustworthiness of an EU-initiated sustainability label, whose signalling effect may attract investor interest. In line with previous literature, we expect fund managers that lack financial returns or fund flows to exploit the current trend towards sustainable investments and use SFDR labels to boost their fund inflows.

Hypothesis 2: Managers of mutual funds with lower financial returns and/or fund flows are more prone to classify their funds as Art. 8 or Art. 9 to increase their fund flows.

3.3 Hypothesis 3: Greenwashing in Art. 8 funds

Based on hypothesis 2, we expect fund managers to use the SFDR label to attract investor interest. This is not problematic if these fund managers adhere to the expectations of pursuing greener investment strategies that comply with Art. 8 and Art. 9. However, due to the self-labelling character of the SFDR, fund managers can adopt such labels without performing accordingly with regard to ESG and hence might engage in greenwashing.

There is evidence that self-designated ESG funds are truly more socially responsible than standard funds. For example, Kempf and Osthoff (2008) find that SRI funds rank higher on ethical criteria than conventional funds. Białkowski and Starks (2016) explore whether self-defined SRI funds have higher exposure to ESG and find that the ESG ratings of the portfolio holdings are, on average, higher in SRI funds than in conventional funds. Similarly, Ghoul and Karoui (2021) examine whether changes in fund names to a sustainability-related appellation are used as a tool to boost fund flows without adapting the fund policy and investment strategy accordingly. They find that funds experience higher fund inflows after the name change while increasing their portfolio turnover and exposure to the MSCI KLD 400 social index. This indicates that the greening of fund names involves substantial portfolio rebalancing and is not used as a greenwashing tool. Brandon et al. (2021) analyse whether signatory members of the PRI, who publicly commit to incorporating ESG principles in the investment process, manage greener funds than non-signatory members. They find that the portfolios of PRI signatories outside the US have higher ESG scores than the portfolios of non-signatories and that their ESG scores increase after the signing of the PRI. Kaustia and Yu (2021) investigate greenwashing in self-designated ESG funds by analysing the portfolio holdings. More specifically, they

investigate the impact of an ESG repurposing event on the portfolio holdings of ESG-unfriendly companies. A repurposing event occurs when funds have updated their prospectuses to describe their investment policies as ESG-compliant. Kaustia and Yu (2021) find evidence that self-declared ESG funds reduce their exposure to ESG-unfriendly industries, such as Oil and Gas, in the first six months after the repurposing event. Lastly, Becker et al. (2021) find that the Morningstar sustainability rating increased in EU funds since the introduction of the SFDR compared to the control group of US funds that are not directly affected by the SFDR.

Opposing this evidence, prior studies have documented actions of fund managers that increase the attractiveness to investors and thus increase fund inflow, even if those changes did not impact the actual portfolio holdings. For example, Cooper et al. (2005) find that managers alter their funds' names to reflect current hot investment styles, despite not adjusting the actual investment strategy and portfolio holdings. Furthermore, Sensoy (2009) reveals that fund managers opportunistically self-select benchmark indexes in the fund prospectuses that do not adequately reflect the actual investment style. Consequently, these funds seem to perform superior to their benchmark and thus attract more investor interest and fund inflows. Similarly, Chen et al. (2021) find that managers of mutual bond funds misclassify their portfolio holdings, resulting in a less risky portfolio. These funds seem to outperform their mistakenly assigned peers with lower risk portfolios and consequently attract more fund flows.

Such misleading behaviour of fund managers is also observed within the context of ESG strategies and greenwashing. For example, Liang et al. (2021) suspect greenwashing of PRI signatories within the hedge fund industry. They show that PRI hedge funds with low ESG scores do not engage differently in ESG-related actions than comparable non-PRI signatories. There are no significant differences in ESG improvements in portfolio companies or voting activities on ESG-related proposals. These findings are complemented by Brandon et al. (2021) who focus on PRI signatories in the mutual fund industry. Despite identifying superior ESG performance of mutual funds outside the US, Brandon et al. (2021) find that US-based PRI investors have lower ESG scores than non-PRI investors and further do not improve them after signing the PRI. These results are consistent with Kim and Yoon (2021), who examine the fund manager behaviour post PRI signing. Despite already having inferior ESG performance before signing, PRI signatories do not significantly improve their portfolio-level ESG scores. Despite finding evidence that self-designated ESG funds decrease their holdings of ESG-unfriendly industries, Kaustia and Yu (2021) point out that circa 8.4% of the funds' holdings are still allocated to such unsustainable industries and that circa 1/5 of the funds increased their

exposure to them. Combined with a higher fund inflow attraction of ESG-labelled funds, their findings suggest potential greenwashing behaviour in not less than 20% of self-labelled green funds. They further support their argumentation by finding that ESG-labelled funds with inferior globe rating attract significantly more fund flows than non-ESG-labelled funds with higher globe rating. Building on this detected greenwashing motivation, Rannou et al. (2022) raise the question of the potential obsolescence of SRI labels after the introduction of the SFDR. This might be the case if the EU policy intervention is successfully categorizing funds of different ESG levels and thereby fighting against greenwashing. They use two complementary machine learning approaches to cluster French SRI funds based on their underlying ESG performance. They find that the group of funds labelled as Art. 8 is very heterogeneous compared to a homogenous set of Art. 9 funds. Hence, they conclude that the SFDR cannot adequately reflect different degrees of greenness. They further state that fund managers of self-designated Art. 8 funds exaggerate the ESG level and estimate that circa 20% of Art. 8 funds are unsuitably categorized as such, which raises greenwashing concerns. Their findings around the SFDR are supported by a Morningstar report from March 2022, which draws a first conclusion one year after the introduction of the SFDR (Morningstar, 2022). As expected, Art. 8 and Art. 9 funds have on average better ESG ratings than Art. 6 funds. However, Morningstar (2022) points out that only circa 55% of all Art. 8 funds have a globe rating 'above average' while circa 20% of Art. 8 funds score 'below average' or 'low'.

These current observations are in line with greenwashing concerns about the SFDR of regulators, FMPs, and investors. The flaws and uncertainties of the regulation raise the question of whether the policy intervention successfully meets its goal of minimising greenwashing in the financial sector or rather drives greenwashing behaviour by providing an opportunity to illegitimately label and market their funds as sustainable. Based on the hypotheses about fund inflow incentives (H1) and opportunistic fund manager behaviour (H2), we expect mutual fund managers in the EU to make use of the vague and equivocal SFDR guidelines and label their funds as Art. 8, despite not reflecting an investment strategy that one would describe as ESG-compliant or sustainable. We focus primarily on Art. 8 funds since the definition of dark green funds is much clearer and stricter than for light green funds, leaving less room for interpretation to fund managers. Hence, we see only very low greenwashing potential in Art. 9 funds, which is in line with media and related literature (e.g. Wilkes, 2021; Rannou et al., 2022).

Hypothesis 3: Fund managers classify their funds as light green despite not pursuing an ESG-friendly investment approach and hence, engage in greenwashing.

4 Data

4.1 Sample selection and variable definitions

Our empirical analysis is based on survivorship-bias-free data (in EUR) from Morningstar Direct for the period between March 2019 to February 2022, covering one year before and after the introduction of the SFDR on 10 March 2021. For simplicity, we account the full month of March 2021 to the post-SFDR period.

In general, the SFDR apply to all financial products that are domiciled and/or sold within the EU. Due to limited data on the specific regions of sale, we only consider mutual funds that are domiciled in the EU. Moreover and consistent with related literature, we focus on open-end equity funds to ensure a homogenous sample and completeness of data, especially considering the poor availability of globe ratings among non-equity funds (e.g. Ammann et al., 2019; Białkowski and Starks, 2016; Hartzmark and Sussman, 2019). Following previous literature, we exclude funds that are less than two years old and have less than EUR 5 million in assets under management (e.g. Chevalier and Ellison, 1997). Applying these exclusion criteria results in a data set of 47,795 fund share classes.

Morningstar Direct provides cross-sectional data on each fund's SFDR classification based on the prospectuses, labelling funds as Art. 6 ("not stated"), Art. 8, or Art. 9. Similarly to existing literature, we gather sustainability data measured by the Morningstar sustainability rating (e.g. Ammann et al., 2019; Hartzmark and Sussman, 2019). The sustainability rating is based on the ESG level of the funds' underlying securities and is determined relative to funds with a similar investment style, defined by the respective Morningstar Global Category. Within each category, funds are ranked on a scale from one (worst) to five (best) globes. As a second ESG label, we derive data on the Low Carbon Designation (LCD) label. This label is assigned to funds with low exposure to fossil fuel and low carbon risk scores and hence indicates the funds' carbon emissions. In addition, we gather several ESG-related variables at the portfolio level which are reported on a monthly or quarterly basis, such as the funds' involvement in controversial weapons or thermal coal. A full list with the definitions of these ESG variables is included in *Appendix A1*. Furthermore, we collect monthly data on relevant fund characteristics, such as the Morningstar star rating, raw returns, and net assets as well as point-in-time data of net expense ratio and turnover ratio, Morningstar Global Category, and the share classes' inception dates.

We transform the Morningstar Direct sample of share classes into data on fund level based on the Fund ID. We aggregate fund size (TNA) across share classes and compute the

fund's weighted average returns. Based on these aggregated numbers and following Sirri and Tufano (1998) we define the monthly net fund flow as the net change in assets under management beyond reinvested returns:

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

where $TNA_{i,t}$ and $TNA_{i,t+1}$ are the total net assets for fund i at the end of months t and $r_{i,t+1}$ and $r_{i,t}$ is the raw return for fund i in month t. This metric implicitly assumes that fund flows occur at the end of the month and measures the growth of assets under management over the AUM growth that would have occurred in absence of new fund inflows and under the assumption that dividends are reinvested (Renneboog et al., 2011; Amman et al., 2019). To limit the effect of outliers, we trim fund flows at the 1st and 99th percentile (Sirri and Tufano, 1998). Furthermore, we derive the funds' age as the time from inception to date and compute the volatility as the standard deviation over the past twelve months' returns. We use the median Morningstar globe and star ratings of all share classes of a fund in the untypical case of varying ratings. In total, our main sample consists of 3,193 individual funds.

4.2 Summary statistics

Appendix A2 provides descriptive statistics for fund-month observations in the sample from March 2020 to February 2022 for all funds (Panel A) and segregated information for Art. 6, Art. 8, and Art. 9 funds (Panel B, C, and D). The mean fund flow during the observation period is negative, potentially reflecting a shift away from the mutual fund industry over the past two years. Notably, Art. 9 funds have positive average fund flows during the observation period.

Table 1 provides summary statistics for key fund characteristics before the introduction of the SFDR (March 2020 to February 2021) in Panel A and after the launch (March 2021 to February 2022) in Panel B. We find that the average Art. 6, Art. 8, and Art. 9 funds are different to each other before and after the SFDR introduction. Art. 8 and Art. 9 funds received significantly more net fund flows in both periods and are larger in terms of net assets than Art. 6 funds. Art. 9 funds performed, on average, better than Art. 6 funds in the year before the SFDR, while there are no differences in average monthly returns in the year afterwards or for Art. 8 funds. However, Art. 8 and Art. 9 funds have higher average star ratings, indicating a superior performance relative to their direct peers. Light and dark green funds have significantly higher globe ratings, signalling superior ESG levels among funds with similar investment strategies. *Appendix A3* reports the correlations among these variables.

Table 1. Mean fund characteristics sorted by the SFDR label

This table shows the mean fund characteristics for the different SFDR categories. Panel A covers one year before the SFDR introduction, Panel B the twelve months afterwards (incl. March 2021). All variables are defined in *Section 3.1*. Columns (Art. 6-Art. 8), (Art. 6-Art. 9), and (Art. 8-Art. 9) provide mean differences and t-tests for mean characteristics of Art. 6, Art. 8, and Art. 9 funds. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	SFDR Label						
	Art. 6	Art. 8	Art. 9	(Art. 6-Art. 8)	(Art. 6-Art. 9)	(Art. 8-Art. 9)	Total
Panel A: Mean fund characteristics for all funds pre-SFDR (03/2020 - 02/2021)							
Monthly fund flow (% of TNA)	-0.47	-0.23	1.02	-0.24***	-1.49***	-1.25***	-0.27
Monthly return (%)	1.55	1.67	1.89	-0.12	-0.35**	-0.22	1.63
12-months volatility (%)	7.10	6.75	6.40	0.35***	0.70***	0.35***	6.89
Globe rating	2.95	3.41	3.82	-0.46***	-0.87***	-0.41***	3.22
Star rating	3.05	3.34	3.59	-0.29***	-0.53***	-0.25***	3.22
Total net assets (€m)	407.90	560.01	575.61	-152.10***	-167.70***	-15.60	490.23
Fund age (months)	162.31	161.23	138.47	1.09	23.85***	22.76***	160.36
Number of observations	17,411	17,786	2,250				37,447
Panel B: Mean fund characteristics for all funds post-SFDR (03/2021 - 02/2022)							
Monthly fund flow (% of TNA)	-0.28	-0.10	0.41	-0.18***	-0.69***	-0.51***	-0.15
Monthly return (%)	0.68	0.66	0.70	0.03	-0.02	-0.04	0.67
12-months volatility (%)	4.17	4.00	3.91	0.18***	0.26***	0.08***	4.08
Globe rating	2.92	3.42	3.89	-0.50***	-0.97***	-0.46***	3.22
Star rating	3.02	3.29	3.58	-0.27***	-0.56***	-0.29***	3.18
Total net assets (€m)	514.55	712.95	879.28	-198.40***	-364.73***	-166.33***	630.90
Fund age (months)	174.20	173.25	150.85	0.94	23.35***	22.40***	172.33
Number of observations	17,437	17,842	2,274				37,553

We further compare Art. 6, Art. 8, and Art. 9 funds regarding their ESG performance, measured by the Morningstar globe rating. Panel A in *Table 2* shows the number of funds segregated in the three articles along with the Morningstar globe rating. Circa 48% of the sample funds are classified as Art. 8, 6% as Art. 9 and the remaining 46% as Art. 6, which supports the criticism about the inflationary labelling of Art. 8 funds and the claim that light green funds become the new standard. Panel B shows the same split for total net assets and underlines the observation that Art. 8 and Art. 9 funds are, on average, larger than Art. 6 funds since they account for 62% of the total assets under management but only for 54% of the total number of funds.

Table 2. Number of funds and net assets per SFDR article and Morningstar globe

This table shows the number of funds (Panel A) classified as Art. 6, Art. 8, and Art. 9 along with the Morningstar globe rating. Panel B shows the same for total net assets (TNA) in EUR million. The percentages indicate the share of Art. 8 and Art. 9 funds per globe rating level.

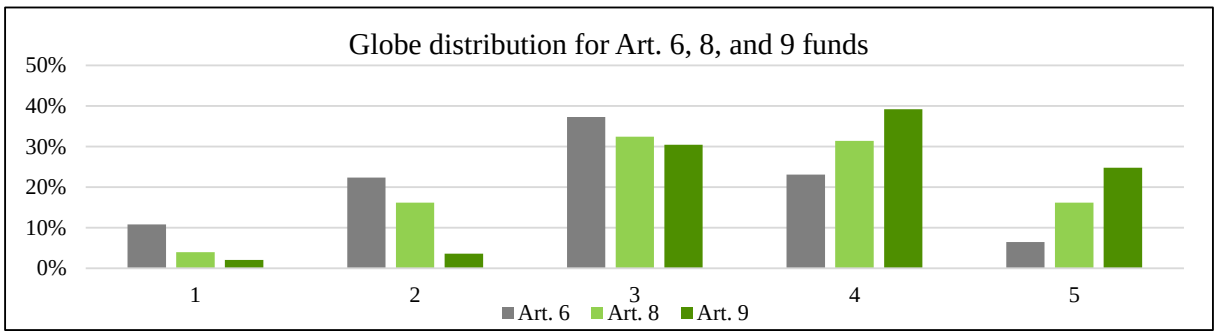
Panel A: Number of funds						
SFDR label	1	2	3	4	5	Total
Art. 6	160	331	552	342	96	1,481
Art. 8	60	245	492	476	245	1,518
Art. 9	4	7	59	76	48	194
Total	224	583	1,103	894	389	3,193
% Art. 8 per globe	26.8%	42.0%	44.6%	53.2%	63.0%	47.5%
% Art. 9 per globe	1.8%	1.2%	5.3%	8.5%	12.3%	6.1%

Panel B: Total net assets (m€)						
SFDR label	1	2	3	4	5	Total
Art. 6	58,708	136,893	275,737	161,466	46,834	679,638
Art. 8	32,008	105,529	315,795	346,550	165,803	965,685
Art. 9	1,550	2,257	45,867	43,772	38,910	132,356
Total	92,266	244,678	637,398	551,788	251,548	1,777,678
% Art. 8 per globe	34.7%	43.1%	49.5%	62.8%	65.9%	54.3%
% Art. 9 per globe	1.7%	0.9%	7.2%	7.9%	15.5%	7.4%

Figure 2 shows that Art. 8 funds are skewed towards a higher sustainability rating. However, circa 20% of these funds are still rated below average (i.e. they have one or two globes), which raises concerns about whether they are legitimately labelled as light green. These low-globe-rated Art. 8 funds are the ones that could be subject to greenwashing. Within the group of Art. 9 funds, only 6% are rated with one or two globes and 65% have four or five globes. Hence, we do not have major greenwashing concerns regarding dark green funds.

Figure 2. Distribution of Art. 6, Art. 8, and Art. 9 funds across the Morningstar globes

This figure shows the distribution of the three SFDR groups across the Morningstar globe rating. The percentage (y-axis) indicates the fraction of Art. 6 (grey), Art. 8 (light green), and Art. 9 (dark green) funds that have the respective globe rating from one to five globes (x-axis).



Furthermore, Art. 6, Art. 8, and Art. 9 funds differ on portfolio holding level with regard to the ESG-related variables as defined in *Appendix A1*. *Figure 3* shows the percentage of funds per article group (y-axis) that is invested in the respective ESG category with a certain fraction of their portfolios (x-axis). We identify a tendency that Art. 8 and Art. 9 funds are less invested in companies associated with controversial weapons, tobacco, and severe controversies than Art. 6 funds. Furthermore, we find that Art. 9 funds tend to dedicate a larger portion of their portfolios to carbon solutions, while Art. 6 and Art. 8 funds do not seem to differ significantly. Surprisingly, most funds are investing more than 10% of their portfolios in companies engaging in animal testing, especially the ones labelled as Art. 9. Despite a slight indication that green-labelled funds are less exposed to fossil fuels, thermal coal, and palm oil, we cannot identify as clear trends as for the other categories.

Figure 3. Portfolio holdings of ESG-friendly and -unfriendly companies

This figure shows graphical evidence as of March 2021 for eight ESG variables on the portfolio level for Art. 6 (grey), Art. 8 (light green), and Art. 9 (dark green) funds. The charts indicate the percentage of portfolio involvement per article group for five distinct levels: 0%, between 0% and 1%, between 1% and 5%, between 5% and 10% and above 10%.

5 Investor responses to SFDR labelling (Hypothesis 1)

With hypothesis 1 (H1), we evaluate the effect of the SFDR introduction on the fund flows of EU-domiciled mutual funds. Because of the SFDR's labelling character, we anticipate similar reactions as for comparable label introductions and self-labelling events in the past. Hence, we assess whether the labelling of funds as Art. 8 or Art. 9 results in superior fund flows.

5.1 Methodology

Following related literature, we create subsamples using propensity score matching with the nearest neighbour method (e.g. Cooper et al., 2005; Ammann et al., 2019; Hartzmark and Sussman, 2019). Propensity score matching offers the opportunity to construct two groups of funds with remarkably similar characteristics, which allows for direct comparison between the control and treatment groups. It is a method predominantly used in nonexperimental settings to evaluate a treatment effect and to minimise potential biases in regression analyses. Furthermore, it increases the meaningfulness of univariate analyses by controlling for characteristics already in the matching procedure. This is of special interest in the case of a non-linear relationship between fund flows and control characteristics (Ammann et al., 2019). For example, past literature has indicated a convex relationship between fund returns and fund flows (Chevalier and Ellison, 1997; Sirri and Tufano, 1998).

We conduct nearest neighbour matching for Art. 8 and Art. 9 funds as treatment groups with Art. 6 as the control group. To estimate propensity scores, we run logit regressions on funds from both the control and treatment groups. Thereby, we regress the SFDR dummy variable (1 for Art. 8 or Art. 9 and 0 for Art. 6 funds) on relevant fund characteristics: 12-month returns before the SFDR introduction, 12-month return volatility, 1-month lagged log of fund net assets, 1-month lagged star and globe ratings and the fund's age in months. The regression yields propensity scores between 0 and 1, which indicate the likelihood of the fund to be allocated to one of the groups (e.g. the closer to one, the higher is the probability to be labelled as Art. 8 or Art. 9). Each treated fund is matched with the fund of the control group with the closest propensity score, i.e. the nearest neighbour. In line with related literature (e.g. Białkowski and Starks, 2016; Ammann et al., 2019), we conduct direct 1:1 pair matching, i.e. each Art. 8 or Art. 9 fund is matched with one Art. 6 fund. We do not accept multi-matching, i.e. multiple Art. 8 or Art. 9 funds cannot be matched with the same Art. 6 fund, and vice versa. By Ammann et al. (2019), we only allow matched pairs with a propensity score difference of a maximum of 0.025 to ensure a high matching quality. Pairs with a higher deviation are dropped.

Appendix B1 reports the fund characteristics of the subsample of matched treatment and control groups. For Art. 8 funds, we obtain 1,091 matched funds per group or a total sample of 2,182 funds. This implies that circa 1/3 of Art. 6 and Art. 8 funds are dropped in response to the matching procedure. We retain 175 Art. 9 funds that are matched with the same number of Art. 6 funds. Notably, we do not find any significant differences in the characteristics at the time of the matching, which implies a high matching quality.

First, we evaluate the labelling effect of the SFDR in a univariate setting to compare the matched groups without assuming a linear relationship (e.g. Ammann et al., 2019; Kaustia and Yu, 2021). The variable of interest is relative monthly fund flows as defined by Sirri and Tufano (1998). We divide the observation period into pre and post SFDR, covering the 12 months prior to and the 12 months post the SFDR adoption, respectively. To capture the full announcement effect in March 2021, we include the entire month in the post-SFDR period. Using two-sided t-tests, we test for differences in the means of monthly fund flows between the categories for different periods. We compare the groups for twelve, six, and three months pre and post the SFDR introduction. By our hypothesis, we expect no significant mean differences in fund flows between Art. 8 or Art. 9 funds and Art. 6 funds before the SFDR, while we expect that Art. 8 and Art. 9 funds realize significantly higher net flows after the SFDR introduction.

In addition to univariate analyses, we conduct a difference-in-difference regression on monthly flows to control for various fund characteristics that previous literature identified as influential factors on mutual fund flows. We run the following regression on fund *i*'s flows in month *t* over a period from March 2020 to February 2022:

$$\begin{aligned} Flows_{i,t} = {} & \beta_0 + \beta_1 * SFDR_i \times Post_i + \beta_2 * SFDR_i + \beta_3 * Post_t \\ & + \beta_4 * \log(TNA_{i,t}) + \beta_5 * Return_{i,t} + \beta_6 * Volatility_{i,t} \\ & + \beta_7 * Age_{i,t} + \beta_8 * Globe_{i,t} + \beta_9 * Star_{i,t} + \epsilon_{i,t} \end{aligned} \quad (2)$$

The dependent variable $Flows_{i,t}$ measures the net flows for fund *i* in month *t*. $SFDR_i$ is a dummy variable that equals 1 for funds classified as Art. 8 or Art. 9 for the respective subsample, and 0 otherwise. $Post_i$ is a dummy indicating the introduction date of the SFDR in March 2021, which equals 1 for months after the effective date and 0 otherwise. The interaction term $SFDR_i \times Post_i$ is the main explanatory variable. To verify our hypothesis, we expect a positive and significant coefficient for the interaction term. We further control for several fund-level variables that may influence investor demand, as identified by previous literature (e.g.

Ammann et al., 2019; Hartzmark and Sussman, 2019; Ceccarelli et al., 2021). Past research has shown that prior financial performance is the main driver for mutual fund flows (e.g. Chevalier and Ellison, 1997; Sirri and Tufano, 1998). Hence, we include monthly returns over the past twelve months as well as the Morningstar star rating, an indicator of the fund's performance relative to its peers. To control for current levels of sustainability we include the Morningstar globe rating. In line with related literature, we control for time-varying fund-level variables such as return volatility, total net assets (log), fund age as well as for style fixed effects based on the Morningstar global categories to account for flows between funds with different investment styles. Time fixed effects are partially captured by the $Post_i$ dummy.

5.2 Empirical results

Table 3 displays the results of t-tests on mean differences in fund flows between Art. 8 and Art. 6 as well as Art. 9 and Art. 6 over the twelve months prior and the twelve months after the introduction of the SFDR in March 2021. We do not find any significant difference in fund flows when comparing Art. 8 and Art. 6 funds in any of the three periods before the launch of the SFDR, covering three months (December 2020 to February 2021), six months (September 2020 to February 2021), and twelve months (March 2020 to February 2021). Hence, funds subsequently labelled as Art. 8 do not seem to experience significantly higher or lower net fund flows before the labelling. However, we find indications for significantly higher fund flows in Art. 8 funds during the time after March 2021. Over the twelve months after the SFDR launch, Art. 8 funds received circa 8.7 percentage points more fund flows than their Art. 6 peers. We do not observe the same effect for Art. 9 funds. The labelling does not significantly impact the net flows into Art. 9 funds compared to Art. 6 funds during the different periods after the SFDR introduction. However, the results indicate that Art. 9 funds received significantly higher fund flows than Art. 6 funds before the labelling. To conclude, these findings suggest that the SFDR introduction has a positive impact on net fund flows into Art. 8 funds but not on flows into Art. 9 funds.

Table 3. Univariate analysis on fund flow differences between Art. 8 or Art. 9 and Art. 6

This table compares the fund flows of Art. 6 funds with the ones of Art. 8 and Art. 9 funds before and after the introduction of the SFDR label using the samples based on nearest neighbour propensity score matching. The table reports the differences in mean fund flows, calculated over different periods: 12 months (-12 to 0), 6 months (-6 to 0), and 3 months (-3 to 0) before the SFDR introduction in March 2021. We show the same intervals for the post period (0 to 3, 0 to 6, and 0 to 12). T-statistics are reported in parenthesis. *, **, and ***, depict statistical significance at the 10%, 5%, and 1% level, respectively.

		Months					
		Pre-SFDR			Post-SFDR		
	N	-12 to 0	-6 to 0	-3 to 0	0 to 3	0 to 6	0 to 12
Art. 8 vs. Art. 6	2,182	-0.25	0.36	0.02	2.57	3.49	8.74**
		(0.12)	(-0.29)	(-0.02)	(-1.43)	(-1.64)	(-2.42)
Art. 9 vs. Art. 6	350	11.22*	5.61	3.38	1.71	2.96	7.53
		(-1.95)	(-1.30)	(-0.96)	(-0.76)	(-0.99)	(-1.75)

Table 4 reports the results of the panel regressions for Art. 8 funds (A) and Art. 9 funds (B). First, it is notable that the dummy variable for Art. 8 funds is insignificant, indicating that light green funds do not attract significantly more fund flows before the SFDR introduction. The interaction term $SFDR \times Post$ measures the labelling effect of Art. 8 and Art. 9 on monthly net fund flows and thereby captures the investors' reaction to the announcement of the SFDR labels in March 2021. Supporting H1 as well as the results in the univariate analysis for Art. 8 funds, we find that the net fund flows for Art. 8 funds are on average 0.16 percentage points per month higher than for Art. 6 funds in the post-period. We further note that the coefficients of the control variables act as expected. Both performance measures, the returns as well as the Morningstar star rating have a significant positive impact on the monthly net fund flows, i.e. superior performance attracts higher fund flows.

The interpretation of the regression results is less intuitive for Art. 9 funds. The interaction term is negative and significant, indicating that funds labelled as dark green do not receive more fund flows after the introduction of the SFDR in March 2021, but rather attract significantly less investor money. This seems counter-intuitive and rejects H1 for Art. 9 funds. However, this observation can be explained by interpreting these findings in a broader context. The positive and significant coefficient for SFDR (Art. 9) indicates that Art. 9 funds received higher fund flows than their Art. 6 peers before the SFDR introduction. This is in line with the results in the univariate analysis. We further identify that the fund names of 124 of the 175 (71%) matched dark green funds are related to sustainability.[2] Hence, we argue that these funds had already been marketed as sustainable before the SFDR launch. The significantly positive

[2] These fund names contain expressions, such as 'Sustainability', 'ESG', 'SRI', 'Impact', 'Green', 'Social', 'Carbon', 'Clean Energy', 'Ethical', 'Climate', 'Global Action'.

SFDR variable indicates that these ESG-labelled funds received higher fund inflows without the Art. 9 label. Since investors had already been aware of the labelling and marketing as a sustainable fund, the SFDR labelling itself did not significantly change the available information to investors. We interpret the significantly negative interaction term not as a direct consequence of the labelling as dark green but rather as a side- and spill-over effect from the general SFDR introduction, primarily from the labelling of other funds as light green. The launch of the SFDR and the consequent marketing of many funds as Art. 8 and Art. 9 increased the overall universe of green-labelled investment funds and hence resulted in a larger number of alternatives for investors dedicating capital towards sustainable investments. The increased competition can result in a cannibalization effect for existing green funds and a re-allocation of investment capital away from specialised and thematic Art. 9 funds towards more generalized Art. 8 funds. From *Table 1* we retrieve that the SFDR labelling results, on average, in smaller inflows to Art. 9 funds and not in outflows. However, this observation raises the question about the effectiveness of the policy intervention which sought to promote sustainable investments but rather leads a diversion of capital streams towards less sustainable alternatives. This question will be further addressed in the discussion section in the context of hypothesis 3.

Table 4. Difference-in-difference regression results on fund flows

This table shows the results for the difference-in-difference regressions on monthly net fund flows using the matched samples for Art. 8 (A) and Art. 9 (B). Columns (1) and (3) report results of simple regressions of fund flow on the respective SFDR article and columns (2) and (4) include various relevant fund characteristics. $SFDR$ is a dummy which indicates the label for Art. 8 and Art. 9 funds in the respective regression. $Post$ is a dummy which marks the effective date of the SFDR introduction and splits the observation period into pre and post. The interaction term $SFDR\ x\ Post$ highlights the impact of the label introduction on monthly fund flows. We control for style fixed effects as indicated by the Morningstar Category. Standard errors are double clustered on month and fund-level and t-statistics are shown in parentheses. *, **, and ***, depict statistical significance at the 10%, 5%, and 1% level, respectively.

	Monthly net fund flow (%)			
	(A) Article 8		(B) Article 9	
	(1) Simple	(2) Controls	(3) Simple	(4) Controls
SFDR x Post	0.20**	0.16*	-0.42	-0.50**
	(2.34)	(1.90)	(-1.68)	(-2.20)
SFDR (Art. 8 or Art. 9)	-0.05	-0.06	0.73***	0.62***
	(-0.59)	(-0.774)	(3.44)	(3.17)
Post	-0.02	-0.82***	-0.16	-1.27***
	(-0.17)	(-3.57)	(-0.73)	(-3.47)
TNA (log)		0.03		0.11*
		(1.13)		(1.95)
Return LTM (%)		0.03***		0.03***
		(6.67)		(3.04)
12-months volatility (%)		0.01		-0.19**
		(0.22)		(-2.29)
Fund age (month)		0.00		0.00*
		(-0.54)		(-2.04)
Morningstar globe rating				
2 Globes		0.00		-0.62
		(0.03)		(-1.32)
3 Globes		0.01		-0.30
		(0.04)		(-0.71)
4 Globes		0.14		-0.25
		(0.89)		(-0.60)
5 Globes		0.26		-0.34
		(1.40)		(-0.79)
Morningstar star rating				
2 Stars		0.12		0.61
		(1.01)		(1.64)
3 Stars		0.25*		0.60
		(1.80)		(1.54)
4 Stars		0.49***		0.89**
		(3.39)		(2.19)
5 Stars		1.37***		1.52***
		(6.22)		(3.42)
Style fixed effects	YES	YES	YES	YES
Clustered robust standard errors	YES	YES	YES	YES
Number of observations	49,071	49,071	7,844	7,844
R-Squared	0.02	0.04	0.05	0.08

We test our results for robustness by altering several factors. First, we control for alternative settings in the matching procedure (*Appendix B2*), by changing the accepted distance between the scores of matched pairs to 0.015 and 0.04 (e.g. Ammann et al., 2019). We note that the significant labelling effect for Art. 8 funds does not hold for a distance of 0.015 after controlling for fund characteristics. Second, we evaluate the robustness of our regression results by changing the control variables (*Appendix B3*). For example, we control for one-month returns instead of LTM returns (e.g. Hartzmark and Sussman, 2019) and include monthly changes in globe and star rating instead of absolute ratings (e.g. Ceccarelli et al., 2021).

6 Determinants of SFDR classification (Hypothesis 2)

In the previous section, we have shown that Art. 8 funds may attract more fund flows after being declared as such. In hypothesis 2 (H2), we examine whether this effect may be anticipated by fund managers. They may view labelling as a tool to improve the attractiveness of their funds, thereby generating more investor demand. Hence, fund managers might be inclined to use green labels to compensate for lacking fund flows. Moreover, past fund returns are one of the main drivers for fund flows and hence, management fees (Chevalier and Ellison, 1997). Thus, we hypothesise that inferior returns and/or lacking inflows are significantly lower for funds that are subsequently labelled as Art. 8 or Art. 9.

6.1 Methodology

As for H1, we construct a treatment group with a matching control group using nearest neighbour propensity score matching. The settings and the procedure are the same as described in *Section 5.1*. The only difference is that the SFDR dummy variable is regressed on 12-month fund flows instead of returns. As in *5.1*, we use 1:1 pair matching, do not allow multi-matching, and accept pairs with a propensity score difference of a maximum of 0.025. In total, 995 Art. 8 funds are matched with the same number of Art. 6 funds, while we retain 123 Art. 9 and Art. 6 funds in the second sample.

We evaluate our hypothesis by examining the determinants and drivers for funds to be classified as either Art. 8 or Art. 9. As outlined in *Section 3.2*, we suspect financial underperformance and lacking fund inflows to be the main drivers for the labelling decision. However, we can derive from the summary statistics in *Table 1* that fund flows are, on average, significantly higher for Art. 8 and Art. 9 funds before SFDR introduction based on t-tests on mean differences. Hence, we focus the analysis for H2 on the potential impact of past fund returns on the classification decision.

Therefore, we use logistic regressions with an SFDR dummy as the dependent variable. In the first equation, the SFDR dummy variable equals 1 if a fund is labelled as Art. 8 (and 0 if labelled as Art. 6) and is regressed on the fund return variable as well as on control variables. In the second equation, the SFDR dummy compares Art. 9 funds against Art. 6 funds, while everything else remains equal. Following previous literature, we control for fund flows (LTM), 12-month return volatility, fund age and TNA (log). In addition, we include the Morningstar star and globe ratings as factor variables. Based on these characteristics, the model estimates a value between 0 and 1, which reflects the likelihood of a fund to be classified as Art. 8 or Art. 9, respectively.

6.2 Empirical results

Table 5 reports the results of the cross-sectional logistic regressions for Art. 8 (A) and Art. 9 (B) funds. For Art. 8 funds, the LTM return coefficient is negative and significant, which indicates that funds with lower preceding fund returns are more likely to be classified as Art. 8. This supports our hypothesis that the SFDR may be used as a tool to mitigate a potential decline in investor demand due to lower fund returns.

The results are different for Art. 9 funds. We find that past fund returns (LTM) are positively related to the labelling decision, i.e. funds with higher fund returns are more likely to be classified as Art. 9. Hence, our hypothesis does not hold for Art. 9 funds. As mentioned before, the labelling of Art. 9 funds is different to the labelling of Art. 8 funds in the sense that these funds have been marketed as sustainable and/or thematic funds before the introduction of the SFDR. Furthermore, Art. 9 funds have significantly higher disclosure requirements and stricter conditions since these funds must pursue a sustainable investment strategy. Hence, we identify a higher cost for self-assigning a dark green label and expect less opportunism among managers of Art. 9 funds. Further, we raise concerns about the causality in the relationship of fund returns and the classification as Art. 9. The regression results indicate that funds labelled as Art. 9 have experienced superior returns in the period before the labelling, potentially because of general trends towards green investments and sustainable funds. ESG funds have generally experienced a dramatic increase in demand and significantly outperformed traditional funds in 2020 (e.g. Morgan Stanley Institute for Sustainable Investing, 2021). This is also reflected in our sample since Art. 9 funds had higher average returns than Art. 6 and Art. 8 funds in the period before the SFDR (*Table 1)*.

Table 5. Cross-sectional logistic regression results on the SFDR decision

This table reports the results for cross-sectional logistic regressions to examine the characteristics of funds labelled as Art. 8 and Art. 9 in columns (A) and (B), respectively. We assign SFDR labelled funds a dummy of 1 and 0 otherwise. In columns (1) and (3), the dummy is regressed on returns (LMT) and in columns (2) and (4) on control variables: returns, return volatility, fund flows, fund size (log), fund age, as well as Morningstar star and globe ratings. We control for style fixed effects as indicated by the Morningstar Category. Standard errors are clustered on the fund level and t-statistics are shown in parentheses. *, **, and ***, depict statistical significance at the 10%, 5%, and 1% level, respectively.

	SFDR Classification			
	(A) Article 8		(B) Article 9	
	(1) Simple	(2) Controls	(3) Simple	(4) Controls
Return LTM (%)	-0.01*	-0.01**	0.02	0.04**
	(-1.73)	(-2.17)	(1.25)	(2.07)
Net flows LTM (% of TNA)		0.00		-0.00
		(0.69)		(-0.51)
TNA (log)		0.01		-0.03
		(0.22)		(-0.20)
12-months volatility (%)		0.03		-0.41
		(0.42)		(-1.63)
Fund age (month)		0.00		0.00
		(0.28)		(0.19)
Morningstar globe rating				
2 Globes		-0.21		-3.01**
		(-0.81)		(-2.01)
3 Globes		-0.36		-0.82
		(-1.42)		(-0.73)
4 Globes		-0.35		-0.90
		(-1.32)		(-0.82)
5 Globes		0.06		-0.48
		(0.21)		(-0.42)
Morningstar star rating				
2 Stars		0.07		-0.58
		(0.32)		(-0.42)
3 Stars		0.21		-0.41
		(0.91)		(-0.31)
4 Stars		0.15		-0.70
		(0.59)		(-0.53)
5 Stars		0.32		-1.31
		(1.05)		(-0.93)
Style fixed effects	YES	YES	YES	YES
Clustered robust standard errors	YES	YES	YES	YES
Number of observations	1,943	1,943	235	235
R-Squared	0.01	0.01	0.03	0.09

To test the robustness of the matching method, we change the accepted distance between the scores of matched pairs to 0.015 and 0.04 and do not find significant differences (*Appendix B4*). Furthermore, we evaluate whether the length of the period before the SFDR launch affects the results (*Appendix B5*). Instead of returns and flows over the last twelve months, we run the regressions over six, three, and one months and obtain the same results.

7 ESG responses of mutual fund managers (Hypothesis 3)

So far, we have shown that fund managers have an incentive to classify their funds as light green to attract investor interest (H1) and that they might use this opportunity to mitigate lacking fund returns (H2). This manager action, combined with the vague SFDR definitions raises greenwashing concerns among investors and policy makers. Thus, we examine in hypothesis 3 (H3) whether fund managers use this situation to illegitimately market their funds as Art. 8 or Art. 9. Further, we analyse whether these funds improve their sustainability performance after the SFDR introduction, in terms of fund-level sustainability measures and portfolio holdings.

7.1 Methodology

To evaluate the greenwashing hypothesis, we primarily focus on Art. 8 funds since Art. 9 funds mainly cover thematic investment topics and seem to be in line with objective ESG ratings: only 6% of Art. 9 funds have one or two Morningstar globes. This is consistent with Rannou et al. (2022), who describe Art. 9 funds as a homogenous set of thematic funds with low greenwashing potential. Hence, we investigate potential greenwashing behaviour in Art. 8 funds and view Art. 9 funds as a sanity check.

As for both previous hypotheses, we conduct nearest neighbour propensity score matching to create two homogenous samples of matched treatment (Art. 8 or Art. 9) and control group (Art. 6). Since we investigate differences in the globe rating, we do not include the sustainability rating in the logistic regression to compute the propensity scores. All other control variables are the same as before, including fund returns (LTM) and fund flows (LTM). As in *5.1*, we use 1:1 pair matching, do not allow multi-matching, and accept pairs with a propensity score difference of a maximum of 0.025. The two samples contain 1,079 Art. 8 and 184 Art. 9 funds that are matched with the same number of Art. 6 funds.

The first part of the analysis is based on portfolio-level ESG labels, measured by the Morningstar globe rating. As described in *Section 4.2,* Art. 8 and Art. 9 funds have, on average, higher Morningstar globe ratings both before and after the SFDR introduction. Hence, light, and dark green funds are, on average, objectively more sustainable than conventional funds. Further, we are interested in the fund manager reaction to the labelling, i.e. whether or how the labelling affects the ESG level of their funds. Therefore, we use the following regression model:

$$Globe_{i,t} = \beta_0 + \beta_1 * SFDR_i \times Post_i + \beta_2 * SFDR_i + \beta_3 * Post_i + Controls_{i,t} + \epsilon_{i,t} \quad (3)$$

$Globe_{i,t}$ is the Morningstar globe rating as a continuous variable. $SFDR_i$ is a dummy variable that equals 1 for funds classified as Art. 8 or Art. 9, and 0 otherwise. $Post_i$ is a dummy indicating the introduction date of the SFDR in March 2021, which equals 1 for months after the effective date and 0 otherwise. The interaction term $SFDR_i \times Post_i$ is the main explanatory variable. We further control for returns (LTM), 12-month return volatility, relative net fund flows (LTM), total net assets (log), fund age, the Morningstar star rating, as well as for style-fixed effects.

In addition to fund-level analyses, we examine the ESG performance of equity funds on a portfolio level. Therefore, we gather data on the funds' exposure to ESG-unfriendly businesses. This exposure is proxied by several data points in Morningstar Direct, which measure the funds' product involvement in controversial weapons, tobacco, animal testing, fossil fuel, thermal coal, and palm oil, as well as the percentage of AUM in severe controversies. We further include the funds' product involvement in carbon solutions as an ESG-friendly category, which serves as a proxy for engagement in sustainable investments. Data is provided monthly for most categories except for product involvement in fossil fuel and carbon solutions, which are reported quarterly. We examine whether Art. 8 and Art. 9 funds have a higher or lower exposure to ESG friendly and unfriendly companies than traditional funds and whether fund managers of such funds change their exposure after the SFDR introduction. If fund managers opportunistically exploit the SFDR labelling, we expect labelled and unlabelled funds not to differ significantly with regard to these metrics and that Art. 8 and Art. 9 funds have not improved after the labelling. To capture both desired aspects simultaneously we run the following regression model:

$$ProductInvolvement_{i,t} = \beta_0 + \beta_1 * SFDR_i \times Post_i + \beta_2 * SFDR_i + \beta_3 * Post_i + Controls_{i,t} + \epsilon_{i,t} \quad (4)$$

$ProductInvolvement_{i,t}$ measures the fund's involvement in one of the ESG-(un)friendly categories and varies depending on the definition of the respective metric as defined in *Appendix A1*. $SFDR_i$ is a dummy variable that equals 1 for funds classified as Art. 8 or Art. 9, and 0 otherwise. $Post_i$ is a dummy indicating the introduction date of the SFDR in March 2021, which equals 1 for months after the effective date and 0 otherwise. The interaction term $SFDR_i \times Post_i$ is the main explanatory variable. We further control for returns (LTM), 12-month return volatility, relative net fund flows (LTM), total net assets (log), fund age, the Morningstar star rating, as well as for style-fixed effects.

7.2 Empirical results and graphical evidence

Table 6 reports the results for the analysis conducted at the fund level and shows the regression results for Art. 8 (A) and Art. 9 (B) funds. First, we note that both light green and dark green funds had significantly higher globe ratings before March 2021 as indicated by the coefficients of the SFDR dummy variable statistics. This indicates that labelled funds were, on average, higher-rated in terms of sustainability rating than their corresponding Art. 6 twins at the moment of the SFDR introduction. Furthermore, we find that Art. 8 funds, on average, significantly improved in their Morningstar sustainability rating after the SFDR launch. The average globe rating for Art. 8 funds increased by 0.1 points. These observations let us assume that Art. 8 funds are, on average, greener than their matched Art. 6 funds and that they increased their engagement in ESG-friendly activities since March 2021 or that their underlying investments improved in terms of ESG performance. For Art. 9 funds, we do not find a significant improvement in globe ratings after controlling for fund characteristics. This could be because Art. 9 funds already have a high level of sustainability and may not have a need to improve their ESG performance to comply with the requirements of Art. 9.

Overall, these observations do not support the hypothesis of greenwashing behaviour in Art. 8 (and Art. 9) funds and support findings in related literature, which either detect higher sustainability ratings in self-dedicated ESG funds or ESG improvements after the labelling (e.g. Kempf and Osthoff, 2008; Białkowski and Starks; 2016; Becker et al., 2021).

Table 6. Difference-in-difference regression results on the Morningstar globe rating

This table shows the results for the difference-in-difference regressions of the Morningstar globe rating on the SFDR dummy for both Art. 8 (A) and Art. 9 (B). Columns (1) and (3) report the results for simple regressions and columns (2) and (4) control for several fund-level variables (monthly fund returns, volatility, relative net fund flows, total net assets (log), fund age, Morningstar star ratings) as well as for style fixed effects. The globe rating is treated as a continuous variable. Standard errors are double clustered on month and fund level. T-statistics are shown in parentheses. *, **, and ***, depict statistical significance at the 10%, 5%, and 1% level, respectively.

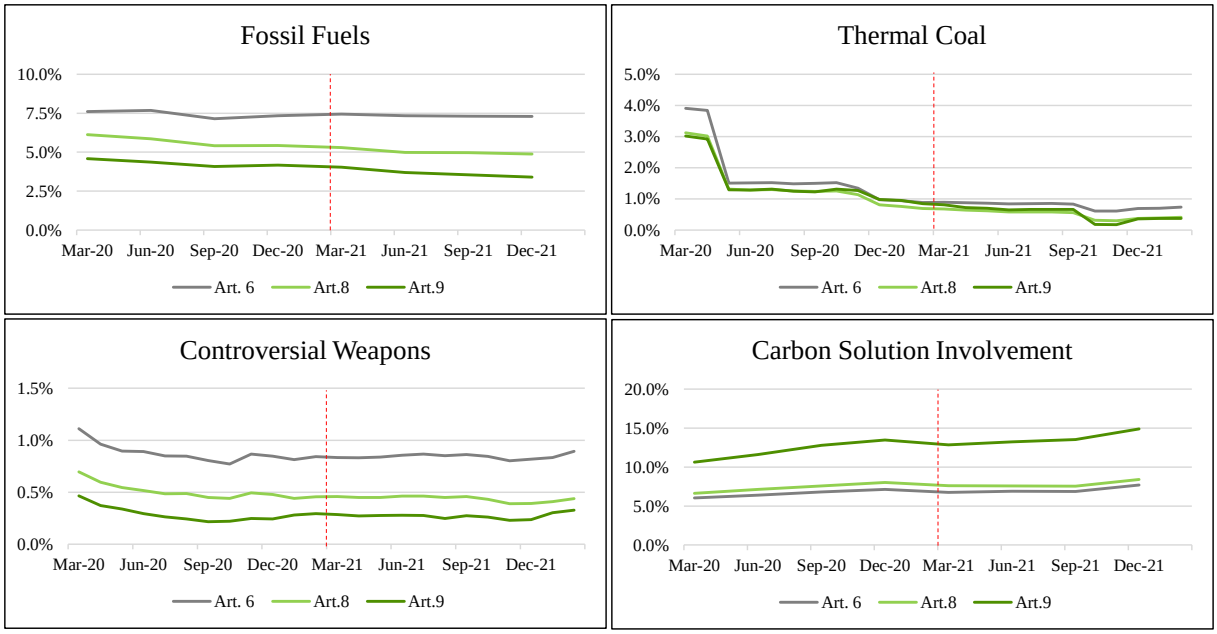
	Morningstar Globe Rating			
	(A) Article 8		(B) Article 9	
	(1) Simple	(2) Controls	(3) Simple	(4) Controls
SFDR x Post	0.10***	0.10***	0.08*	0.08
	(6.17)	(5.17)	(1.79)	(1.57)
SFDR (Art. 8 or Art. 9)	0.33***	0.32***	0.61***	0.64***
	(8.94)	(9.11)	(6.20)	(6.68)
Post	-0.04***	-0.21***	-0.03	-0.09
	(-3.50)	(-4.13)	(-0.81)	(-0.98)
Return LTM (%)		0.00***		-0.01**
		(-3.26)		(-2.70)
Net flows LTM (% of TNA)		-0.02		-0.11
		(-0.62)		(-1.45)
TNA (log)		-0.04***		0.04
		(-2.96)		(1.06)
12-months volatility (%)		-0.11***		-0.09**
		(-8.10)		(-2.50)
Fund age (month)		0.00***		0.00
		(3.00)		(0.37)
Morningstar star rating				
2 Stars		0.19**		0.74***
		(2.64)		(3.08)
3 Stars		0.44***		0.90***
		(5.95)		(3.70)
4 Stars		0.63***		0.93***
		(7.95)		(3.91)
5 Stars		0.87***		1.11***
		(9.77)		(4.37)
Style fixed effects	YES	YES	YES	YES
Clustered robust standard errors	YES	YES	YES	YES
Number of observations	48,521	48,521	6,271	6,271
R-Squared	0.26	0.32	0.25	0.29

For the portfolio level analysis, we split the eight dependent variables into two groups, covering PAI-related and non-PAI-related metrics. The PAI portfolio-level metrics comprise the fund's product involvement in fossil fuel, thermal coal, controversial weapons, and carbon solutions. First, we provide graphical evidence that compares the average exposure of Art. 6, Art. 8, and Art. 9 funds to ESG-(un)friendly companies over the two years around the SFDR introduction (*Figure 4*). We see that Art. 8 and Art. 9 funds are less exposed to fossil fuels, thermal coal, and controversial weapons than Art. 6 funds and more engaged in carbon solutions

involvement. Moreover, we identify a stronger trend away from fossil fuels for light and dark green funds. Interestingly, Art. 6 and Art. 8 funds move in accordance with carbon solutions involvement, while Art. 9 funds seem to significantly increase their portfolio holdings.

Figure 4. Portfolio exposure to PAI-related portfolio characteristics

This figure shows the development of the funds' exposure to PAI-related portfolio variables over the observation period per article group. Fossil Fuels and Carbon Solution Involvement are reported quarterly, and Controversial Weapons and Thermal Coal are reported monthly. The red dashed vertical line marks the SFDR introduction in March 2021.



The regression results for PAI-related portfolio variables are reported in *Table 7*. Except for controversial weapons, Art. 8 funds do not reveal a significantly superior ESG performance to Art. 6 funds on portfolio level before the SFDR. Funds labelled as Art. 8 were neither significantly less invested in companies that engage in environmentally unfriendly businesses (i.e. fossil fuel or thermal coal), nor did they dedicate a significantly larger fraction of their portfolio towards companies supporting carbon solutions. After adopting the label, however, Art. 8 funds seem to become more environmentally conscious as they significantly decrease their exposure to fossil fuel and thermal coal compared to Art. 6 funds. Despite having a significantly lower exposure to controversial weapons before the SFDR, Art. 8 funds further reduce their investments in businesses involved in the production and distribution of weapons. The involvement in carbon solutions is not affected by the SFDR introduction. We reason that investments in carbon solutions can be seen as sustainable investments. Thus, we suspect that funds investing in carbon solutions could be classified as Art. 9 rather than as Art. 8.

This observation is supported by the regression results for Art. 9 funds. Dark green funds are both significantly more involved in carbon solutions before March 2021 and even increased

their exposure after the labelling as Art. 9, on average. Moreover, these funds are significantly less exposed to fossil fuels, thermal coal, and controversial weapons than Art. 6 funds and even reduced their investments in fossil fuels post SFDR introduction. This supports our presumption that Art. 9 funds are, on average, likely to be adequately labelled as such. Art. 9 funds can be compared to the ESG-repurposed funds in the sample used by Kaustia and Yu (2021) who find similar results. Funds that change their names towards a sustainability-related appellation tend to have lower exposure to oil & gas related industries and higher exposure to ESG-friendly industries such as "Solar" or "Waste Management" compared to the control group. These differences become more evident after the name changing process, which corresponds to our findings for the involvement of Art. 9 funds in fossil fuels and carbon solutions.

Table 7. Regression results on PAI-related portfolio-level metrics

This table shows the linear regression results for PAI-related product involvement metrics, which are regressed on the SFDR dummy variable. The four PAI categories capture the fund's involvement in (A) fossil fuel, (B) thermal coal, (C) controversial weapons, and (D) carbon solutions. The underlying samples are based on nearest neighbour propensity score matching. We control for monthly fund returns, volatility, relative net fund flows, total net assets (log), fund age, Morningstar globe and star ratings, as well as for style-fixed effects. Standard errors are double clustered on month- and fund-level and t-statistics are shown in parentheses. *, **, and ***, depict statistical significance at the 10%, 5%, and 1% level, respectively.

	PAI-related Portfolio Level Metrics							
	(A) Fossil Fuel		(B) Thermal Coal		(C) Controv.Weapons		(D) Carbon Solutions	
	(1) Art. 8	(2) Art. 9	(3) Art. 8	(4) Art. 9	(5) Art. 8	(6) Art. 9	(7) Art. 8	(8) Art. 9
SFDR x Post	-0.50***	-0.64**	-0.11*	0.17	-0.06**	-0.05	-0.04	0.83***
	(-15.04)	(-3.70)	(-1.85)	(1.21)	(-2.78)	(-0.70)	(-0.78)	(3.77)
SFDR (Art. 8 or Art. 9)	-0.25	-0.82*	-0.09	-0.26*	-0.30***	-0.58***	0.19	2.31***
	(-1.70)	(-2.23)	(-1.45)	(-1.79)	(-6.14)	(-5.52)	(1.31)	(4.84)
Post	1.10**	1.98***	-0.54***	-0.62***	0.09	0.08	0.10	-0.86
	(3.24)	(4.72)	(-3.71)	(-3.53)	(1.52)	(0.60)	(0.29)	(-1.77)
Control variables	YES	YES	YES	YES	YES	YES	YES	YES
Style fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Clustered robust SE	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	14,747	1,909	48,521	6,269	48,521	6,269	14,747	1,909
R-Squared	0.76	0.49	0.26	0.24	0.26	0.50	0.30	0.32

Analogue to PAI-related variables, *Figure 5* provides graphical evidence for PAI-unrelated variables. The graphs for severe controversies and tobacco are in line with the findings for PAI-related characteristics, since Art. 8 and Art. 9 funds are, on average, less exposed to them than Art. 6 funds. Notably, the exposure of Art. 9 funds to these categories is remarkably close to zero. Art. 8 funds are, on average, more exposed to companies involved in palm oil than Art. 6 funds, however, this difference seems to converge after the introduction of the SFDR. Moreover, we notice that both sustainable fund categories are more involved in companies associated with animal testing over the entire observation period.

Figure 5. Portfolio exposure to PAI-unrelated portfolio characteristics

This figure shows the development of the funds' exposure to PAI-unrelated portfolio variables over the observation period per article group. All variables are reported monthly. The red dashed vertical line marks the SFDR introduction in March 2021.

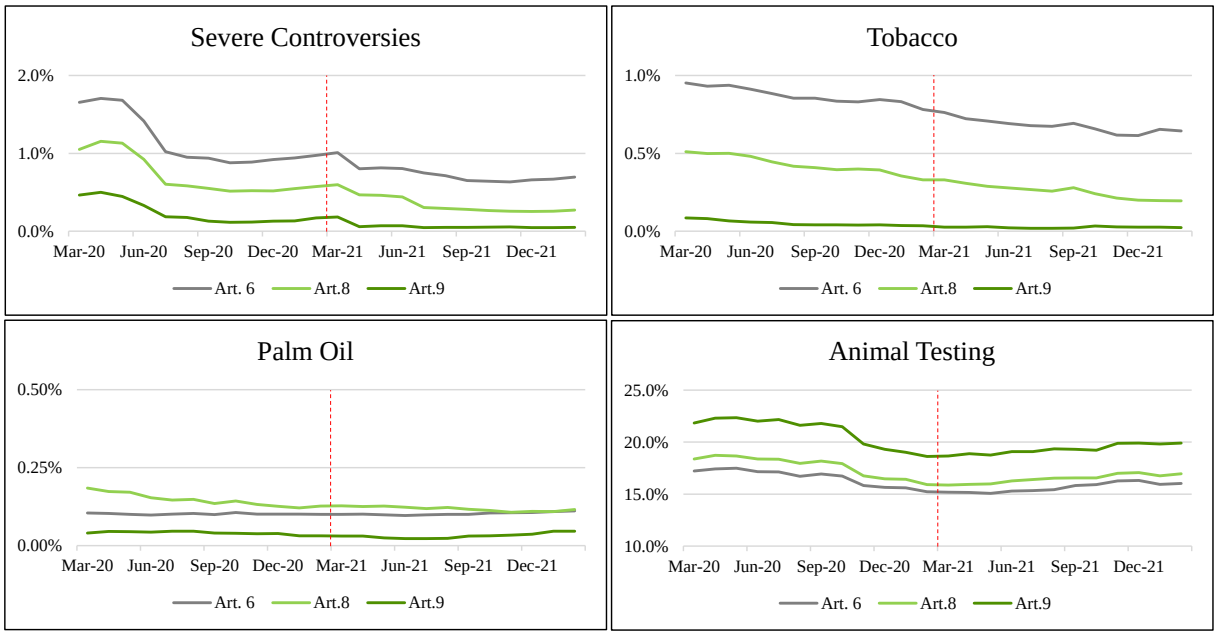


Table 8 shows the regression results for the four PAI-unrelated portfolio-level metrics severe controversies, palm oil, tobacco, and animal testing. In line with the graphical evidence, Art. 8 and Art. 9 funds are less invested in controversies and tobacco than Art. 6 funds, which is consistent with the findings of Kaustia and Yu (2021). Surprisingly, Art. 9 funds were significantly more invested in companies conducting animal testing than their Art. 6 peers. This could be due to thematic healthcare funds investing in pharmaceutical or biotechnology companies that serve social purposes and might be interpreted as sustainable investments. Moreover, neither Art. 8 nor Art. 9 funds significantly reduced their exposure to companies associated with animal testing activities compared to Art. 6 funds, despite a trend away from these businesses post-SFDR as indicated by the significant and negative $Post$ coefficient. It is further notable that both Art. 8 and Art. 9 are more exposed to companies associated with severe controversies and manufacturers or distributors of tobacco products after the SFDR introduction. These observations let us assume that fund managers might not focus their sustainability engagement on ESG categories that are not related to the PAIs and thereby not subject to the disclosure requirements.

Table 8. Regression results on PAI-unrelated portfolio-level metrics

This table shows the linear regression results for PAI-unrelated product involvement metrics, which are regressed on the SFDR dummy variable. The four non-PAI categories capture the fund's involvement in (A) severe controversies, (B) palm oil, (C) tobacco, and (D) animal testing. The underlying samples are based on nearest neighbour propensity score matching. We control for monthly fund returns, volatility, relative net fund flows, total net assets (log), fund age, Morningstar globe and star ratings, as well as for style-fixed effects. Standard errors are double clustered on month- and fund-level and t-statistics are shown in parentheses. *, **, and ***, depict statistical significance at the 10%, 5%, and 1% level, respectively.

	PAI-unrelated Portfolio Level Metrics							
	(A) Severe Controversies		(B) Palm Oil		(C) Tobacco		(D) Animal Testing	
	(1) Art. 8	(2) Art. 9	(3) Art. 8	(4) Art. 9	(5) Art. 8	(6) Art. 9	(7) Art. 8	(8) Art. 9
SFDR x Post	0.11**	0.32***	0.00	0.01	0.07**	0.14**	-0.13	-0.24
	(2.55)	(3.12)	(0.02)	(0.47)	(2.80)	(2.11)	(-0.96)	(-0.76)
SFDR (Art. 8 or Art. 9)	-0.26***	-0.58***	-0.03*	-0.03	-0.35***	-0.72***	0.09	2.88***
	(-5.25)	(-5.51)	(-1.85)	(-1.58)	(-6.32)	(-4.81)	(0.31)	(2.88)
Post	-0.31**	-0.19	0.00	-0.01	-0.09	-0.01	-3.02***	-3.78***
	(-2.11)	(-1.12)	(0.14)	(-0.43)	(-1.59)	(-0.10)	(-5.37)	(-4.05)
Control variables	YES	YES	YES	YES	YES	YES	YES	YES
Style fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Clustered robust SE	YES	YES	YES	YES	YES	YES	YES	YES
Number of observations	48,521	6,269	48,521	6,269	48,521	6,269	48,521	6,269
R-Squared	0.30	0.29	0.46	0.24	0.20	0.17	0.59	0.47

We conduct several tests to check the robustness of the matching procedure and regression results. As for H1 and H2, we change the accepted distance between the scores of matched pairs to 0.015 and 0.04 and do not find significant differences in the findings (*Appendix B6*). Furthermore, we use the Low Carbon Designation label as an alternative dependent variable to the globe rating (*Appendix B7*). The LCD label considers the exposure to fossil fuels and the carbon intensity. Because of the binary nature of the variable, we conduct a logistic regression to investigate a potential relationship between the LCD and SFDR labels. Supporting our results for the globe rating, we find that Art. 8 and Art. 9 funds are significantly more likely to receive the LCD label after the SFDR labelling. Due to the consideration of fossil fuel involvement in the LCD label, this regression serves as a robustness test on the fund and the portfolio level.

8 Discussion

8.1 Implications

We study the implications of the introduction of the EU SFDR in March 2021 to provide a first indication of the effectiveness and potential flaws of the policy intervention, especially in the light of severe criticism and greenwashing concerns. This is of special interest to the EU policy makers since one of the regulation's main objectives is to prevent greenwashing while promoting sustainable investments. These goals shall be reached by setting sustainability-related disclosure requirements, thereby reducing information asymmetries and enabling investors to make better-informed decisions. Since FMPs are not required to disclose such information until January 2023 and the SFDR label is the primary novel information communicated to capital markets as of now, this thesis focuses primarily on the labelling effect of Art. 8 and Art. 9.

We demand two criteria to be fulfilled to support the (short-term) success of the SFDR regarding mutual funds. First, fund managers shall not opportunistically exploit the circumstances around the SFDR to self-assign a green label without acting accordingly ("greenwashing criterion"). Second, investor demand for green-labelled equity funds shall increase after the SFDR launch since the label enables investors to identify funds with supposedly sustainable investment strategies ("fund flow criterion"). We assess both criteria by jointly evaluating our three hypotheses.

The greenwashing criterion is covered by H2 and H3. In the analysis for H2, we find that funds with lower returns are more likely to be labelled as Art. 8. This observation indicates potential opportunistic behaviour in form of exploiting the SFDR as a marketing tool to compensate for lacking fund returns and hence prevent a potential loss in investor demand or performance fees. Such behaviour is questionable if the labelling is not justified by a superior ESG performance and misleads investors. This is examined in H3. We find that both Art. 8 and Art. 9 funds have significantly higher Morningstar globe ratings than conventional equity funds at the time of the SFDR introduction in March 2021 and that Art. 8 funds further improved this objective ESG rating in the year afterwards. On the portfolio level, we see ambiguous results. For PAI-related product involvement metrics, we find that Art. 8 funds are not significantly different from Art. 6 at the time of the SFDR launch but tend to reduce their exposure to ESG-unfriendly businesses. For non-PAI portfolio-level metrics, we find that Art. 8 funds are mostly less involved in ESG-unfriendly companies pre SFDR but increase the exposure to such businesses after the SFDR introduction. We reason that fund managers focus on the

optimization of PAI metrics, such as thermal coal and fossil fuel involvement since the disclosure of such metrics is central to the SFDR alignment. In contrast, metrics such as the exposure to companies with severe controversies or palm oil production are not explicitly required by the RTS. This indicates that managers of Art. 8 funds adapt their behaviour after the SFDR launch to comply with the disclosure requirements but neglect other ESG-related aspects that are not asked for by the SFDR. On the one hand, this observation supports the SFDR's objective to prevent greenwashing since Art. 8 labelled funds indeed became greener after March 2021. On the other hand, this development comes at the expense of ESG-relevant categories that are not covered by the SFDR and hence reveal a caveat of the regulation. We thereby identify the problem that arises in multitasking models. Motivating people to focus on certain dimensions can result in the negligence of others. For example, Bebchuk and Tallarita (2022) analyse the implications of ESG-based compensation on aggregate stakeholder welfare and find that tying CEO compensation to ESG metrics distracts them from non-ESG, financial metrics, which ultimately comes at the expense of the shareholders. Moreover, they find that CEOs tend to focus on metrics with high measurability. In the context of SFDR, we acknowledge that FMPs can only report what they can measure. For example, it is very arbitrary to determine which investments are associated with severe controversies.

Regarding the fund flow criterion, we find that funds labelled as Art. 8 receive significantly higher fund inflows in the year after March 2021 than their Art. 6 peers. However, this observation alone does not qualify for an informed evaluation without assessing whether Art. 8 funds are more sustainable than conventional funds. Light green labelled funds are, on average, greener than unlabelled funds both on fund and on portfolio level for PAI-related categories. Combining both observations, we can derive that the SFDR label seems to promote capital flows towards greener funds labelled as Art. 8. Art. 9 funds, however, receive lower fund flows after the SFDR launch. We explain this observation by the increasing competition among green-labelled funds and a small marginal value of the Art. 9 label as a green label since most of these funds had been already marketed as sustainable funds before the SFDR. At the same time, we reveal in H3 that these funds are more sustainable than Art. 6 and Art. 8 funds, also regarding positive involvement in carbon solutions. Unlike Art. 8 funds, Art. 9 funds actively support sustainable investments. Hence, it raises concerns that investor flows seem to be directed away from these impact-creating funds towards less ESG-focused Art. 8 funds. On the other hand, these capital flows incentivize fund managers to improve the sustainability level in Art. 8 funds. This causes a trade-off that is difficult to quantify and evaluate.

Altogether, we are hesitant to judge the effectiveness of the SFDR one year after the effective date. We acknowledge the impact of the SFDR on the fund and portfolio level ESG performance. However, we remain sceptical about the potential fund flow cannibalization effect between Art. 8 and Art. 9 funds and the negligence of PAI-unrelated portfolio characteristics.

8.2 Limitations

Before formulating a recommendation to the EU policy makers, we reflect upon potential limitations in our analysis with regard to data, methodology, and underlying assumptions.

Most importantly, we point out that our analysis assumes that all funds have been classified according to the SFDR as of March 2021. This drawback is due to the limitation of the Morningstar Direct database, which only reports the current SFDR status on an as-is basis. It does not provide information about the historical SFDR label (e.g. monthly), nor does it indicate the assignment dates of the labels. Hence, we are not able to comprehend the exact period for which a fund is labelled as Art. 8 or Art. 9, nor can we identify potential changes in the label over the past year. However, we argue that assuming March 2021 as the initial classification date for all funds is an acceptable approximation because of the following reasons. First, we argue that most of the funds currently classified as light or dark green had been so since the initial launch of the SFDR in March 2021. Within the first 20 days, circa 21% of total European funds had been labelled as either Art. 8 or Art. 9, while green-labelled funds accounted for circa 25% of European funds after four months (Morningstar, 2021b, 2021d) and circa 28% as of December 2021 (Morningstar, 2022). Moreover, we note that since March 2021, circa six hundred funds were launched as Art. 8 or Art. 9, reflecting almost half of all new EU funds and accounting for circa 9% of all Art. 8 or Art. 9 funds. Since our sample only contains funds that are older than two years, these funds are disregarded and hence overstate the current percentage of labelled funds. Second, we expect that the SFDR classification has been constant for most of the funds over the past year. Since FMPs are not yet required to report and justify their SFDR labels, we assume that no or only very few funds downgraded their funds or changed between Art. 8 and Art. 9 labels. This is consistent with Morningstar (2022) which did not identify any light or dark green fund that was downgraded since the SFDR introduction. Unfortunately, Morningstar (2022) does not provide any indication about Art. 6 funds that had been upgraded to Art. 8 in the months after March 2021. Third, we argue that potential biases arising from this underlying assumption are in favour of our hypothesis and support the robustness of our findings. By assuming that all SFDR labels had been assigned in March 2021, we treat every Art. 8 and Art. 9 fund today as such over the entire period since the SFDR

introduction. For example, a fund that was labelled as Art. 8 in December 2021 is accounted for in the sample of Art. 8 funds since March 2021 and thereby mitigates potential differences between Art. 6 and Art. 8 funds. The fact that we nonetheless find significant differences indicates that the mitigating effect of such funds is not significantly prevalent. We suspect that more specific SFDR data (e.g. monthly) would rather emphasise our findings. To conclude, we acknowledge that the available SFDR data is imperfect and can result in potential biases. However, we argue that the results are still robust and meaningful and highlight that the only related SFDR working paper, Becker et al. (2021), is based on the same underlying assumption.

A limitation regarding the nature of the SFDR data is that unclassified funds are by default labelled as Art. 6. Hence, we are not able to distinguish between funds that are labelled as Art. 6 due to the lack of ESG compliance and funds that are consciously unlabelled to avoid extensive disclosure requirements and the anticipated costs of reporting. For example, we expect that for smaller asset managers, the costs of labelling funds as light or dark green may exceed the expected benefits. Hence, Art. 6 funds with the potential to be classified as Art. 8 or Art. 9 can distort the sample and mitigate differences between labelled and unlabelled funds.

In terms of methodology, we highlight limitations with regard to H3. Our greenwashing analysis is based on the comparison between the treatment and control group, i.e. we evaluate the ESG performance of Art. 8 and Art. 9 funds versus the one of Art. 6 funds. We find that labelled funds are relatively more sustainable than the control group. However, we cannot assess the absolute ESG level, since the SFDR does not prescribe minimum thresholds on metrics that qualify funds to be labelled as light or dark green. Hence, there are no general benchmarks against which we can measure ESG performance. By analysing relative ESG performance we follow related literature (e.g. Białkowski and Starks, 2016; Kaustia and Yu, 2021).

Lastly, we raise potential endogeneity concerns about the criteria used in the propensity score matching. The objective of the matching is to match funds that are very similar to each other regarding their fund characteristics. Ideally, these funds are identical and only differ with regard to the variable of interest. However, due to the lack of available data, we cannot consider certain fund characteristics, such as the net expense ratio or the turnover ratio.

9 Conclusion

Considering the criticism of the SFDR and the greenwashing concerns in Art. 8 funds, it is of interest for FMPs, investors, and policy makers to understand the implications of the regulation. FMPs shall be assured that the SFDR does not threaten fair competition among green-labelled financial products. Investors shall be able to rely on disclosed information that is backed by the credibility of the EU. Policy makers shall get a first indication of the effectiveness and potential caveats of the regulation to react and adjust if needed.

Based on our findings, we identify two problems that we recommend considering in future evaluations of the SFDR regulation. First, we find indications that Art. 8 funds receive more fund flows at the expense of Art. 9 funds that might suffer from increased competition among green-labelled funds. Such reallocation of investor capital may be unfavourable under the assumption that Art. 9 funds are more sustainable than Art. 8 funds. We suspect that this effect might be due to the unintentional labelling character of the SFDR (Rust, 2021). Investors might mistakenly perceive Art. 8 and Art. 9 as credible sustainability labels. However, Art. 8 and Art. 9 solely refer to disclosure requirements and not to investment requirements. There are no minimum thresholds that qualify financial products for being labelled as light green or dark green. The second problem arises from conflicts in multitasking models. Fund managers seem to focus on improving ESG indicators that are subject to disclosure within the SFDR, while other ESG-relevant characteristics are neglected. We suspect that the problem of multitasking models does not exclusively occur between PAI- and non-PAI characteristics but also within the 18 PAIs. FMPs might prioritize certain PAIs based on improvability, measurability, or expected relevance to investors, while others might be systematically neglected.

One tool to mitigate both problems could be the introduction of a sustainability label, which is backed by the credibility of the EU and is based on the SFDR reporting. We thereby follow the IMF's call for proper regulatory oversight with regard to sustainability labels in the mutual fund industry (International Monetary Fund, 2021). At the same time, we acknowledge the efforts of the EU to introduce a uniform framework for reporting. Hence, we do not suggest replacing the disclosure requirements with investment requirements and minimum thresholds for each PAI. Instead, we propose to introduce labels that complement the SFDR and are based on the PAI metrics reported in the periodic documents. For example, the label could be assigned if defined thresholds for multiple PAI metrics are met. The EU would thereby incentivize fund managers to focus on certain PAIs or other neglected ESG characteristics while mitigating adverse effects resulting from the unintended labelling character of the SFDR.

Ideally, the introduction of such a label shall be backed by fundamental empirical research. Hence, we encourage future research to extend our findings in multiple directions. First, we suggest further exploring the implications of the SFDR as a multitasking model. In addition to our analysis of PAI- non-PAI-related characteristics, it is of interest to understand whether and how fund managers prioritize the different PAIs and whether certain indicators are systematically neglected. Such insights can be valuable to policy makers for the evaluation of the effectiveness of the regulation. Second, we encourage investigating potential labelling effect differences for retail and institutional investors, similar to Ammann et al. (2019) within the context of the Morningstar sustainability rating. For example, we expect that fund flows into SFDR-labelled funds are mainly driven by institutional investors, considering the lack of visibility of the rating for retail investors on popular platforms, such as Morningstar, as well as potential pressure for institutional investors to preferably invest in Art. 8 and Art. 9 funds in consideration of their own SFDR label. Furthermore, we suggest examining differences in fund characteristics within Art. 8 and Art. 9 funds, for example by identifying those funds that had been already marketed as sustainable before the SFDR introduction. Such analysis would extend the findings of Rannou et al. (2022) who find that Art. 8 funds are very heterogeneous while Art. 9 funds are homogeneous. It could be insightful to further segregate Art. 8 funds into subsamples and compare them with regard to fund flows and ESG performance. Furthermore, future research will become even more relevant when companies are eventually required to disclose sustainability-related information as of January 2023. From then on, we expect SFDR downgrades for funds that cannot comply with the reporting standards or voluntarily switch to the less reporting intensive Art. 6 category. January 2023 also marks the end of the pure labelling character of the SFDR and provides new information to the capital markets. Uniform RTS templates with quantitative metrics provide additional data points that can be used in future analyses to evaluate greenwashing concerns.

To conclude, this thesis is just the basis for numerous future research opportunities. Most of these opportunities will gradually emerge as the SFDR unfolds itself in the coming months and years. This highlights the topicality and the dynamics of the regulation. It will be interesting to monitor whether and how policy makers react to future developments in research and how the SFDR and financial regulation will evolve.

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Appendix

Appendix A. Definitions and descriptive statistics

Appendix A1. Definitions of portfolio-level ESG variables

This table provides definitions of portfolio-level ESG variables that are gathered from the Morningstar Direct database. We sort the variables into two groups, PAI-related (Panel A) and PAI-unrelated (Panel B) characteristics. All variables are based on company-level data from Sustainalytics and measure a fund portfolio's exposure to involvement in certain businesses or products. Morningstar computes and reports the portfolio's Product Involvement Percentage as a weighted sum of the underlying holdings' exposure. Morningstar includes companies based on a binary indication of whether they engage in certain activities (controversial weapons, animal testing, severe controversies) or based on minimum involvement thresholds measured by revenues (fossil Fuel, thermal coal, carbon solutions, palm oil, tobacco).

Variable	Definition
Panel A: PAI-related portfolio level variables	
Fossil Fuel	The company is involved in thermal coal extraction or power generation, oil and gas production or power generation, or engages in other oil and gas products.
Thermal Coal	The company is involved in the extraction of thermal coal for coal mining and exploration or generates electricity from thermal coal.
Controversial Weapons	The company is involved in the production of core weapon systems or provides components for such. Controversial weapons comprise, amongst others, biological and chemical weapons, nuclear weapons, anti-personnel mines and cluster weapons.
Carbon Solutions	The company has exposure to carbon solutions, including renewl energy productison, supporting products & services and green transportation.
Panel B: PAI-unrelated portfolio level variables	
Severe Controversies	The company is associated with severe controversies.
Palm Oil	The company is involved in the production and/or distribution of palm oil.
Tobacco	The company manufactures or distributes tobacco and tobacco-related products.
Animal Testing	The company conducts animal testing for pharmaceutical or non-pharmaceutical products such as medical devices and biotechnology.

Appendix A2. Summary statistics sorted by SFDR category

This table shows descriptive statistics for mutual equity funds domiciled in the EU for which information on the SFDR label and the Morningstar globe rating is available. The table covers all fund-month observations from March 2020. Panel A provides information for all funds in the sample and Panel B, C, and D are split into Art. 6, Art. 8, and Art. 9 funds, respectively.

	SFDR Label							
	N	min	p25	mean	median	p75	max	sd
Panel A: All funds								
Monthly fund flows (% of TNA)	75,000	-19.75	-1.29	-0.21	-0.14	0.88	19.63	3.80
Monthly return (%)	75,000	-63.38	-1.44	1.15	1.62	4.09	43.34	5.82
12-months volatility (%)	75,000	1.20	3.74	5.48	5.35	6.73	25.56	2.08
Globe rating	75,000	1.00	3.00	3.22	3.00	4.00	5.00	1.09
Star rating	75,000	1.00	2.00	3.20	3.00	4.00	5.00	1.07
Fund size (m€)	75,000	5.01	60.60	560.66	186.59	534.68	20,796.63	1,209.28
Fund age (Months)	75,000	18.46	79.83	166.32	142.36	237.40	1,010.03	108.25
Turnover ratio (%)	2,328	-323.73	8.41	68.01	40.54	98.00	2,969.33	121.25
Net expense ratio (%)	1,646	-1.61	1.20	1.66	1.74	1.94	16.17	0.92
Panel B: Article 6 funds								
Monthly fund flows (% of TNA)	34,848	-19.73	-1.34	-0.38	-0.18	0.68	19.62	3.73
Monthly return (%)	34,848	-63.38	-1.51	1.12	1.53	4.06	43.34	5.98
12-months volatility (%)	34,848	1.20	3.77	5.63	5.49	6.93	25.56	2.23
Globe rating	34,848	1.00	2.00	2.93	3.00	4.00	5.00	1.07
Star rating	34,848	1.00	2.00	3.04	3.00	4.00	5.00	1.07
Fund size (m€)	34,848	5.01	40.79	461.27	122.64	370.68	20,796.63	1,262.11
Fund age (Months)	34,848	27.20	82.23	168.23	148.66	236.67	858.13	108.71
Turnover ratio (%)	956	-216.83	6.25	71.32	41.84	108.00	820.97	108.14
Net expense ratio (%)	799	-1.61	1.10	1.60	1.70	1.94	8.72	0.86
Panel C: Article 8 funds								
Monthly fund flows (% of TNA)	35,628	-19.75	-1.30	-0.17	-0.14	0.95	19.54	3.82
Monthly return (%)	35,628	-51.17	-1.38	1.16	1.67	4.11	33.35	5.69
12-months volatility (%)	35,628	1.20	3.73	5.37	5.24	6.60	15.73	1.95
Globe rating	35,628	1.00	3.00	3.42	3.00	4.00	5.00	1.05
Star rating	35,628	1.00	3.00	3.32	3.00	4.00	5.00	1.05
Fund size (m€)	35,628	5.04	91.90	636.60	247.65	660.53	19,236.61	1,137.89
Fund age (Months)	35,628	18.46	78.43	167.22	139.20	245.10	1,010.03	109.27
Turnover ratio (%)	1,211	-235.18	9.74	64.19	40.00	94.48	2,969.33	123.05
Net expense ratio (%)	773	0.02	1.22	1.65	1.74	1.92	5.90	0.71
Panel D: Article 9 funds								
Monthly fund flows (% of TNA)	4,524	-19.34	-0.76	0.71	0.33	2.02	19.63	4.07
Monthly return (%)	4,524	-26.90	-1.24	1.29	1.95	4.24	21.40	5.54
12-months volatility (%)	4,524	1.62	3.66	5.15	5.20	6.29	13.65	1.73
Globe rating	4,524	1.00	3.00	3.85	4.00	5.00	5.00	0.89
Star rating	4,524	1.00	3.00	3.58	4.00	4.00	5.00	1.01
Fund size (m€)	4,524	5.26	137.53	728.25	342.68	784.43	13,786.33	1,275.66
Fund age (Months)	4,524	21.80	71.82	144.66	121.10	196.52	735.86	93.32
Turnover ratio (%)	159	-323.73	4.00	77.25	45.54	96.00	1,723.83	171.18
Net expense ratio (%)	74	0.11	1.47	2.37	1.84	2.26	16.17	2.21

Appendix A3. Correlation matrix

This table shows the correlation matrix of key fund characteristics used throughout this thesis. It depicts (1) monthly fund returns, (2) monthly relative fund flows, (3) total net assets (log), (4) 12-months return volatility, (5) fund age in months, (6) the Morningstar globe rating, and (7) the Morningstar star rating.

Variables	1	2	3	4	5	6
1. Monthly return (%)						
2. Monthly fund flows (% of TNA)	0.09					
3. TNA (log)	0.02	0.05				
4. 12-months volatility (%)	0.14	-0.04	-0.13			
5. Fund Age (month)	-0.01	-0.01	0.01	-0.02		
6. Globe Rating	0.00	0.05	0.11	-0.14	0.04	
7. Star Rating	0.03	0.12	0.30	-0.11	-0.02	0.24

Appendix B. Methodology, empirical results, and robustness tests

Appendix B1. Descriptive statistics of the matched sample

This table shows the mean fund characteristics for the different matched samples used in H1. Panel A covers the one year before the SFDR introduction in March 2021, while Panel B shows the same information twelve months afterwards. All variables are defined in *Section 3.1*. Columns *Dif* provide mean differences and tests for mean characteristics of Art. 6, Art. 8, and Art. 9 funds. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

	Mean fund characteristics for matched funds as of Feb 2021							
	Art. 6 vs. Art. 8				Art. 6 vs. Art. 9			
	Art. 6	Art. 8	Dif	Total	Art. 6	Art. 9	Dif	Total
Monthly return (%)	1.07	1.07	0.00	1.07	1.13	1.12	0.01	1.12
12-months volatility (%)	0.07	0.07	-0.00	0.07	0.07	0.07	-0.00	0.07
TNA (log)	19.03	19.02	0.01	19.02	19.47	19.46	0.01	19.47
Globe rating	3.12	3.15	-0.03	3.14	3.71	3.72	-0.01	3.72
Star rating	3.18	3.16	0.03	3.17	3.46	3.56	-0.10	3.51
Fund age (months)	177.25	176.22	1.03	176.73	164.88	159.44	5.44	162.16
Number of observations	1,091	1,091		2,182	175	175		350

Appendix B2. Hypothesis 1 robustness test – matching settings

This table shows the robustness test results for the difference-in-difference regressions on monthly net fund flows using the matched samples for Art. 8 and Art. 9 using different settings in the matching procedure. Columns (A) and (B) show the results for Art. 8 and Art. 9 funds, respectively. In contrast to *Table 4*, we change the accepted propensity score differences to 0.015 in columns (1) and (3) and 0.040 in columns (2) and (4). We control for style fixed effects as indicated by the Morningstar Category. Standard errors are double clustered on month and fund-level and t-statistics are shown in parentheses. *, **, and ***, depict statistical significance at the 10%, 5%, and 1% level, respectively.

	Monthly net flow (%)			
	(A) Article 8		(B) Article 9	
	(1) 0.015	(2) 0.040	(3) 0.015	(4) 0.040
SFDR x Post	0.14	0.16*	-0.53**	-0.51**
	(1.58)	(2.01)	(-2.32)	(-2.20)
SFDR (Art. 8 or Art. 9)	-0.01	-0.05	0.55**	0.65***
	(-0.14)	(-0.66)	(2.73)	(3.26)
Post	-0.84***	-0.85***	-1.17***	-1.44***
	(-3.68)	(-3.56)	(-3.25)	(-4.24)
TNA (log)	0.02	0.02	0.14**	0.10*
	(1.05)	(0.91)	(2.49)	(1.86)
Return LTM (%)	0.03***	0.03***	0.02***	0.03***
	(6.86)	(6.75)	(2.94)	(4.11)
12-months volatility (%)	0.01	0.01	-0.20**	-0.18**
	(0.18)	(0.11)	(-2.24)	(-2.60)
Fund age (month)	0.00	0.00	0.00**	0.00**
	(-0.61)	(-0.15)	(-2.19)	(-2.10)
Morningstar globe rating				
2 Globes	0.02	0.04	-0.59	-0.16
	(0.11)	(0.27)	(-1.38)	(-0.34)
3 Globes	0.02	0.03	-0.37	0.11
	(0.11)	(0.21)	(-0.99)	(0.25)
4 Globes	0.13	0.12	-0.31	0.16
	(0.83)	(0.77)	(-0.85)	(0.38)
5 Globes	0.27	0.21	-0.33	0.11
	(1.46)	(1.17)	(-0.81)	(0.25)
Morningstar star rating				
2 Stars	0.12	0.12	0.66*	0.57
	(0.99)	(1.06)	(1.77)	(1.52)
3 Stars	0.25*	0.23	0.61	0.60
	(1.76)	(1.71)	(1.56)	(1.54)
4 Stars	0.50***	0.48***	0.93**	0.84**
	(3.32)	(3.41)	(2.30)	(2.11)
5 Stars	1.39***	1.36***	1.55***	1.69***
	(6.45)	(6.28)	(3.53)	(3.76)
Style fixed effects	YES	YES	YES	YES
Clustered robust standard errors	YES	YES	YES	YES
Number of observations	48,265	49,522	7,295	8,242
R-Squared	0.04	0.04	0.04	0.09

Appendix B3. Hypothesis 1 robustness test – different control variables

This table shows the robustness test results for the difference-in-difference regressions on monthly net fund flows using the matched samples for Art. 8 and Art. 9 using different control variables. Columns (A) and (B) show the results for Art. 8 and Art. 9 funds, respectively. In contrast to *Table 4*, we control for changes in Morningstar globe and star rating instead of categorical ratings and consider 1-month returns instead of LTM returns. We control for style fixed effects as indicated by the Morningstar Category. Standard errors are double clustered on month and fund-level and t-statistics are shown in parentheses. *, **, and ***, depict statistical significance at the 10%, 5%, and 1% level, respectively.

	Monthly net flow (%)	
	(A) Article 8	(B) Article 9
SFDR x Post	0.20**	-0.45*
	(2.29)	(-1.88)
SFDR (Art. 8 or Art. 9)	-0.05	0.68***
	(-0.68)	(3.24)
Post	-0.22	-0.75**
	(-1.10)	(-2.31)
TNA (log)	0.10***	0.18***
	(5.14)	(3.23)
Return L1M (%)	0.03**	0.03
	(2.46)	(1.20)
12-months volatility (%)	-0.07	-0.23**
	(-1.49)	(-2.78)
Fund age (month)	0.00	0.00*
	(-1.12)	(-2.07)
Change in Mornigstar globe rating	-0.03	0.07
	(-0.60)	(0.35)
Change in Mornigstar star rating	0.18***	0.12
	(3.06)	(1.09)
Style fixed effects	YES	YES
Clustered robust standard errors	YES	YES
Number of observations	49,071	7,844
R-Squared	0.02	0.06

Appendix B4. Hypothesis 2 robustness test – matching settings

This table reports the robustness test results for logistic regression to examine the characteristics of funds labelled as Art. 8 and Art. 9. Columns (A) and (B) show the results for Art. 8 and Art. 9 funds, respectively. In contrast to *Table 5*, we change the accepted propensity score differences to 0.015 in columns (1) and (3) and 0.040 in columns (2) and (4). We control for style fixed effects as indicated by the Morningstar Category. Standard errors are clustered on the fund level and t-statistics are shown in parentheses. *, **, and ***, depict statistical significance at the 10%, 5%, and 1% level, respectively.

	SFDR Classification			
	(A) Article 8		(B) Article 9	
	(1) 0.015	(2) 0.040	(3) 0.015	(4) 0.040
Return (%)	-0.02***	-0.02**	0.04**	0.04**
	(-2.64)	(-2.40)	(2.13)	(2.13)
Net flows (% of TNA)	0.00	0.00	-0.00	-0.00
	(0.33)	(0.21)	(-0.71)	(-0.26)
TNA (log)	0.00	-0.01	-0.03	0.01
	(0.13)	(-0.15)	(-0.20)	(0.09)
12-months volatility (%)	0.05	0.01	-0.54**	-0.39
	(0.84)	(0.12)	(-1.96)	(-1.62)
Fund age (month)	0.00	-0.00	0.00	0.00
	(0.47)	(-0.09)	(0.01)	(0.30)
Morningstar globe rating				
2 Globes	-0.24	-0.26	-2.99**	-3.07**
	(-0.93)	(-1.03)	(-1.97)	(-2.01)
3 Globes	-0.38	-0.44*	-0.79	-0.81
	(-1.47)	(-1.72)	(-0.69)	(-0.69)
4 Globes	-0.34	-0.35	-0.96	-0.94
	(-1.26)	(-1.33)	(-0.85)	(-0.81)
5 Globes	-0.01	-0.06	-0.54	-0.51
	(-0.03)	(-0.20)	(-0.45)	(-0.43)
Morningstar star rating				
2 Stars	0.09	0.09	-0.35	-0.50
	(0.40)	(0.40)	(-0.26)	(-0.37)
3 Stars	0.26	0.27	-0.45	-0.39
	(1.11)	(1.18)	(-0.34)	(-0.30)
4 Stars	0.27	0.19	-0.69	-0.57
	(1.08)	(0.77)	(-0.53)	(-0.43)
5 Stars	0.54*	0.57*	-1.41	-1.53
	(1.79)	(1.90)	(-0.99)	(-1.11)
Style fixed effects	YES	YES	YES	YES
Clustered robust standard errors	YES	YES	YES	YES
Number of observations	1,916	1,969	222	248
R-Squared	0.01	0.01	0.10	0.08

Appendix B5. Hypothesis 2 robustness test – observation periods

This table reports the robustness test results for logistic regression to examine the characteristics of funds labelled as Art. 8 and Art. 9. In contrast to *Table 5*, we regress the dummy variably on returns and net fund flows covering 6 months (A), 3 months (B), and 1 month (C). We control for style fixed effects as indicated by the Morningstar Category. Standard errors are clustered on the fund level and t-statistics are shown in parentheses. *, **, and ***, depict statistical significance at the 10%, 5%, and 1% level, respectively.

	SFDR Classification		
	Article 8		
	(A) 6 months	(B) 3 months	(C) 1 month
Return (%)	-0.02**	-0.05***	-0.05*
	(-2.16)	(-3.00)	(-1.90)
Net flows (% of TNA)	0.00	0.00	0.01*
	(1.14)	(1.16)	(1.85)
TNA (log)	0.01	0.01	0.02
	(0.29)	(0.32)	(0.44)
12-months volatility (%)	0.04	0.03	(0.03)
	(0.60)	(0.48)	(0.40)
Fund age (month)	0.00	0.00	0.00
	(0.19)	(0.14)	(0.19)
Morningstar globe rating			
2 Globes	-0.23	-0.23	-0.21
	(-0.87)	(-0.88)	(-0.80)
3 Globes	-0.40	-0.42	-0.39
	(-1.56)	(-1.63)	(-1.49)
4 Globes	-0.41	-0.44	-0.38
	(-1.53)	(-1.64)	(-1.40)
5 Globes	0.00	-0.04	0.04
	(0.01)	(-0.14)	(0.13)
Morningstar star rating			
2 Stars	0.00	0.01	-0.01
	(0.00)	(0.06)	(-0.03)
3 Stars	0.08	0.08	0.04
	(0.36)	(0.39)	(0.20)
4 Stars	-0.03	-0.02	-0.08
	(-0.14)	(-0.10)	(-0.36)
5 Stars	0.03	0.04	-0.05
	(0.10)	(0.15)	(-0.18)
Style fixed effects	YES	YES	YES
Clustered robust standard errors	YES	YES	YES
Number of observations	1,943	1,943	1,943
R-Squared	0.01	0.01	0.01

Appendix B6. Hypothesis 3 robustness test – matching settings

This table shows the robustness test results for the linear regression of the Morningstar globe rating on the SFDR dummy for both Art. 8 (A) and Art. 9 (B). In contrast to *Table 6*, change the accepted propensity score differences to 0.015 in columns (1) and (3) and 0.040 in columns (2) and (4). Standard errors are double clustered on month- and fund-level and t-statistics are shown in parentheses. *, **, and ***, depict statistical significance at the 10%, 5%, and 1% level, respectively.

	Morningstar Globe Rating			
	(A) Article 8		(B) Article 9	
	(1) 0.015	(2) 0.040	(3) 0.015	(4) 0.040
SFDR x Post	0.09***	0.09***	0.09*	0.10*
	(5.11)	(4.97)	(1.76)	(1.96)
SFDR (Art. 8 or Art. 9)	0.33***	0.32***	0.59***	0.66***
	(9.30)	(9.00)	(6.13)	(7.19)
Post	-0.20***	-0.21***	-0.10	-0.20**
	(-4.00)	(-4.22)	(-1.15)	(-2.32)
Return LTM (%)	0.00***	0.00***	-0.01**	-0.01***
	(-3.18)	(-3.14)	(-2.73)	(-3.05)
Net flows LTM (% of TNA)	-0.02	-0.01	-0.11	0.00
	(-0.77)	(-0.33)	(-1.46)	(0.1)
TNA (log)	-0.04**	-0.04***	0.03	0.04
	(-2.73)	(-2.95)	(0.89)	(1.14)
12-months volatility (%)	-0.10***	-0.11***	-0.10***	-0.11***
	(-7.73)	(-7.83)	(-2.91)	(-3.87)
Fund age (month)	0.00***	0.00***	0.00	0.00
	(3.02)	(3.14)	(0.08)	(0.47)
Morningstar star rating				
2 Stars	0.20***	0.18**	0.70***	0.71***
	(2.83)	(2.54)	(2.84)	(3.00)
3 Stars	0.44***	0.43***	0.86***	0.89***
	(5.87)	(5.84)	(3.37)	(3.76)
4 Stars	0.63***	0.60***	0.93***	0.88***
	(7.99)	(7.66)	(3.71)	(3.79)
5 Stars	0.85***	0.84***	1.12***	1.03***
	(9.50)	(9.47)	(4.22)	(4.10)
Style fixed effects	YES	YES	YES	YES
Clustered robust standard errors	YES	YES	YES	YES
Number of observations	47,653	49,094	5,909	6,589
R-Squared	0.31	0.31	0.28	0.30

Appendix B7. Hypothesis 3 robustness test – Low Carbon Designation label

This table shows the robustness test results for the linear regression of the Morningstar globe rating on the SFDR dummy for both Art. 8 (A) and Art. 9 (B). In contrast to *Table 6*, we use the LCD label as dependent variable instead of the Morningstar globe rating. Due to the binary nature of the LCD variable, we use a logistic regression instead of a linear regression. Standard errors are double clustered on month- and fund-level and t-statistics are shown in parentheses. *, **, and ***, depict statistical significance at the 10%, 5%, and 1% level, respectively.

	LCD	
	(A) Article 8	(B) Article 9
SFDR x Post	0.26***	0.55***
	(6.00)	(7.61)
SFDR (Art. 8 or Art. 9)	0.00	0.42
	(0.03)	(1.61)
Post	-0.13	-0.82***
	(-0.61)	(-4.67)
TNA (log)	-0.04	0.32**
	(-1.17)	(2.17)
Return LTM (%)	0.02*	0.02***
	(1.69)	(2.60)
Net flows LTM (% of TNA)	0.02	-0.42
	(0.22)	(-1.25)
12-months volatility (%)	-0.14**	-0.25***
	(-2.39)	(-3.50)
Fund age (month)	0.00	0.00
	(0.90)	(0.94)
Morningstar globe rating		
2 Globes	1.48***	1.83*
	(5.00)	(1.92)
3 Globes	1.93***	2.57***
	(6.30)	(2.91)
4 Globes	3.25***	3.32***
	(10.06)	(3.84)
5 Globes	4.70***	4.68***
	(12.32)	(5.02)
Morningstar star rating		
2 Stars	0.26	2.18**
	(1.15)	(2.31)
3 Stars	0.31	1.45*
	(1.29)	(1.67)
4 Stars	0.42*	1.24
	(1.70)	(1.41)
5 Stars	1.40***	2.34**
	(4.49)	(2.67)
Style fixed effects	YES	YES
Clustered robust standard errors	YES	YES
Number of observations	12,256	1,461
R-Squared	0.36	0.32