SFDR Meets Morningstar: The Impact of SFDR on Morningstar Globe Ratings and Fund Flows

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ABSTRACT

This paper examines the impact of the Sustainable Finance Disclosure Regulation (SFDR) on Morningstar Globe Ratings and fund flows, focusing on whether regulatory classifications complement or substitute private ESG metrics. Using a dataset of over 6,400 European equity mutual funds from March 2019 to August 2024, we use panel regressions, propensity score matching, difference-in-difference, and an interaction model to analyse two key research questions. First, we investigate whether SFDR classifications enhance Morningstar Globe Ratings, finding that funds classified under Articles 8 and 9 significantly improve their ratings post-SFDR, while Article 6 funds experience relative declines. This suggests that the implementation of SFDR has led to higher ESG standards. Second, we explore whether SFDR substitutes the Morningstar Globe Rating in influencing fund flows. The results reveal a substitution effect for Article 8 funds, with investors increasingly relying on SFDR classifications over Morningstar Globe Ratings in their capital allocation. In contrast, no substitution effect is observed for Article 9 funds, likely due to their already well-established sustainability credentials. This research highlights SFDR's role in enhancing transparency and shaping investor preferences, offering critical implications for policymakers, fund managers, and investors.

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1. Introduction

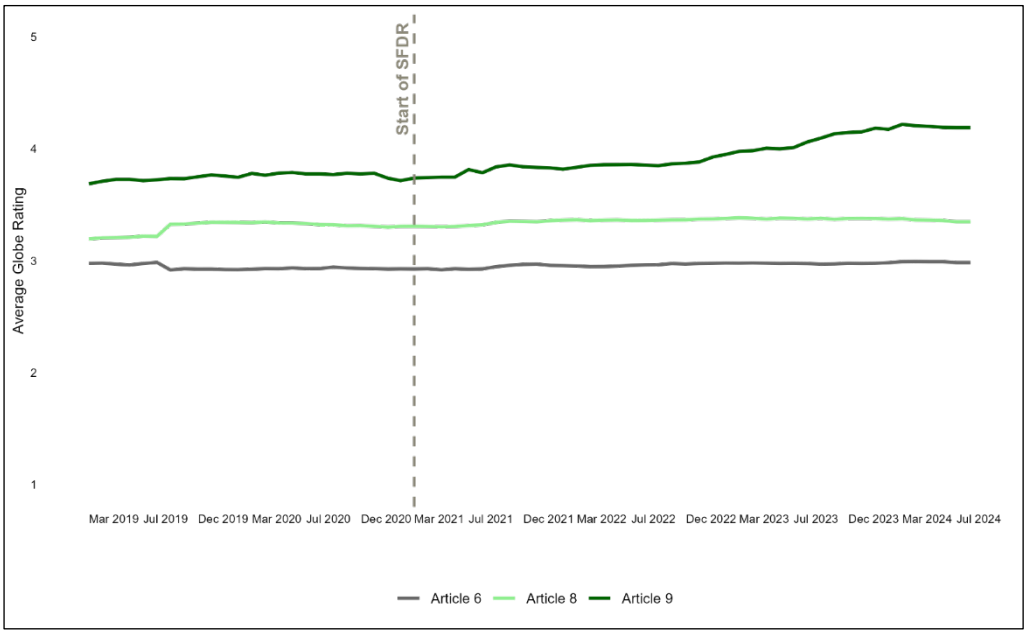
Sustainable finance has become a central part of global financial markets, highlighting the increasing focus on directing capital toward environmental, social, and governance (ESG) goals. Today, sustainable investments span private equity, retail funds, asset management, and sovereign wealth portfolios, driven by heightened investor awareness and regulatory interventions (Kumar et al., 2022). ESG-labelled assets now account for around a third of global assets under management, emphasizing the financial sector's increasing commitment to sustainability (Bloomberg Intelligence, 2024). While this growth marks significant progress, the rise of sustainable finance has also brought challenges, particularly concerns over greenwashing and inconsistencies among private ESG metrics (Berg et al., 2021).

Recognizing the need for standardized sustainability disclosures, the European Union introduced the Sustainable Finance Disclosure Regulation (SFDR) in 2019. SFDR aspires to enhance transparency, mitigate greenwashing, and direct capital flows toward genuinely sustainable investments. Enforced on March 10, 2021, SFDR requires Financial Market Participants (FMPs) to disclose how they integrate sustainability into their investment strategies, aiming to harmonize ESG reporting across the financial sector. Funds are classified into three categories under SFDR: Article 6, for funds that merely disclose sustainability risk integration; Article 8, for those promoting specific environmental or social characteristics; and Article 9, for funds explicitly pursuing sustainable investment objectives. Presently, 61% of European funds are classified under Articles 8 and 9, reflecting both investor demand and fund managers' responses to the regulation (Morningstar Sustainalytics, 2024). Simultaneously, private metrics like Morningstar Globe Ratings (Globe ratings) have long served as tools for evaluating ESG risks and guiding investment flows, providing detailed portfolio-level assessments of sustainability (Hartzmark and Sussman, 2019; Ammann et al., 2018). Understanding the impact of SFDR is critical for both policymakers and market participants. On the regulatory side, the European Union has invested heavily in initiatives like SFDR to reshape financial markets and accelerate the transition to greener investments. However, with private ESG metrics such as Morningstar's Globe Ratings already influencing capital allocation, it remains uncertain whether SFDR adds unique value or merely overlaps with these existing tools.

SFDR has affected the Globe Ratings across different fund categories, with clear differences emerging between Article 6, Article 8, and Article 9 funds after the regulation's implementation (Figure 1). This provides an opportunity to explore the interaction between the regulatory and market-driven mechanisms of different sustainability labels. Do regulatory classifications complement private metrics by enhancing their credibility, or do they act as substitutes, rendering private metrics less relevant? Addressing these questions is essential to understanding the broader implications of SFDR for the sustainable finance ecosystem.

Figure 1. Average Globe Rating per SFDR category

This figure shows the average Globe rating of funds per SFDR category from March 2019 up until August 2024, highlighting the implementation of SFDR in March 2021.



This paper addresses two key research questions. First, it examines how SFDR classifications influence Globe ratings from the regulatory side, focusing on whether SFDR improves the ratings of Article 8 and Article 9 funds. Second, it investigates whether SFDR classifications substitute for or complement private ESG metrics in shaping fund flows. By addressing these questions, the research seeks to uncover the broader implications of SFDR for the sustainable finance ecosystem. To answer these questions, the study employs a quantitative research design based on a difference-in-difference and an interaction model together with

propensity score matching. The dataset includes monthly data on European equity mutual funds from March 2019 to August 2024. Key variables include fund-level Globe ratings, fund flows, and SFDR classifications, complemented by control variables such as fund size, returns, and volatility.

The results highlight several key points. First, SFDR has a positive effect on Globe ratings for Article 8 and Article 9 funds following its implementation, suggesting that the regulation enhances transparency and improves ESG performance among sustainability-focused funds. Conversely, Article 6 funds see declines in their Globe ratings after the SFDR implementation, indicating that the regulation helps to more clearly differentiate between sustainable and non-sustainable funds. Second, the analysis uncovers a substitution effect for Article 8 funds, where investors increasingly rely on SFDR classifications relative to Globe ratings in shaping fund flows. However, no such substitution effect is observed for Article 9 funds, likely because their established reputations for strong sustainability reduce the additional value provided by further classifications or ratings.

This research contributes to the growing literature on sustainable finance by exploring the interaction between regulatory classifications and private ESG metrics. Since the implementation of SFDR, studies have highlighted its impact on capital allocation and investor behaviour. Becker et al. (2022) show that Article 8 and Article 9 funds experienced significant inflows post-SFDR, driven by improved Globe ratings that enhanced investor confidence. Similarly, Emiris et al. (2024) report that SFDR increased investor confidence, spurring greater capital allocation to Articles 8 and 9 funds. Michl and Schmid (2022) observed that Article 8 funds benefited from inflows while Article 9 funds faced relative outflows. Ferriani (2024), on the other hand, underscores that Article 9 funds, with stricter sustainability objectives, were the only category to see significant increases in fund flows. Before SFDR, private ESG metrics such as the Globe rating played a key role in shaping fund flows, where higher sustainability scores correlated with higher fund flows (Ammann et al., 2018; Hartzmark and Sussman, 2019; Fang and Prada, 2022; Ceccarelli et al., 2023). Additionally, socially responsible investment (SRI) funds attracted stable, long-term capital, with investors valuing their ethical alignment and societal impact (Bollen, 2007; Benson and Humphrey, 2008; Renneboog et al. 2011). Despite extensive research on SFDR and ESG metrics, the interaction between these frameworks remains underexplored. This study addresses this gap, examining whether SFDR complements or substitutes the Globe rating, offering insights into the evolving dynamics of sustainable finance.

These findings offer valuable insights to policymakers, fund managers and investors. For policymakers, the results emphasize the importance of refining SFDR's classifications to reduce ambiguities and ensuring robust enforcement to minimize greenwashing risks. For fund managers, the findings highlight the need to align with SFDR while maintaining broader ESG strategies that go beyond regulatory compliance. For investors, the results suggest the importance of balancing the simplicity of SFDR classifications with the granularity of private metrics to make informed decisions. Ultimately, this paper sheds light on the transformative role of regulatory interventions in sustainable finance, providing insights into how SFDR reshapes the interplay between transparency and capital allocation.

The remainder of the paper is structured as follows: Section 2 provides an in-depth review of the relevant literature. Section 3 introduces the Sustainable Finance Disclosure Regulation (SFDR) and offers an overview of the Morningstar Ratings. Section 4 describes the data utilized in the regressions. Section 5 outlines the research questions and methodological design. Section 6 presents the empirical results, while Section 7 discusses the findings, addresses limitations, and suggestions for future research. Finally, Section 8 concludes the paper.

2. Literature Review

Studies on ESG topics often focus on fund flows due to the well-established link between past financial performance and capital allocation. Foundational research by Chevalier and Ellison (1997), Sirri and Tufano (1998), and Berk et al. (2004) demonstrates that funds with strong historical performance consistently attract higher inflows. Since the implementations of SFDR, there has been many studies showing a relationship between fund flows and SFDR classifications (Becker et al.; 2022, Michl and Schmid, 2022; Emiris et al., 2024; Ferriani, 2024). Becker et al. (2022) demonstrate that funds classified under SFDR's Article 8 and Article 9 attracted significant inflows following the regulation's implementation, reflecting a shift in investor preferences towards sustainability-aligned investments. The study also highlights improved Globe ratings for Article 8 and Article 9 funds after the SFDR implementation, suggesting that regulatory frameworks can enhance the credibility of private ESG metrics. Similarly, Emiris et al. (2024) report that SFDR increased investor confidence, spurring greater capital allocation to Articles 8 and 9 funds. Contrastingly, Michl and Schmid (2022) find that while Article 8 funds benefited from inflows, Article 9 funds experienced relative outflows. Ferriani (2024) emphasizes that Article 9 funds were the only category to significantly increase fund flows after SFDR implementation. The contradictions in fund flows highlight an interesting distinction in investor trust between the two classifications under different conditions.

Before SFDR, private ESG metrics such as the Globe rating were key tools for evaluating fund sustainability. Introduced in 2016, the Globe rating provided a standardized method for assessing portfolios on ESG criteria. Ammann et al. (2018) find compelling evidence that retail investors prioritized funds with superior ESG ratings, with high-rated funds attracting $4.1–$10.1 million in additional inflows annually, while low-rated funds faced outflows of $1–$5 million. Hartzmark and Sussman (2019) confirmed these results, showing that high-rated sustainability funds attracted over $24 billion in inflows, while low-rated funds saw outflows exceeding $12 billion. Fang and Prada (2022) similarly found that high-rated funds consistently achieved 5.28% to 5.76% higher annual fund flows compared to low-rated funds. Ceccarelli et al. (2023) add that funds with Morningstar's "low carbon" label, introduced in 2018, experienced significant net inflows, further demonstrating the influence of private ESG metrics on investor behaviour.

Prior to the availability of detailed ESG metrics like the Globe rating, investors relied on socially responsible investment (SRI) funds for sustainable investments. Bollen (2007) finds that SRI funds exhibited lower volatility in fund flows compared to conventional funds, suggesting that they attract more resilient, long-term capital. Similar findings by Benson and Humphrey (2008) and Renneboog et al. (2011) indicate that SRI investors are less influenced by past returns, reinforcing the notion of a stable, values-driven investor base. Statman (2008) highlights that socially responsible investments appeal to investors not only for their potential financial returns but also for their societal impact, reflecting a growing emphasis on aligning investments with personal values. Riedl and Smeets (2017) emphasize that preferences for ESG-aligned funds are often driven by social signalling and individual ethical considerations, rather than purely financial motives.

While the past literature highlights the distinct impacts of SFDR and private ESG ratings on fund flows, the interaction between these frameworks remains underexplored. SFDR's mandatory classification system could complement or compete with third-party metrics like the Globe rating, creating potential synergies or conflicts in investor perceptions. Becker et al. (2022) touch on this interaction, noting improved Globe ratings among European funds post-SFDR, but the specific mechanisms and investor behaviour driving this relationship require further study. Our study contributes to a more nuanced understanding of how investors respond to regulatory classifications, exploring whether SFDR enhances or potentially diminishes the impact of private ESG ratings like Globe rating in shaping investor behaviour. We are particularly interested in how regulations like SFDR interact with private metrics such as the Globe rating, whether these regulations offer investors additional information, improve metric transparency, or alter the perceived utility of private ESG ratings. On the market side, we investigate how investors regard SFDR classifications in relation to private metrics like the Globe rating, examining whether the regulatory framework substitutes or complements the role of unregulated ESG metrics in the investor decision-making processes.

3. SFDR and Morningstar Ratings

3.1. Sustainable Finance Disclosure Regulation (SFDR)

The European Parliament and Council published regulation (EU) 2019/2088 on sustainability-related disclosures in the financial services sector on 27th November 2019, commonly referred to as the Sustainability Financial Disclosure Regulation (SFDR). The regulation applies to all Financial Market Participants (FMPs) and financial products that are sold or domiciled in Europe. The framework stipulates that all FMPs disclose their investment decision-making framework on the integration of sustainability. Financial market participants include insurance investors, investment firms, pension providers, alternative investment managers, venture capital firms and social entrepreneurship funds. The regulation aims to decrease information asymmetries in principal-agent relationships related to the integration of sustainability risks, harmonize sustainability-related disclosure rules across the European Union and facilitate informed decisions by investors (European Union, 2019). By implementing this regulation, the European Union joined forces with the UN's Sustainable Development Goals (SDGs) and the Paris Agreement to alter union-wide investment behaviour within the financial sector by regulating information disclosure related to sustainable investing (The European Parliament and the Council, 2019).

The SFDR establishes two distinct levels of disclosure requirements: entity-level and product-level. Entity-level disclosures pertain to fund managers and are typically provided on their websites. These disclosures are regulated by Articles 3 to 5 of the SFDR. Article 3 requires fund managers to explain their methodologies for integrating sustainability risks into investment decisions and the potential impact on returns. Article 4 mandates disclosure of how financial products impact Principal Adverse Impacts (PAIs), which include 14 mandatory and 31 voluntary indicators addressing issues such as environmental concerns, social and employee matters, human rights, and anti-corruption efforts. Article 5 requires fund managers to disclose how sustainability considerations are reflected in their remuneration policies.

Product-level disclosures focus on specific financial products and are found in pre-contractual documents such as fund prospectuses and quarterly or annual reports. These disclosures are governed by Articles 6 to 11, with Article 7 requiring financial market participants (FMPs) to disclose the impact of their products on Principal Adverse Impact (PAI) indicators. SFDR also

requires FMPs to classify their investment products under Article 6, Article 8, or Article 9 of the regulation:

- Article 6: Funds that do not promote sustainability must disclose how sustainability risks are integrated into their investment process, if at all.
- Article 8: Funds that promote environmental or social characteristics (referred to as "light green" funds) must disclose how these characteristics are achieved.
- Article 9: Funds with sustainable investment as their primary objective (known as "dark green" funds) must provide detailed information on how this objective is met. This includes demonstrating that their investments contribute to environmental or social objectives, as defined under Article 2, Paragraph 17 of the regulation, which requires investments to support environmental or social goals while adhering to good governance practices.

The distinction between Article 8 and Article 9 funds lies in their investment focus and disclosure requirements. Article 8 funds, like the JPMorgan Global Growth & Income Fund, promote environmental or social characteristics by incorporating ESG factors into their investment processes, but their primary goal remains financial performance. In contrast, Article 9 funds, such as the Nordea 1 - Global Climate and Environment Fund, specifically target sustainable investments that contribute positively to environmental or social objectives. This "dark green" classification reflects a dedicated sustainability focus, requiring stricter disclosures to demonstrate that sustainability is the primary investment objective.

The 2019/2088 SFDR regulation came into effect on March 10, 2021, the first regulation is referred to as the first level of the implementation phase (Level I). From this date, FMPs are required to report entity-level PAI indicators in their investment decision-making process, disclose the integration of sustainability risks, and label their fund as Article 6, Article 8 or Article 9. The SFDR Level I reference period started on the 1st of January 2022. During the first reference period, FMPs must collect data to meet the disclosure requirements outlined in their respective articles. The second stage of the implementation phase coincides with the start of the second reference period, on the 1st of January 2023. This stage in the implementation phase of SFDR is called “Level II”, or Regulatory Technical Standard “RTS”, and includes a new regulation, 2022/1288, stipulating and clarifying the guidelines and content of PAI indicator reporting. This regulation

clarifies how to disclose sustainability risks and aims to enhance disclosure standardization across financial products (The European Parliament and the Council, 2022).

The implications of the implementation of the SFDR regulation for FMPs are sustainability risk transparency, standardized and harmonized reporting and the need to comply with a constantly developing regulatory environment. Due to its complex nature, the SFDR has changed since its inception to alleviate the regulatory burden on FMPs, while aiming to enhance transparency and disclosure requirements on financial products. On the 18th of June 2024, the European Supervisory Authorities (ESA) delivered an Opinion on SFDR highlighting that the complexity of SFDR acts as a barrier to its effective implementation (European Supervisory Authorities, 2024). The Opinion points out that the "promotion of environmental or social characteristics" under Article 8 is too broad which leads to confusion about the actual sustainability of financial products. The Opinion also points out that disclosures under Article 9 (despite its connection to 'sustainable investments' in Article 2, Paragraph 17 of the 2019/2088 regulation) have limited harmonization because of the wide discretion of interpretation given to FMPs.

The effectiveness of SFDR is thus highly dependent on the alignment of FMPs to report consistent with each other, giving rise to ESA's recommendations of simplified documentation, improved transparency of PAI indicators at a financial product level and reduced disclosure frequency of PAI indicators (European Supervisory Authorities, 2024). Another risk which is related to the uncertainty of SFDR is that of greenwashing, because fund managers can market their financial products as meeting sustainable targets based on unambiguous data and self-classified PAI indicators. The Opinion raises concerns about greenwashing misuse through the SFDR Article 8 and Article 9 labels because of the broad definitions as discussed above. To prevent this, the Opinion emphasizes the need to introduce specific 'regulatory product categories' (which are vaguely described within the text), and to clarify definitions (for example, Article 2, Paragraph 17's definition of 'sustainable investments'). If the European Parliament and the Council would adapt the regulation to the recommendations of the Opinion from ESA, this would imply an additional regulation to the first two levels, Level I (2019/2088) and Level II (2022/1288) and therefore also another third implementation phase of the regulation.

Morningstar highlights the ongoing evolution of sustainable funds under the SFDR with Article 8 funds experienced a resurgence in Q3 2024, attracting EUR 38 billion—the highest inflow

since late 2021—driven primarily by fixed-income investments (Morningstar Sustainalytics, 2024). In contrast, Article 9 funds continued to see net outflows of EUR 2.2 billion, although the scale of outflows was smaller than in previous quarters. Market preferences favoured Article 6 funds, which recorded significant inflows of EUR 96 billion. Despite regulatory changes and market volatility, total assets in Article 8 and Article 9 funds remained stable at EUR 6 trillion, accounting for approximately 60% of European Union fund assets. The pace of reclassification activities, such as upgrades to Article 8, has slowed, indicating a more settled regulatory environment (Morningstar Sustainalytics, 2024).

3.2. The Morningstar Ratings

The Morningstar Sustainability Rating, commonly referred to as the "Globe" Rating, was introduced in March 2016 to assist investors in evaluating mutual funds and exchange-traded funds (ETFs) on environmental, social, and governance (ESG) criteria. This rating system is designed to provide insights into the ESG risks associated with a fund's holdings, allowing investors to gauge how well funds manage such risks relative to others in their category. The rating relies on a comprehensive, bottom-up assessment of each fund's portfolio, using ESG risk data provided by Sustainalytics, a well-established ESG research and ratings provider. Sustainalytics evaluates both corporate and sovereign risks within each portfolio, combining these evaluations into a single ESG risk rating for each holding.

The Globe rating is derived from two main components: the corporate ESG risk rating and the country risk rating. The corporate ESG risk rating assesses each company's unmanaged ESG risks, focusing on how significant these risks may be to a company's long-term economic value. The country risk rating considers how well each country is managing ESG factors across three pillars: natural and produced capital, human capital, and institutional capital. These factors are essential for understanding broader, macro-level ESG risks, especially in funds holding government bonds or other sovereign assets. By merging these elements, the Globe rating presents a comprehensive measure of the ESG risk embedded within each fund, offering a clearer picture of both corporate and sovereign sustainability risks.

Funds are evaluated on a relative basis within their Morningstar Global category, meaning a fund's Globe rating reflects how it performs on ESG risk compared to others in the same category.

As a result, a fund with higher absolute ESG risks might still achieve a favourable rating if its category peers face even higher risks. The final rating is expressed as a score of 1 to 5 globes. Funds with a 5-Globe rating represent the best ESG performers, with a low overall ESG risk relative to peers, while funds with a 1-Globe rating represent those with the highest ESG risk. The distribution of these ratings follows a normal curve: the top 10% of funds in each category receive 5 globes, the next 22.5% receive 4 globes, the middle 35% receive 3 globes, the following 22.5% receive 2 globes, and the lowest 10% receive 1 globe (Morningstar, 2021). This percentile-based approach provides a clear, comparative view for investors, helping them select funds that align with their sustainability preferences.

In addition to the Globe rating, Morningstar provides an Overall Rating, commonly referred to as the "Star" Rating, which has been a standard in fund evaluation for decades. Unlike the Globe rating, which focuses specifically on ESG factors, the Star Rating evaluates a fund's historical risk-adjusted return relative to similar funds. The Star Rating is calculated based on a fund's past performance over three, five, and ten years, using net-of-fees total returns. The performance of each fund is then ranked within its Morningstar Category, with adjustments for risk. Similar to the Globe rating, the Star Rating is distributed on a curve: the top 10% of funds in each category receive 5 stars, the next 22.5% receive 4 stars, the next 35% receive 3 stars, the next 22.5% receive 2 stars, and the lowest 10% receive 1 star. This rating system is intended to give investors an insight into which funds have consistently delivered strong, risk-adjusted returns within their category.

The implementation of SFDR introduces a regulatory framework that could intersect with existing sustainability metrics such as Globe ratings. While SFDR classifications provide a standardized baseline for sustainability disclosures, Globe ratings offer a granular, independent assessment of ESG risks at the portfolio level. These two systems could complement one another by addressing different aspects of sustainability. SFDR classifications enhance the credibility and comparability of fund-level disclosures, creating a foundation for Globe ratings to supplement with detailed evaluations of specific ESG risks. Investors might use SFDR to identify funds aligned with Articles 8 or 9 and rely on Globe ratings for additional validation. However, there is also a risk that some investors might rely solely on SFDR classifications, viewing them as sufficient for assessing sustainability. Such reliance could result in the loss of the nuanced insights offered by Globe ratings, which go beyond regulatory requirements to evaluate ESG risks in detail.

4. Data

4.1. Data Description

We collect month-end data, in euros, for open-end equity mutual funds domiciled in Europe from Morningstar Direct, covering the period from March 2019 to August 2024. To maintain a consistent sample of comparable funds, and in line with prior research (e.g., Ceccarelli et al., 2023; Ammann et al., 2018; Hartzmark & Sussman, 2019), we exclude funds classified as fixed income, bond, money market, and other non-equity categories. In addition, we exclude mutual funds with a size under 5 million euros and those with an inception date less than two years before the SFDR implementation (March 2019), ensuring a mature sample of funds for the analysis.

For each fund, we collect monthly time series for the data on Globe ratings, Morningstar Star Ratings, monthly net fund flows, aggregated fund sizes, and returns. We also obtain a time series of SFDR classifications. Where funds have multiple share classes, we use FundID codes from Morningstar Direct to aggregate data to the fund level. When aggregating, we compute returns, volatility and fund ages across share classes and aggregate fund sizes to obtain total fund-level sizes. Volatility is calculated as the standard deviation of returns over the past 12 months. If Morningstar Global or Star ratings differed between share classes, we use the median rating across classes to represent the fund-level rating.

The data on SFDR classification timing is not complete for the initial implementation phase starting in March 2021. To address this, we extrapolate each fund's SFDR status back to March 2021 from the first available reporting date, in the manner established by Emiris et al. (2024). In total, our sample includes 6,448 EU-domiciled funds.

Following Sirri and Tufano (1998), we define fund flows the change in total net assets (TNA) in open-end equity mutual funds, adjusted for reinvested returns:

$$Flow_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1} \cdot (1 + r_{i,t})}{TNA_{i,t-1}}$$

In the equation above, $TNA_{i,t}$ is defined as the total net assets in mutual fund i at month t and $r_{i,t}$ is defined as the raw return for mutual fund i at month t. This method assumes that fund flows occur at the end of each period, with dividends reinvested, meaning that any growth in assets under management is not affected by in- or outflows during the period.

Consistent with previous literature, we winsorize variables at the 1st and 99th percentiles to mitigate the impact of outliers on our findings (e.g., Ceccarelli et al., 2023; Becker et al., 2022). This procedure helps to control for extreme values that could otherwise distort the results, thereby enhancing the robustness of the analysis.

4.2. Summary Statistics

Tables 1 and 2 provide an overview of key characteristics for the sample observations, segmented into two periods, pre-SFDR (March 2019 to February 2021), and post-SFDR (March 2021 to August 2024). The data is organized by SFDR article classifications as of August 2024 (Article 6, Article 8, and Article 9), thus allowing for a comparative analysis of fund flows, total net assets, Globe rating, Star Rating, returns, and volatility across different classifications.

In the pre-SFDR period, (Panel A of Table 1), monthly fund flows for Article 6 and Article 8 funds are negative on average (-0.32% and -0.17%, respectively), while Article 9 funds exhibit a positive average monthly flow of 0.89%, suggesting a preliminary investor preference for funds with explicit sustainable objectives before the SFDR implementation. In terms of total net assets, Article 8 funds hold the largest average amount (€540.9 million), which is higher than both Article 6 (€348.1 million) and Article 9 (€388.0 million) funds. Both Globe and Star ratings are relatively higher for Article 8 and Article 9 funds, with Article 9 funds achieving the highest average Globe rating (3.75) and Article 8 funds the highest average Star Rating (3.29) (see Appendix A4 for mean difference statistical significance for Pre- and Post-SFDR). Additionally, Article 9 funds exhibit the highest average return (1.35%), followed by Article 8 (1.14%) and Article 6 funds (0.98%), highlighting a positive association between returns and the level of sustainability focus in the pre-implementation period. The volatility metric, measured as 12-month volatility, is relatively consistent across categories but is slightly lower for Article 9 funds (5.70%) compared to Article 6 (5.84%) and Article 8 (5.76%) funds.

In the post-SFDR period (Panel B of Table 1), a distinct shift is evident. While Article 6 and Article 8 funds continue to exhibit slight outflows (-0.37% and -0.38%, respectively), the outflow for Article 9 funds is notably reduced to -0.07%. This trend suggests a positive adjustment in investor sentiment towards Article 9 funds following the SFDR framework, which provided clearer guidelines. Total net assets increased significantly across all classifications, with Article 9

funds showing the largest growth, reaching an average of €736.5 million. This increase implies a heightened investor interest in funds with explicit sustainability objectives, as defined by Article 9. Globe ratings show a post-SFDR improvement, with Article 9 funds achieving the highest Globe rating (3.96), indicating strengthened ESG credentials post-regulation (see Figure 1 for graphical presentation). Star ratings remain higher for Article 8 and Article 9 funds compared to Article 6, signalling sustained investor confidence in funds with a sustainability focus. Returns have decreased in the post-SFDR period, with Article 9 funds reporting an average return of 0.46%. Volatility has also decreased across all categories post-SFDR, with Article 6 funds exhibiting the lowest volatility (4.32%) and Article 9 funds the highest (4.78%).

Table 2 offers further insight into the distribution of funds and fund sizes by the Globe ratings. Panel A of Table 2 reveals that a higher proportion of Article 9 funds occupy the top Globe rating categories (4 and 5 globes), emphasizing their strong ESG attributes, while Article 6 funds are more widely dispersed across the lower Globe ratings, in line with their lack of specific ESG mandates. This distribution suggests that SFDR classifications effectively direct investors towards funds with stronger ESG standards, particularly within the Article 9 category. Panel B of Table 2 shows the total fund size per SFDR category and Globe rating. Notably, Article 8 and Article 9 funds collectively hold a greater proportion of assets within the higher Globe rating categories (3 to 5 globes), with Article 9 funds demonstrating a substantial concentration in these categories. This highlights the preference for sustainable investment options, as funds classified under Article 8 and Article 9 have attracted larger pools of assets, reflecting investor confidence in the integrity and transparency of their ESG commitments.

In summary, these tables collectively demonstrate the impact of SFDR on the investment landscape, with observable shifts in fund flows, total assets, Globe ratings, Star Ratings, returns, and volatility, especially for Article 8 and Article 9 funds. The data indicate that SFDR has strengthened investor confidence in sustainability-focused funds, leading to increased assets and improved ratings for these funds while also contributing to reduced volatility. The growth in assets and higher ESG ratings post-SFDR suggest that investors are increasingly aligning their capital with funds that meet transparent, regulatory-backed sustainability standards.

Table 1. Summary Statistics on Fund Flows

This table provides summary statistics on fund flows and key fund characteristics for the period before the implementation of the Sustainable Finance Disclosure Regulation (SFDR). The data covers March 2019 to February 2021 in Panel A and March 2021 to August 2024 in Panel B and is organized by SFDR Article classifications (Article 6, Article 8, and Article 9). All statistics are calculated as the average over the period. The table shows the mutual fund's SFDR classification as of August 2024. All variables are defined under the data section.

Panel A. Pre-SFDR Summary Statistics (March 2019 to February 2021)

	SFDR Label			Total
	(1) Art. 6	**(2) Art. 8**	**(3) Art. 9**	**(4) Total**
Monthly Fund Flows, %	-0.32	-0.17	0.89	-0.22
Total Net Assets, €m	348.1	540.9	388.0	435.0
Globe Rating	2.94	3.30	3.75	3.14
Star Rating	3.02	3.29	3.23	3.15
Return, %	0.98	1.14	1.35	1.06
12-month Volatility, %	5.84	5.76	5.70	5.80
Number of observations	83,184	67,128	4,440	154,752

Panel B. Post-SFDR Summary Statistics (March 2021 to August 2024)

	SFDR Label			Total
	(1) Art. 6	**(2) Art. 8**	**(3) Art. 9**	**(4) Total**
Monthly Fund Flows, %	-0.37	-0.38	-0.07	-0.37
Total Net Assets, €m	419.8	666.3	736.5	536.9
Globe Rating	2.97	3.36	3.96	3.18
Star Rating	2.94	3.14	3.18	3.04
Return, %	0.58	0.55	0.46	0.56
12-month Volatility, %	4.32	4.51	4.78	4.42
Number of observations	145,572	117,474	7,770	270,816

Table 2. Summary Statistics on per SFDR Category and Morningstar Globe Rating

This table shows the number of funds classified as Article 6, Article 8 and Article 9 together with their Globe rating (Panel A) and fund size classified as Article 6, Article 8 and Article together with their Globe rating (Panel B). The table shows the mutual fund's SFDR classification, Globe rating and fund size as of August 2024. Percentages indicate Article 6, Article 8 and Article 9 distribution among Morningstar Globe Ratings.

Panel A. Total Number of Funds per SFDR Category and Globe Rating

SFDR Label / Globe Rating	1	2	3	4	5	Total
Art. 6	215	628	1,124	579	216	2,762
Art. 8	120	395	979	808	380	2,682
Art. 9	4	6	21	69	79	179
Total	**339**	**1,029**	**2,124**	**1,456**	**675**	**5,623**
% of Art. 6	7.8%	22.7%	40.7%	21.0%	7.8%	100.0%
% of Art. 8	4.5%	14.7%	36.5%	30.1%	14.2%	100.0%
% of Art. 9	2.2%	3.4%	11.7%	38.5%	44.1%	100.0%

Panel B. Total Fund Size per SFDR Category and Globe Rating

SFDR Label / Globe Rating	1	2	3	4	5	Total
Art. 6	59,117	380,409	490,310	145,030	57,424	1,132,292
Art. 8	38,265	180,328	484,707	422,695	149,141	1,275,138
Art. 9	399	507	8,196	48,442	26,393	83,939
Total	**97,782**	**561,245**	**983,214**	**616,168**	**232,959**	**2,491,369**
% of Art. 6	5.2%	33.6%	4.3%	1.3%	5.1%	100.0%
% of Art. 8	3.0%	14.1%	38.0%	33.1%	11.7%	100.0%
% of Art. 9	0.5%	0.6%	9.8%	57.7%	31.4%	100.0%

5. Research Questions and Design

This chapter explores the impact of SFDR on Globe ratings and fund flows, addressing both regulatory-side and market-side dynamics. The analysis is guided by two research questions: first, how SFDR relates to Globe ratings; and second, whether SFDR complements or substitutes private ESG metrics in shaping fund flows.

5.1. Research question 1: Do Article 8 or 9 funds increase their Morningstar Globe Rating after the implementation of SFDR?

The first research question examines the effect of SFDR on Globe ratings, a widely used private ESG metric that evaluates funds based on ESG risk relative to their peers. This aligns with research from Becker et al. (2022), who observe that SFDR improved Globe ratings for funds in the European Union compared to their U.S. counterparts, suggesting that the regulation enhances the transparency and credibility of ESG ratings.

Prior research underscores the influence of Globe ratings on investor behaviour. For instance, Amman et al. (2018) and Hartzmark and Sussman (2019) demonstrated that funds with higher Globe ratings attract significant inflows, while lower-rated funds experience outflows. Similarly, Ceccarelli et al. (2023) highlighted the impact of Morningstar's "low carbon" label on fund flows, emphasizing the importance of identifiable sustainability signals in capital allocation. Despite their significance, private ESG ratings face well-documented challenges, particularly inconsistencies across providers. Berg et al. (2021) highlighted substantial disparities in ESG assessments across rating agencies, creating confusion among investors and undermining trust in these metrics. SFDR addresses these issues by introducing a regulated disclosure framework that requires funds to report their sustainability strategies in a standardized, detailed, and transparent manner. This creates a more consistent benchmark for private metrics like the Globe rating to align with.

We hypothesize that SFDR positively influences Globe ratings for Article 8 and Article 9 funds through two primary mechanisms: enhanced ESG practices and improved transparency and quality of data. Firstly, SFDR incentivizes funds to enhance their ESG practices by introducing mandatory compliance requirements and increasing scrutiny of sustainability strategies. Fund managers must actively invest in ESG expertise and infrastructure to meet the regulation's stringent

standards. This includes hiring ESG specialists, improving data collection processes, and developing internal policies to address ESG risks. Martinez-Meyers et al. (2024) found that SFDR's implementation led to a measurable reduction in ESG risks and an improvement in ESG performance across a diverse sample of funds. These improvements were attributed to the resources and expertise allocated by fund managers to comply with SFDR's requirements. For example, SFDR mandates the reporting of Principal Adverse Impacts (PAIs), such as greenhouse gas emissions, exposure to controversial industries, and biodiversity impacts. These factors align closely with the ESG risks assessed by Globe ratings. By meeting SFDR's disclosure requirements, funds generate high-quality ESG data that address key risk factors. This enables funds to better demonstrate their sustainability practices to both investors and rating agencies. As a result, Article 8 and Article 9 funds are well-positioned to achieve higher Globe ratings by aligning their practices with regulatory expectations and improving their sustainability performance.

Secondly, SFDR mandates more granular and comprehensive sustainability disclosures, significantly improving the quality and standardization of data available to rating agencies like Morningstar. By requiring funds to report on sustainability strategies in a consistent format, the regulation reduces information asymmetries and improves the ability of investors and rating agencies to assess ESG risks. Globe ratings rely on detailed portfolio-level data to evaluate funds' ESG risks relative to their peers. Prior to SFDR, the lack of standardized reporting among funds made it challenging for rating agencies to conduct accurate and comparable assessments. SFDR resolves this issue by requiring funds categorized as Article 8 and Article 9 to provide transparent and consistent disclosures. This includes mandatory reporting on metrics such as carbon intensity, exposure to fossil fuels, and alignment with international sustainability goals. The availability of higher-quality data enables Morningstar to perform more precise ESG risk evaluations. Funds that comply with SFDR's rigorous disclosure requirements are more likely to demonstrate robust sustainability credentials, which in turn increases their Globe ratings. By reducing ambiguity and ensuring consistency across disclosures, SFDR enhances the credibility and reliability of ESG assessments.

The regulation introduces a structured framework that explicitly ties sustainability practices to compliance. This structured approach makes investments in ESG expertise, data collection, and internal processes more justifiable to fund managers and stakeholders. The combination of improved practices and better data creates a virtuous cycle: funds enhance their ESG performance

to comply with SFDR, which generates high-quality disclosures that align with Morningstar's evaluation criteria, resulting in higher Globe ratings. To test this hypothesis, we employ a Difference-in-Differences approach, which captures the differential impact of SFDR on Morningstar Globe ratings in the post-implementation period. The regression model is specified as follows:

$$Globe_{i,t} = \alpha + \beta_0 \times Treat_i + \beta_1 \times Post_t + \beta_2 \times (Treat_i \times Post_t) + Controls_{i,t} + \mu_{i,t}$$

The dependent variable in the model is *Globe*, representing the Globe rating for fund *i* at time *t*. The key variable of interest is the coefficient of the interaction term *Treat* × *Post,* which captures the differential impact of SFDR on the Globe ratings of treated funds during the post-implementation period. To control for potential biases arising from time-invariant effects we include fund-fixed effects in the regression model and estimate the model using fund-clustered standard errors. Fixed effects control for time-invariant characteristics of funds, such as their management style or historical performance, which may affect their Globe ratings independently of SFDR. We cluster standard errors on the fund level to account for unobserved heterogeneity. This approach is consistent with recent research, such as Becker et al. (2022) and Ceccarelli et al. (2023), which underscores the importance of controlling for fund-level heterogeneity in ESG studies. Additionally, we align with Becker et al. (2022) in controlling for other time-varying factors that may influence Globe ratings; returns, fund flows, fund age and total net assets. These factors account for observable characteristics that might independently affect Morningstar Globe ratings.

To ensure comparability between treatment and control groups, we use 1:1 neighbour matching to create matched samples of treatment and control groups consistent with prior studies (e.g., Ammann et al., 2018, and Hartzmark and Sussman, 2019, Becker et al. 2022, Michl and Schmid, 2022). This method pairs funds from the treatment and control groups that are similar in observable characteristics, such as size, returns, fund age, volatility and Star rating. The rationale for using 1:1 neighbour matching is to reduce selection bias and create a quasi-experimental setting that mimics randomized controlled trials. Rosenbaum and Rubin (1983) argued that matching methods improve the validity of causal inferences by ensuring that treatment and control groups

are balanced on key covariates. In the context of this study, matching helps isolate the effect of SFDR by minimizing confounding differences between funds. We create three matched samples of treatment and control group combinations to ensure robustness:

1. Article 6 funds as the treatment group, with Article 8 and Article 9 funds as the control group.
2. Article 8 funds as the treatment group, with Article 6 funds as the control group.
3. Article 9 funds as the treatment group, with Article 6 funds as the control group.

Based on the findings from Becker et al. (2022), we expect a positive significant coefficient for the interaction term in the matched samples (2) and (3), and a negative coefficient for the interaction term in the matched sample (1). This would indicate that SFDR leads to a higher Globe rating for funds classified as either Article 8 or Article 9 after the SFDR implementation, and a decrease in Globe rating for Article 6 funds. This finding would provide evidence that SFDR's disclosure requirements not only enhance transparency but also improve the alignment of private ESG metrics with regulatory standards.

5.2. Research question 2: Does SFDR substitute the Morningstar Globe Rating in influencing fund flows to Article 8 and 9 funds?

Building on the findings of our first research question, which studies SFDR's effect on Globe ratings, the second research question shifts focus to the interaction between SFDR classifications and Globe ratings in predicting fund flows. This question seeks to determine whether SFDR complements or substitutes Globe ratings in guiding investors' capital allocation decisions.

Extensive research has established that higher Globe ratings lead to greater fund flows. Amman et al. (2018) and Hartzmark and Sussman (2019) demonstrated that funds with higher Globe ratings attract significant inflows, while those with lower ratings experience outflows, underscoring the importance of sustainability signals in guiding investor decisions. Similarly, Morningstar Direct (2021) found that funds with higher Globe ratings consistently outperformed their peers in terms of capital inflows, indicating that ESG ratings serve as a critical factor in investors' decision-making processes. Additionally, Ceccarelli et al. (2023) showed that

Morningstar's "low carbon" label, a closely related ESG signal, had a substantial positive impact on fund flows, reinforcing the role of transparent non-financial metrics in shaping capital allocation.

The interplay between SFDR classifications and fund flows has also been examined. Becker et al. (2022) showed that Article 8 and Article 9 funds, which adhere to stricter sustainability standards, attracted significantly higher fund flows following SFDR's implementation. Similarly, Michl and Schmid (2022) demonstrated that SFDR positively influenced capital flows to these sustainability-focused funds. Our replication of Becker et al. (2022) regression on our data sample (Appendix A5) confirms these findings, revealing that Article 8 funds experienced a consistent increase in fund flows post-SFDR. This suggests that SFDR classifications effectively attract investor attention to funds promoting environmental and social characteristics. However, the results for Article 9 funds reveal a nuanced dynamic: while these funds continued to outperform Article 6 funds in attracting flows, the incremental benefit of SFDR classifications appears less pronounced for funds already positioned as highly sustainable. This indicates that Article 9 funds may have reached a saturation point where their sustainability credentials are already well-recognized by investors, reducing the marginal impact of SFDR on their flows. This research question thus sheds light on how SFDR classifications and Globe ratings collectively shape investor behaviour, offering insights into their complementary and potentially substitutive roles in driving capital allocation.

The rationale for this hypothesis is grounded in signalling theory, which posits that clear and credible signals are essential for reducing information asymmetry in markets. Regulatory classifications such as SFDR provide a government-endorsed signal that mitigates concerns about greenwashing and increases transparency. Delmas and Burbano (2011) noted that regulatory frameworks often outperform voluntary private labels in curbing greenwashing because they establish enforceable standards. By distinguishing genuinely sustainable funds from those that may exaggerate their commitments, SFDR classifications could reshape investor reliance on private ESG ratings.

The interaction between SFDR and Globe ratings forms the focus of this question. On the one hand, SFDR could act as a substitute for Globe ratings by providing a stronger regulatory signal, reducing the incremental value of private ratings. Becker et al. (2022) observed that Article

8 and Article 9 funds attracted significant inflows post-SFDR, suggesting that the regulation's classifications serve as an independent signal for investors. On the other hand, SFDR could complement Globe ratings, amplifying their combined impact. Marquis et al. (2016) found that private metrics, such as third-party certifications or ratings, gain additional credibility when paired with regulatory oversight, as the combination mitigates concerns about biases or inconsistencies in private evaluations. Specifically, their study demonstrated that when private sustainability labels (e.g., certifications or ratings) operate alongside enforceable regulatory standards, investors perceive these private metrics as more trustworthy. This dual-layer validation strengthens the signalling power of private metrics, leading to enhanced investor confidence. Their analysis revealed that organizations or financial products performing well on both regulatory standards and private metrics received significantly higher capital inflows compared to those excelling in only one area, highlighting the complementary nature of these two systems in influencing investor behaviour.

To test our question of SFDR's role as a substitute or complement to the Globe rating, we estimate the following regression model:

$$Flows_{i,t} = \alpha + \beta_1 \times Globe_{i,t} + \beta_2 \times Treat_t + \beta_3 \times (Globe_{i,t} \times Treat_t) + Controls_{i,t} + \mu_{i,t}$$

In this model, fund flows are the dependent variable, measured as the monthly change in net assets for fund *i* at time *t*. The key independent variables include the Globe rating *Globe* and SFDR classifications *Treat*, indicating whether a fund is categorized as Article 6, Article 8 or Article 9. The interaction term *Globe*×*Treat* is of particular interest, as it captures the combined effect of SFDR classifications and Globe ratings on fund flows. This term provides insights into whether SFDR acts as a complement to private ESG ratings by amplifying their impact on fund flows or as a substitute by diminishing the incremental value of Globe ratings in guiding investor behaviour. To control for potential biases arising from time-invariant effects we include fund-fixed effects in the regression model and estimate the model using fund-clustered standard errors following Becker et al. (2022). Additional control variables fund size, age and returns are included to capture other determinants of fund flows. For example, larger funds may naturally attract more investor attention, while funds with lower volatility appeal to risk-averse investors. These controls

ensure that the observed effects of SFDR and Globe ratings are not confounded by unrelated fund characteristics, aligning the analysis with prior studies such as Ammann et al. (2018) and Becker et al. (2022).

The analysis is conducted separately for pre- and post-SFDR periods, allowing us to measure how fund flows respond to Globe ratings and SFDR classifications in these distinct periods. We do not expect to find any significant results for the treated funds during the pre-SFDR period, as the classifications were not yet readily available. This serves as a placebo test to confirm the absence of SFDR-related effects before its implementation.

The methodology for 1:1 neighbour matching mirror that of the first research question. Matching ensures balanced treatment and control groups by pairing funds with similar observable characteristics, such as size, age, and historical returns.

The expected outcomes hinge on the sign and significance of the coefficient of the interaction term *Globe*×*Treat*. A negative coefficient would indicate that SFDR substitutes Globe ratings by reducing their incremental influence on fund flows, reflecting a shift toward reliance on the SFDR classification. Conversely, a positive coefficient for the interaction terms, would suggest that SFDR complements Globe ratings, amplifying their combined effect and reinforcing investor confidence in sustainability-focused funds. We expect to find a negative coefficient for the interaction term in the matched samples (2) and (3), as we believe that investors will look towards SFDR as a substitute for Globe ratings. We do not expect to find a significant result for the interaction term in the first matched sample (1).

6. Results

To test our hypotheses, we generate subsamples of funds using propensity scores paired on the nearest neighbour method. Propensity score matching is commonly used in observational studies to estimate the effect of a treatment or intervention by adjusting for variables that predict treatment assignment (Ammann et al., 2018). This approach helps create comparable subsamples based on observed characteristics such as fund size, returns and volatility, allowing for a more accurate assessment of the impact of the treatment. The 1:1 nearest neighbour method, also known as greedy matching, pairs the closest eligible control unit with the treated unit based on control characteristics. This is the most common form of propensity score matching (Thoemmes and Kim, 2011) and has been used in similar studies previously (e.g., Ammann et al., 2018, and Hartzmark and Sussman, 2019, Becker et al. 2022, Michl and Schmid, 2022).

We conduct the matching in three steps. First, we define the treatment group in three different settings. In the first setting, we use Article 6 funds as the treatment group and Article 8 and 9 funds as the control group. In the second setting, we use Article 8 funds as the treatment group and Article 6 funds as the control group. In the third setting, we use Article 9 funds as the treatment group and Article 6 funds as the control group. We match the funds based on their SFDR classifications in August 2024, and keep the matched subsamples constant over time, consistent with Ammann et al. (2018). Second, to calculate propensity scores, we run logistic regressions for each of the four settings defined above. As the dependent variable, the model uses the treatment indicator (SFDR label) as a dummy variable, 1 for the respective Article and 0 otherwise. For example, in the first setting, Article 6 funds would be equal to one while Article 8 and 9 funds would be equal to zero. We match the funds based on the independent variables fund returns, fund volatility, fund size and the Morningstar Star rating. We deliberately do not use Globe ratings as a factor when matching the funds because of the explanatory value of keeping funds with varying Globe ratings in the matched sample and because it is our independent variable. We use the two-year average before the SFDR implementations of independent variables to match our funds, i.e., the average between March 2019 to February 2021. The result from the regression is fitted values ranging from 0 to 1 representing the estimated probability that the observation is in the treatment group. Third, we match funds in the treatment group with funds in the control group based on the 1:1 nearest neighbour method. Consistent with previous literature, we drop all matched pairs with a propensity score differing by more than 0.025 (e.g., Ammann et al. 2018). See Appendix A6 and

A7 for a robustness test using a propensity score differing of 0.01 (A6) and 0.04 (A7). We do not allow multi-matching between our control group and treatment group.

We end up with a treatment group and a matched control group with similar fund characteristics. Table 3 indicates that there are few significant differences between funds in the treatment and control groups. In Panel A, Panel B, and Panel C we show the difference test and significance between our matched funds. Notably, the mean fund sizes differ significantly between all matched settings (Panel A – Panel C). However, this is not considered a problem in the models since we weight fund flows as a percentage of the fund size. Furthermore, Panel A show significant mean differences in fund returns. This is not considered a significant problem for our analysis, as the models include fund returns as a control variable, ensuring that any observed effects are attributed to Article 8 and Article 9 classifications rather than differences in fund performance.

6.1. Research question 1: Do Article 8 or 9 funds increase their Morningstar Globe Rating after the implementation of SFDR?

The results of the Difference-in-Differences regression analysis which examined the impact of the SFDR on Globe ratings are presented in Table 4. Three matched-pair settings were analysed: Article 6 funds compared to Articles 8 and 9 funds (Column 1), Article 8 funds compared to Article 6 funds (Column 2) and Article 9 funds compared to Article 6 funds (Column 3). The dependent variable across all models is the Globe rating, and the key independent variable is the interaction term *Treat* × *Post*, which captures the differential effect of SFDR implementation on Globe ratings.

The analysis reveals several notable findings. Foremostly, that in the Article 6 compared to Articles 8 and 9 comparison (Column 1), the interaction term is negative and statistically significant, demonstrating that Article 6 funds faced a relative decline in Globe ratings after the implementation of SFDR. This suggests that SFDR has disproportionately benefited funds with higher sustainability classifications (Articles 8 and 9), as these funds appear to have improved their ESG practices as well as the quality of data disclosed relative to Article 6 funds.

In Column 2, which compares Article 8 funds to Article 6 funds, the interaction term is positive and statistically significant. This result indicates that Article 8 funds underwent an increase in their Globe ratings relative to Article 6 funds following SFDR implementation.

Table 3: Propensity Score Matching sample comparison

This table reports the treatment and control group mean and median values as well as the mean and median difference for all control characteristics used when matching the samples. All variables are matched on the 2-year average before the SFDR implementation, i.e. the average of the variables between March 2019 and February 2021. Panel A shows the mean and median values of the matched samples in the Art. 6 (treatment group) versus Art. 8 and Art. 9 (control group) setting, Panel B shows the mean and median values of the matched samples in the Art. 8 (treatment group) versus Art. 6 (control group) setting, and Panel C shows the mean and median values of the matched samples in Art. 9 (treatment group) versus Art. 6 (control group). The SFDR articles are held constant and classified as per August 2024. All control variables are defined under the data section. Significance is reported in the difference test, where *, **, and ***, show significance at 10%, 5% and 1% levels.

Panel A. Matched sample comparison Art. 6 funds versus Art. 8 and Art. 9 funds

	Treatment		Control		Difference test (p-value)	
	Mean	Median	Mean	Median	Mean	Median
Return, %	0.75	1.2	0.73	1.2	0.02**	0.00
12-month volatility, %	5.84	6.6	5.83	6.6	0.01	-0.01
Total Net Assets, €m	391.46	391.2	412.33	410.7	-20.88	-19.43***
Star Rating	3.14	3.1	3.16	3.2	-0.02	-0.02
Fund Age	14.75	14.7	14.75	14.7	0.00	0.00

Panel B. Matched sample comparison Art. 8 funds versus Art. 6 funds

	Treatment		Control		Difference test (p-value)	
	Mean	Median	Mean	Median	Mean	Median
Return, %	0.75	1.28	0.76	1.26	-0.02	0.02
12-month volatility, %	5.81	6.54	5.80	6.51	0.01	0.02
Total Net Assets, €m	422.51	421.69	403.70	403.20	18.81	18.50***
Star Rating	3.19	3.19	3.19	3.18	0.00	0.01
Fund Age	14.77	14.77	14.77	14.76	0.00	0.01

Panel C. Matched sample comparison Art. 9 funds versus Art. 6 funds

	Treatment		Control		Difference test (p-value)	
	Mean	Median	Mean	Median	Mean	Median
Return, %	0.92	1.50	0.94	1.53	-0.02	-0.02
12-month volatility, %	5.61	6.25	5.65	6.31	-0.04	-0.06
Total Net Assets, €m	358.69	338.64	318.60	308.59	40.08	30.05*
Star Rating	3.21	3.15	3.25	3.27	-0.03	-0.12
Fund Age	12.82	12.84	13.12	13.11	-0.30	-0.27

This supports the hypothesis that SFDR's regulatory framework incentivized sustainable practices within Article 8 funds, leading to measurable improvements in their ESG performance.

Column 3 compares Article 9 funds to Article 6 funds and show an even larger positive coefficient for the interaction term. This suggests that Article 9 funds, which explicitly pursue sustainable objectives, experienced the most substantial improvement in Globe ratings compared to Article 6 funds. These findings reinforce the hypothesis that Article 9 funds, by virtue of their higher sustainability objectives, benefited the most from the introduction of SFDR.

The control variables provide additional insights. Fund age is positively and significantly associated with higher Globe ratings across all settings, suggesting that older funds tend to achieve better ESG ratings, possibly due to their established practices and resources. The effect of fund size is mixed, with a small negative but significant coefficient in the Article 9 versus Article 6 comparison, showing that larger Article 9 funds may face challenges in maintaining top-tier ESG performance. Returns and fund flows are not statistically significant across models, suggesting that Globe ratings are less sensitive to short-term performance metrics and more impacted by structural and regulatory factors like SFDR.

Overall, these results confirm our hypothesis, demonstrating that SFDR has had a positive and significant impact on Globe ratings for Article 8 and Article 9 funds compared to Article 6 funds. However, Article 9 funds, which explicitly pursue sustainable investment objectives, experienced the largest improvements.

6.2. Research question 2: Does SFDR substitute the Morningstar Globe Rating in influencing fund flows to Article 8 and 9 funds?

Table 5 presents the results of an interaction analysis examining how the implementation of the SFDR affects the relationship between Globe ratings and fund flows. The model explores the interaction between Globe ratings and SFDR classifications (e.g., Article 6, Article 8, Article 9) to determine whether SFDR complements or substitutes Globe ratings in influencing fund flows. The analysis is divided into two panels: pre-SFDR (Panel A) and post-SFDR (Panel B), allowing for comparisons of how the relationship evolves before and after the implementation of the regulation. Fund flows are the dependent variable, while the key interaction term, $Globe \times Treat$, measures the extent to which SFDR alters the effect of Globe ratings on fund flows.

Before the implementation of SFDR (Panel A), the interaction term $Globe \times Treat$ is not statistically significant across all comparisons. This indicates that, prior to the implementation of SFDR, Globe ratings influenced fund flows similarly across all SFDR classifications. This aligns with our expectations, as the treatment group serves as a placebo test, given that SFDR had not yet been introduced.

In the post-SFDR period (Panel B), the results reveal significant changes in the interaction between Globe ratings and SFDR classifications, particularly for Article 8 funds. For Article 6 compared to Articles 8 and 9 (Column 1), the interaction term remains insignificant, therefore highlighting no substantial change in the influence of Globe ratings on fund flows for Article 6 funds. However, for Article 8 compared to Article 6 (Column 2), the interaction term becomes negative and statistically significant. This suggests that SFDR partially substitutes the Globe rating as a sustainability signal for Article 8 funds, with investors increasingly relying on SFDR classifications and placing less emphasis on Globe ratings. For Article 9 compared to Article 6 (Column 3), the interaction term remains insignificant. This result may reflect that Article 9 funds, as the most sustainable classification, already rely heavily on their ESG reputation and image, making the incremental value of Globe ratings less relevant. Control variables in the post-SFDR period remain consistent with the pre-SFDR findings. Fund size, fund age, and returns continue to exhibit positive and significant associations with fund flows, underscoring their importance in driving investor behaviour.

The results partially support our hypothesis, demonstrating that SFDR modifies the relationship between Globe ratings and fund flows, however this is only applicable for Article 8 funds. The significant and negative interaction term for Article 8 funds indicates that SFDR partially substitutes the Globe rating as a signal of sustainability in this classification. However, for Article 9 funds, the interaction terms remain insignificant, suggesting that the substitution effect is not uniform across all classifications.

Table 4: Difference-in-Difference Regression on Globe Rating

This table presents a difference-in-difference analysis of Morningstar Globe ratings using the three settings of matched pairs. Column (1) shows the Art. 6 (treatment) and Art. 8 & Art. 9 (control) setting, Column (2) shows the Art. 8 (treatment) and Art. 6 (control) setting, and Column (3) shows the Art. 9 (treatment) and Art. 6 (control) setting. The table shows the time-period March 2019 to August 2024. The dependent variable in the model is the Globe rating and the independent variables are Post (equal to one after the SFDR implementation, March 2021), fund size, fund age, fund returns, fund flows and Treat. Treat is a dummy taking the value one if the fund is classified as Art. 6 (Column 1), Art. 8 (Column 2), Art. 9 (Column 3). The interaction term Post x Treat highlights the impact of the SFDR label on the Globe rating after the introduction of SFDR. The model estimates fund fixed effects and clusters standard errors on the fund level. T-statistics are reported in parentheses where *, **, and ***, show significance at 10%, 5% and 1% level.

	Globe Rating		
	(1) Art. 6	**(2) Art. 8**	**(3) Art. 9**
Treat x Post	-0.066***	0.070***	0.130*
	(0.022)	(0.023)	(0.074)
Post	0.021	-0.044***	-0.110**
	(0.015)	(0.015)	(0.047)
Total Net Assets, €m	-0.00002	-0.00001	-0.0001*
	(0.00002)	(0.00002)	(0.00005)
Fund Age	0.018***	0.018***	0.065***
	(0.004)	(0.004)	(0.013)
Return, %	0.00003	-0.00001	0.001
	(0.0002)	(0.0002)	(0.001)
Monthly Fund Flows, %	0.001	0.0001	-0.003
	(0.0005)	(0.0005)	(0.002)
Number of Observations	277,511	254,461	19,891
R2	0.003	0.003	0.028
Fund fixed effects	Yes	Yes	Yes
Clustered standard-errors	Yes	Yes	Yes

Table 5: Interaction model Regression on Fund Flows

This table presents an interaction analysis of Globe ratings and SFDR on the effect of fund flows. Column (1) shows the Art. 6 (treatment) and Art. 8 & Art. 9 (control) setting, Column (2) shows the Art. 8 (treatment) and Art. 6 (control) setting, and Column (3) shows the Art. 9 (treatment) and Art. 6 (control) setting. The matching procedure includes a propensity score difference of maximum 0.025. The model uses fund flows as its dependent variable and Globe rating, fund size, fund age, fund returns and Treat as the independent variables. Treat is a dummy taking the value one if the fund is classified as either Art. 6 (Column 1), Art. 8 (Column 2) or Art. 9 (Column 3). The interaction term Globe rating x Treat highlights the effect SFDR has on Globe rating's effect on fund flows. The model estimates fund fixed effects and clusters standard errors on the fund level. T-statistics are reported in parentheses where *, **, and ***, show significance at 10%, 5% and 1% level.

	Fund Flows		
Panel A. Pre-SFDR	**(1) Art. 6**	**(2) Art. 8**	**(3) Art. 9**
Globe Rating x Treat	0.035	-0.048	0.220
	(0.063)	(0.067)	(0.200)
Globe Rating	0.028	0.053	0.130
	(0.043)	(0.049)	(0.130)
Total Net Assets, €m	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)
Fund Age	0.044***	0.049***	0.038***
	(0.003)	(0.003)	(0.012)
Return, %	0.400***	0.420***	0.470***
	(0.037)	(0.037)	(0.130)
Number of Observations	112,262	103,058	8,007
R2	0.014	0.015	0.017
Firm fixed effects	Yes	Yes	Yes
Clustered standard-errors	Yes	Yes	Yes
Panel B. Post-SFDR	**(1) Art. 6**	**(2) Art. 8**	**(3) Art. 9**
Globe Rating x Treat	0.100	-0.140**	0.049
	(0.064)	(0.068)	(0.250)
Globe Rating	-0.053	0.042	-0.180
	(0.048)	(0.046)	(0.170)
Total Net Assets, €m	0.001***	0.001***	0.001**
	(0.000)	(0.000)	(0.000)
Fund Age	0.017***	0.021***	0.016*
	(0.002)	(0.003)	(0.008)
Return, %	0.430***	0.390***	0.530***
	(0.030)	(0.030)	(0.092)
Number of Observations	154,959	142,344	10,842
R2	0.009	0.008	0.013
Firm fixed effects	Yes	Yes	Yes
Clustered standard-errors	Yes	Yes	Yes

7. Discussion

7.1. Implications

7.1.1. Research question 1: Do Article 8 or 9 funds increase their Morningstar Globe Rating after the implementation of SFDR?

Our findings show that funds categorized under SFDR Articles 8 and 9 experienced significant improvements in their Globe ratings after SFDR implementation, whereas Article 6 funds faced declines. These trends underscore the impact of SFDR on aligning fund practices with the data requirements of Globe ratings while also illustrating the complementary but distinct roles these systems play in shaping ESG disclosures and assessments. These findings align with Becker et al. (2022), who demonstrated that SFDR improved sustainability metrics for EU funds relative to their U.S. counterparts, and Michl and Schmid (2022), who observed similar improvements in ESG performance metrics following SFDR's implementation.

Globe ratings are derived from portfolio-level data, offering a granular evaluation of the ESG risks associated with a fund's underlying holdings. Sustainalytics, the primary data provider for Morningstar, conducts detailed assessments of both corporate and sovereign risks, producing a fund-level ESG risk score. This evaluation incorporates unmanaged ESG risks across key factors such as greenhouse gas emissions, biodiversity impacts, and governance practices, with a focus on how these risks might affect the long-term economic value of the fund's investments. The ratings are therefore highly dependent on the quality and depth of information available about the portfolio, as well as the transparency with which that data is disclosed. This need for high-quality data underscores findings from Berg et al. (2021), who highlighted inconsistencies in private ESG ratings due to variability in data availability and quality. In contrast, SFDR operates at both the entity and product levels, emphasizing standardized disclosure requirements that create a uniform baseline for sustainability reporting. The framework categorizes funds into Articles 6, 8, and 9, which differ in the scope and detail of information they must provide. Article 6 funds are required to disclose how they integrate sustainability risks into their investment processes, but they do not promote sustainability explicitly. Article 8 funds, which promote environmental or social characteristics, must disclose how these characteristics are achieved, including reporting on Principal Adverse Impacts (PAIs) such as exposure to controversial sectors or carbon intensity. Article 9 funds, which pursue sustainability as a primary objective, are held to the highest standards,

requiring detailed explanations of how their investments contribute to specific environmental or social goals. These distinctions reflect SFDR's role in creating a clear framework that differentiates sustainable investments from traditional ones, as noted by Delmas and Burbano (2011), who emphasize the importance of transparency to mitigate greenwashing risks.

The link between SFDR and Globe ratings lies in how these systems complement each other by addressing different levels of ESG evaluation. SFDR's emphasis on transparency and standardization creates a structured foundation for the data used by rating agencies like Morningstar. For example, SFDR's mandatory reporting on PAIs overlaps with many of the ESG factors assessed by Sustainalytics, such as carbon emissions and exposure to unsustainable industries. Funds that comply with SFDR's rigorous disclosure requirements are better positioned to provide the granular data necessary for higher Globe ratings. This complements findings from Michl and Schmid (2022), who noted that SFDR's transparency requirements incentivize fund managers to adopt practices that align with private ESG evaluations.

Furthermore, the alignment between SFDR and private ratings methodologies enables more precise ESG risk assessments. By standardizing the reporting practices of funds across Europe, SFDR reduces the information asymmetries that have historically hindered the accuracy of private ESG evaluations. This alignment has been particularly beneficial for funds under Articles 8 and 9, whose enhanced reporting has contributed to significant improvements in their Globe ratings. These results illustrate SFDR's dual impact: on one hand, it compels funds to adopt more robust ESG practices to meet regulatory standards, and on the other, it equips rating agencies with the data needed to refine their assessments. This is consistent with findings from Becker et al. (2022), who showed that SFDR raised sustainability performance across the board by incentivizing better data collection and ESG expertise.

The decline in Globe ratings for Article 6 funds can be attributed to two primary factors. First, the relative improvement of Article 8 and Article 9 funds post-SFDR implementation creates a peer comparison disadvantage for Article 6 funds. Since Globe ratings are relative metrics, the significant advancements in ESG practices and disclosures by Article 8 and 9 funds make Article 6 funds appear weaker in comparison, even if their performance remains unchanged. Second, recalibration of Globe ratings methodology in response to SFDR may shift the emphasis toward factors that align closely with Article 8 and 9 disclosure requirements, inadvertently disadvantaging

Article 6 funds, which are not subject to these standards. These factors collectively explain the observed decline in Globe ratings for Article 6 funds.

These findings have critical implications for stakeholders. For fund managers, the observed link between SFDR and improved Globe ratings emphasizes the strategic importance of aligning fund practices with regulatory standards and private ESG evaluations. Investing in ESG data collection, analytics, and expertise not only enhances compliance with SFDR but also positions funds favourably for higher Globe rating. For investors, SFDR can give complementary information to the Globe ratings, which underscores the importance of considering both regulatory classifications and portfolio-level evaluations when making capital allocation decisions. Furthermore, as Delmas and Burbano (2011) note, clear and standardized disclosures like those under SFDR play a critical role in building investor confidence and channelling capital toward sustainable investments.

These findings demonstrate how SFDR's standardized disclosure requirements enhance the data quality used by Globe ratings, driving significant improvements for Article 8 and 9 funds. This underscores the critical role of regulatory frameworks in shaping both fund practices and ESG evaluations, offering investors clearer benchmarks for sustainable investing.

7.1.2. Research question 2: Does SFDR substitute the Morningstar Globe Rating in influencing fund flows to Article 8 and 9 funds?

The findings suggest that SFDR classifications are influential in how sustainability is assessed, particularly for Article 8 funds, where evidence indicates a substitution effect with private metrics such as the Globe rating. This reliance has significant implications for policy, fund behaviour, and investor decision-making. While SFDR's standardized framework improves transparency, it raises concerns about balancing its simplicity with the depth and nuance provided by certain private ESG metrics.

The significant negative interaction between Globe ratings and SFDR for Article 8 funds suggests that investors are placing less emphasis on private metrics after the SFDR implementation. This substitution with SFDR may lead to loss of information previously gained through private ESG metrics. Private ratings push funds to exceed regulatory requirements by fostering broader ESG practices. Meanwhile, SFDR's binary classification risks creating a "race to the middle,"

where funds aim only to meet minimum thresholds (for example being classified as Article 8) instead of striving for more ambitious sustainability goals.

For policymakers, SFDR's growing prominence presents significant challenges. Its success in standardizing sustainability classifications highlights its influence on financial markets, but ambiguities in the definitions of Articles 8 and 9, as noted by the European Supervisory Authorities (ESA, 2024), increase the risk of greenwashing and could erode investor trust. This necessitates refinements, such as clarifying definitions or introducing independent verification mechanisms. However, overcomplicating SFDR risks making it less accessible and harder for stakeholders to implement effectively. To refine regulatory frameworks, it is essential to study how SFDR is being used in practice. Are investors relying on it to filter funds or as a substitute for private ESG metrics? Understanding these dynamics can help policymakers design regulations that not only improve transparency but also align with market behaviour, avoiding unintended consequences while supporting sustainable investment practices.

For fund managers, prioritizing SFDR compliance might divert resources from enhancing private ESG metrics, potentially leading to less focus on governance quality or forward-looking ESG practices emphasized by these metrics. While alignment with SFDR ensures regulatory compliance, it may hinder innovation and reduce the diversity of ESG approaches in the market. Funds classified as Article 6 face additional challenges, as SFDR's binary framework categorizes them as "non-sustainable" despite potentially incorporating strong ESG practices. This risks sidelining ESG-friendly funds that do not meet the specific criteria for Article 8 or Article 9, limiting recognition of their contributions to sustainability.

Investor behaviour may also be impacted by increased reliance on SFDR classifications as a shortcut for assessing sustainability, potentially leading to reduced engagement with the detailed evaluations provided by private metrics. While this might simplify decision-making, it risks misallocating capital. Investors may favour funds that technically meet SFDR requirements (Article 8 or Article 9) but lack substantive ESG practices, while overlooking funds outside SFDR classifications (Article 6) that demonstrate genuine sustainability efforts. This could occur if investors indiscriminately exclude all Article 6 funds, despite some exhibiting strong ESG credentials.

Delmas and Burbano (2011) highlight how transparency frameworks with vague criteria or weak enforcement can exacerbate greenwashing risks, allowing entities to meet formal requirements without delivering real-world sustainability outcomes. If SFDR's definitions remain ambiguous or poorly enforced, similar risks could emerge. Over time, this emphasis on regulatory adherence over substantive ESG impact might shift capital away from investments that address systemic sustainability challenges, undermining the financial sector's ability to contribute to long-term environmental and social objectives.

The absence of a significant interaction between Globe ratings and SFDR for Article 9 funds indicates that these funds, already seen as highly sustainable due to their explicit objectives, rely more on their established ESG reputation. For these funds, additional classification or rating systems offer little incremental value in attracting investors, suggesting they have reached a credibility threshold where further categorization offers diminishing returns.

The consideration of the relationship between Globe ratings and SFDR classifications adds a novel dimension to the literature, providing insights into how regulatory frameworks affect the role of private ESG metrics. Previous studies have examined SFDR's overall impact but have not explicitly analysed its substitutive role for private ratings (e.g., Becker et al., 2022). These findings show that SFDR has shifted investor focus for Article 8 funds, offering a more accessible and standardized framework while addressing concerns over the variability of private ESG ratings. This analysis highlights how Article 8 funds reshape the relative importance of sustainability signals and provides a clearer framework for investors. These findings additionally suggest that SFDR classifications have become an important signal of sustainability, providing investors with a level of confidence previously associated with private ratings. This shift emphasises the importance of regulatory classifications in addressing the variability and opacity of private ESG ratings, as highlighted by Berg et al. (2021). For investors this means that the Article 8 SFDR classification is seen as a reliable benchmark, reducing the perceived necessity of Globe ratings.

Combining the two research questions, the findings reveal that SFDR has successfully driven improvements in ESG practices from a regulatory perspective, particularly in Article 8 and 9 funds. From a market perspective, investors have shown reduced reliance on private ESG metrics for their investment decisions, favouring SFDR classifications instead. This suggests that while SFDR has

encouraged funds to disclose their ESG practices, its classifications may not be ideally suited as a standalone ESG metric for guiding market-driven investment decisions.

7.2. Limitations

Despite its valuable insights, this study on SFDR's impact is subject to several limitations, many of which are grounded in the challenges of data reconstruction and classification consistency. One critical issue arises from the reliance on reconstructed SFDR classifications, where historical categorizations were inferred retrospectively based on their classifications in August 2024. This approach may inadvertently introduce bias as the assumption that fund classifications remain static over time does not account for nuances in fund reclassifications. According to Morningstar's Q3 2024 report, only around ten funds changed classifications within the quarter, suggesting that such changes are rare (Morningstar Sustainalytics, 2024). However, this small sample size limits the applicability of such observations and emphasizes the need for more granular historical data at monthly intervals to enhance accuracy. In addition, the small sample size of Article 9 funds presents challenges for statistical inference. With only a small fraction of funds classified under this category, the findings may not fully capture the broader implications for these funds. This limitation highlights the need for larger, more diverse datasets to validate the observed trends.

One shortcoming of the SFDR data lies in the default classification of unlabelled funds as Article 6. This prevents differentiation between funds genuinely lacking ESG compliance and those intentionally avoiding classification to sidestep the extensive disclosure requirements and associated reporting costs. For instance, smaller asset managers may find that the expenses of obtaining light or dark green classifications outweigh the perceived advantages. As a result, Article 6 funds that could potentially meet the criteria for Article 8 or Article 9 classifications may skew the dataset, reducing the distinction between labelled and unlabelled funds.

Finally, the study does not disentangle the potential influence of fund branding or pre-existing reputational effects, a dynamic explored by Michl & Schmid (2022). Their work highlights that funds with established sustainability reputations and strong branding often attract investors regardless of their regulatory classifications, leveraging their perceived ESG credibility to drive inflows. This implies that some of the observed fund flows in this study may be influenced by these pre-existing reputational advantages, rather than being solely attributable to SFDR classifications.

Such branding effects could create a confounding factor, where the credibility and recognition of a fund's name or history of ESG alignment play a significant role in shaping investor behaviour. Future research could address this limitation by explicitly isolating the effects of branding from regulatory classifications. A potential approach to account for this influence would involve analysing fund names, as many funds explicitly incorporate terms like "sustainable," "green," or "ESG" into their titles to signal their commitment to sustainability. By controlling for such naming conventions, researchers could better differentiate between inflows driven by perceived reputational advantages and those resulting from SFDR classifications. Also, incorporating reputational metrics, such as historical ESG ratings or media coverage, could further clarify the extent to which branding influences investor decisions relative to regulatory signals. Addressing these factors would enhance the robustness of the analysis and provide a more accurate assessment of SFDR's impact on investment behaviour.

7.3. Further Research

The findings of this study open several avenues for future exploration, each addressing critical gaps in understanding the broader implications and effectiveness of SFDR. They also highlight opportunities to shape policies that further guide investors toward more sustainable and impactful green investments.

A potential area for further research is the examination of SFDR's impact on private markets, including private equity and venture capital. The Global Impact Investing Network, highlights the growing prominence of impact investing (GIIN, 2024). Impact-only investors those dedicating 100% of their assets under management to impact investments have achieved a compounded annual growth rate of 9% in their asset under management allocation. Meanwhile, investors who blend impact investments with traditional, impact-agnostic strategies have seen their asset under management allocation grow at a faster compounded annual growth rate of 34%, reflecting the expanding mainstream appeal of impact investing (GIIN, 2024). This momentum highlights the need for further research into the potential application of frameworks like within private markets, particularly in private equity and venture capital. These asset classes operate under distinct dynamics compared to public equity markets, yet they are witnessing growing interest in measuring social and environmental outcomes. The lack of a standardized framework for assessing

impact in private funds hinders comparability and transparency, presenting an opportunity for SFDR-inspired frameworks to address these challenges. Future research could explore how tailored regulatory frameworks could enhance accountability, improve investor confidence, and create a more robust structure for sustainable investments in private markets, ultimately driving the broader adoption of ESG-oriented practices across all asset classes.

Another intriguing direction would be to analyse the role of PAI indicators in influencing investor behaviour. The SFDR introduces specific metrics, such as carbon intensity or biodiversity loss, to quantify adverse effects. Future research could delve into which PAI indicators are most salient for investors and how they shape capital flows. Such an analysis could help refine the SFDR framework by emphasizing the metrics that resonate most with sustainable investment objectives.

Survey-based research could complement these quantitative studies by exploring investor perceptions of SFDR classifications as against private ESG ratings. Understanding how investors weigh regulatory labels against private ratings could shed light on behavioural drivers behind fund flows. This would provide valuable insight into the interplay between regulatory and private signals, offering a more nuanced view of the manner in which investors prioritize different sources of sustainability information. Longitudinal studies would also be valuable in assessing the long-term impact of SFDR. Extending the analysis to include data beyond 2024 would enable researchers to evaluate whether the trends observed in this study persist, diminish, or evolve over time as market participants adapt to the regulation. Such research could also uncover lagging effects, providing a fuller picture of SFDR's sustained influence on capital allocation. As a final point, cross-market comparisons of this kind would offer a global perspective on SFDR's effectiveness. Examining its impact alongside similar frameworks in the United States, Asia, or other regions would help identify best practices and areas for improvement. Understanding how different regulatory systems address similar challenges could inform the development of more harmonized global sustainability policies, fostering greater alignment across markets.

Each of these areas presents an opportunity to deepen understanding of SFDR's role in shaping sustainable finance and to explore its applicability in broader contexts. Together, they can contribute to refining regulatory approaches and advancing global efforts toward more transparent and effective sustainable investment practices.

8. Conclusion

This paper demonstrates that the SFDR affects the landscape of sustainable investing and has had a marked influence on private ESG ratings and fund flows. By enhancing Globe ratings for Article 8 and 9 funds, SFDR might provide a credible regulatory framework that incentivizes transparency and drives measurable improvements in ESG performance. We have found that this regulation has the potential to act as a catalyst for meaningful change in sustainable finance as it addresses critical gaps left by private ESG metrics and setting a higher standard for market participants.

The dynamic interplay between SFDR classifications and private Globe ratings reveals an important evolution in investor behaviour. For Article 8 funds, SFDR partially substitutes Globe ratings, demonstrating the growing reliance on regulatory classifications as a trusted signal. For Article 9 funds, the lack of a significant relationship suggests that the strongest sustainability performers do not necessarily benefit from the credibility of regulatory validation. SFDR's impact on fund flows to Article 8 funds highlights its ability to redirect capital toward greener investments for funds that are not already signalled as green for investors.

Effective regulation, like SFDR, addresses the root causes of inefficiencies in the market, such as the lack of comparability in ESG metrics and the risks of greenwashing. By reducing asymmetries between what investors seek and what the market provides, such frameworks create a more transparent market where capital can flow efficiently toward truly sustainable investments. However, it is equally important to understand the unintended consequences of financial markets relying on such regulation's labels to simplify investment decisions. This reliance can lead to a loss of critical information, as investors may overlook nuanced evaluations provided by private metrics, prioritizing compliance over substantive ESG practices.

As global challenges intensify, the financial sector can play a pivotal role. By systematically filling information gaps and incentivizing responsible investment practices, policymakers can ensure that financial markets evolve to meet the demands of a greener future.

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Appendix

Appendix A1. Summary statistics sorted by SFDR category and Region Pre-SFDR

This table shows descriptive statistics for Article 6, Article 8, and Article 9, the Total of all funds. The table covers all available data prior to SFDR, i.e. the average between March 2019 up until March 2021. Panel A provides information for the Article 6 fund sample, Panel B provides information for the Article 8 fund sample, Panel C provides information for the Article 9 fund sample, and Panel D provides information for the total (Art. 6, Art. 8 and Art. 9) fund sample.

	SFDR Label					
	N	P25	Mean	Median	P75	SD
Panel A. Article 6 funds						
Monthly Fund Flows, %	83 184	-1.2	-0.3	-0.1	0.7	4.3
Total Net Assets, €m	83 184	30.2	348.2	88.3	277.9	969.9
Globe Rating	83 184	2.0	2.9	3.0	4.0	1.1
Star Rating	83 184	2.0	3.0	3.0	4.0	1.1
Return, %	83 184	-1.3	1.0	1.4	3.7	5.2
12-month Volatility, %	83 184	4.3	5.8	5.7	7.0	2.1
Monthly Fund Flows, %	83 184	7.0	13.8	12.0	19.0	8.8
Panel B. Article 8 funds						
Monthly Fund Flows, %	67 128	-1.4	-0.2	-0.2	1.1	4.7
Total Net Assets, €m	67 128	70.3	540.9	200.9	543.3	1 044.9
Globe Rating	67 128	3.0	3.3	3.0	4.0	1.1
Star Rating	67 128	3.0	3.3	3.0	4.0	1.0
Return, %	67 128	-1.1	1.1	1.6	3.9	5.2
12-month Volatility, %	67 128	4.4	5.8	5.6	6.9	1.9
Monthly Fund Flows, %	67 128	4.4	5.8	5.6	6.9	1.9
Panel C. Article 9 funds						
Monthly Fund Flows, %	4 440	-0.8	0.9	0.3	2.3	5.1
Total Net Assets, €m	4 440	57.0	388.0	179.6	407.0	676.6
Globe Rating	4 440	3.0	3.8	4.0	5.0	1.0
Star Rating	4 440	3.0	3.2	3.0	4.0	1.0
Return, %	4 440	-0.8	1.4	1.8	4.0	5.2
12-month Volatility, %	4 440	4.4	5.7	5.6	6.7	1.8
Monthly Fund Flows, %	4 440	7.0	13.1	12.0	19.0	7.6
Panel D. Total funds						
Monthly Fund Flows, %	154 752	-1.3	-0.2	-0.1	0.9	4.5
Total Net Assets, €m	154 752	42.5	435.0	132.2	402.3	1 001.3
Globe Rating	154 752	2.0	3.1	3.0	4.0	1.1
Star Rating	154 752	2.0	3.1	3.0	4.0	1.1
Return, %	154 752	-1.2	1.1	1.5	3.8	5.2
12-month Volatility, %	154 752	4.3	5.8	5.7	7.0	2.0
Monthly Fund Flows, %	154 752	7.0	14.3	13.0	20.0	9.0

Appendix A2. Summary statistics sorted by SFDR category and Region Post-SFDR

This table shows descriptive statistics for Article 6, Article 8, and Article 9, the Total of all funds. The table covers all available data prior to SFDR, i.e. the average between March 2021 up until August 2024. Panel A provides information for the Article 6 fund sample, Panel B provides information for the Article 8 fund sample, Panel C provides information for the Article 9 fund sample, and Panel D provides information for the total fund (Art. 6, Art. 8 and Art. 9) sample.

	SFDR Label					
	N	P25	Mean	Median	P75	SD
Panel A. Article 6 funds						
Monthly Fund Flows, %	145 572	-1.0	-0.4	-0.1	0.5	3.7
Total Net Assets, €m	145 572	33.7	419.8	98.5	324.1	1 203.3
Globe Rating	145 572	2.0	3.0	3.0	4.0	1.1
Star Rating	145 572	2.0	2.9	3.0	4.0	1.1
Return, %	145 572	-2.1	0.6	0.7	3.3	4.2
12-month Volatility, %	145 572	3.2	4.3	4.0	5.2	1.5
Monthly Fund Flows, %	145 572	9.0	16.5	15.0	22.0	8.8
Panel B. Article 8 funds						
Monthly Fund Flows, %	117 474	-1.2	-0.4	-0.2	0.6	4.0
Total Net Assets, €m	117 474	80.8	666.3	234.6	655.6	1 332.1
Globe Rating	117 474	3.0	3.4	3.0	4.0	1.1
Star Rating	117 474	3.0	3.1	3.0	4.0	1.0
Return, %	117 474	-2.4	0.5	0.8	3.4	4.5
12-month Volatility, %	117 474	3.3	4.5	4.2	5.4	1.6
Monthly Fund Flows, %	117 474	3.3	4.5	4.2	5.4	1.6
Panel C. Article 9 funds						
Monthly Fund Flows, %	7 770	-1.0	-0.1	-0.1	0.9	3.8
Total Net Assets, €m	7 770	78.1	736.5	256.9	728.4	1 384.2
Globe Rating	7 770	3.0	4.0	4.0	5.0	1.0
Star Rating	7 770	3.0	3.2	3.0	4.0	1.0
Return, %	7 770	-2.8	0.5	0.8	3.6	4.8
12-month Volatility, %	7 770	3.6	4.8	4.5	5.7	1.6
Monthly Fund Flows, %	7 770	10.0	15.9	15.0	21.0	7.6
Panel D. Total funds						
Monthly Fund Flows, %	270 816	-1.1	-0.4	-0.2	0.6	3.8
Total Net Assets, €m	270 816	47.7	536.9	152.5	478.6	1 272.9
Globe Rating	270 816	2.0	3.2	3.0	4.0	1.1
Star Rating	270 816	2.0	3.0	3.0	4.0	1.0
Return, %	270 816	-2.2	0.6	0.8	3.3	4.4
12-month Volatility, %	270 816	3.3	4.4	4.1	5.3	1.6
Monthly Fund Flows, %	270 816	10.0	17.0	16.0	23.0	9.0

Appendix A3. Correlation Matrix: Total Fund (Art.6, Art.8 and Art. 9) Sample

This table shows the correlation matrix of fund characteristics. It shows (1) Fund flows, (2) Returns, (3) volatility, (4) Fund size, (5) Globe Rating, (6) Star rating. The table uses the entire period (pre- and post-SFDR) and uses the total dataset (including all SFDR funds).

Variable	(1)	(2)	(3)	(4)	(5)	(6)
(1) Monthly Fund Flows, %	1.00					
(2) Return, %	0.06	1.00				
(3) 12-month volatility, %	-0.01	0.11	1.00			
(4) Total Net Assets, €m	0.03	0.02	-0.03	1.00		
(5) Globe Rating	0.02	0.00	-0.04	0.04	1.00	
(6) Star Rating	0.09	0.04	-0.06	0.23	0.10	1.00

Appendix A4. T-test Mean Difference Pre- and Post-SFDR Implementation

This table presents a mean difference analysis of control variables used in the regressions in a Pre- and Post-SFDR implementation setting. Column (1) shows the Pre-SFDR setting (March 2019 to February 2021), Column (2) shows the Post-SFDR setting (March 2021 to August 2024), and Column (3) shows the difference between Column (1) and Column (2) together with significance. *, **, and ***, show significance at 10%, 5% and 1% level.

	Comparison Pre- and Post-SFDR		
	(1) Pre-SFDR	**(2) Post-SFDR**	**(3) Mean Difference**
Panel A. Article 6 funds			
Monthly Fund Flows, %	-0.32	-0.37	-0.05***
Total Net Assets, €m	348.2	419.8	71.7***
Globe Rating	2.94	2.97	0.03***
Star Rating	3.02	2.94	-0.08***
Return, %	0.98	0.58	-0.40***
12-month Volatility, %	5.84	4.32	-1.52***
Panel B. Article 8 funds			
Monthly Fund Flows, %	-0.17	-0.38	-0.21***
Total Net Assets, €m	540.9	666.3	125.4***
Globe Rating	3.30	3.36	0.06***
Star Rating	3.29	3.14	-0.15***
Return, %	1.14	0.55	-0.59***
12-month Volatility, %	5.76	4.51	-1.25***
Panel C. Article 9 funds			
Monthly Fund Flows, %	0.89	-0.07	-0.96***
Total Net Assets, €m	388.0	736.5	348.6***
Globe Rating	3.75	3.96	0.21***
Star Rating	3.23	3.18	-0.05**
Return, %	1.35	0.46	-0.90***
12-month Volatility, %	5.70	4.78	-0.92***

Appendix A5: Difference-in-Difference Regression on Fund Flows

This table presents a difference-in-difference analysis of SFDR's impact on fund flows. Column (1) shows the Art. 6 (treatment) and Art. 8 & Art. 9 (control) setting, Column (2) shows the Art. 8 (treatment) and Art. 6 (control) setting, and Column (3) shows the Art. 9 (treatment) and Art. 6 (control) setting. The model uses fund flows as its dependent variable and fund size, fund age, fund returns and SFDR as the independent variables. Treat is a dummy taking the value one if the fund is classified as Art. 6 (Column 1), Art. 8 (Column 2), Art. 9 (Column 3). The interaction term Post x Treat highlights the effect SFDR has on fund flows after the SFDR implementation. The model estimates fund fixed effects and clusters standard errors on the fund level. T-statistics are reported in parentheses where *, **, and ***, show significance at 10%, 5% and 1% level.

	Fund Flows		
	(1) Art. 6	**(2) Art. 8**	**(3) Art. 9**
Post x Treat	-0.028	0.055*	-0.372***
	(0.030)	(0.031)	(0.113)
Post	0.329***	0.242***	0.107
	(0.032)	(0.033)	(0.119)
Fund Age	-0.152***	-0.141***	-0.116***
	(0.008)	(0.008)	(0.030)
Total Net Assets, €m	0.000***	0.000***	0.000**
	(0.000)	(0.000)	(0.000)
Return, %	0.041***	0.046***	0.038***
	(0.002)	(0.002)	(0.006)
Number of Observations	293,344	269,073	20,714
R2	0.004	0.005	0.008
Fund Fixed Effects	Yes	Yes	Yes
Clustered Standard-Errors	Yes	Yes	Yes

Appendix A6. Research Question 2 Robustness Test (Lower Propensity Score: 0.01)

This table presents an interaction analysis of Globe ratings and SFDR on the effect of fund flows. Column (1) shows the Art. 6 (treatment) and Art. 8 & Art. 9 (control) setting, Column (2) shows the Art. 8 (treatment) and Art. 6 (control) setting, and Column (3) shows the Art. 9 (treatment) and Art. 6 (control) setting. Compared to Table 5, this table uses a propensity score difference of 0.01. The model estimates fund fixed effects and clusters standard errors on the fund level. T-statistics are reported in parentheses where *, **, and ***, show significance at 10%, 5% and 1% level.

		Fund Flows	
Panel A. Pre-SFDR	**(1) Art. 6**	**(2) Art. 8**	**(3) Art. 9**
Globe Rating x Treat	0.036	-0.032	0.190
	(0.064)	(0.065)	(0.200)
Globe Rating	0.027	0.051	0.160
	(0.044)	(0.049)	(0.130)
Total Net Assets, €m	0.002***	0.002***	0.002***
	(0.0002)	(0.0002)	(0.0004)
Fund Age	0.042***	0.050***	0.035***
	(0.003)	(0.003)	(0.011)
Return, %	0.410***	0.420***	0.420***
	(0.037)	(0.037)	(0.130)
Number of Observations	109,100	100,853	7,786
R2	0.014	0.016	0.017
Firm fixed effects	Yes	Yes	Yes
Clustered standard-errors	Yes	Yes	Yes

Panel B. Post-SFDR	**(1) Art. 6**	**(2) Art. 8**	**(3) Art. 9**
Globe Rating x Treat	0.089	-0.120*	0.080
	(0.066)	(0.069)	(0.260)
Globe Rating	-0.059	0.040	-0.140
	(0.049)	(0.047)	(0.180)
Total Net Assets, €m	0.001***	0.001***	0.001***
	(0.0002)	(0.0002)	(0.0004)
Fund Age	0.015***	0.021***	0.013
	(0.002)	(0.003)	(0.008)
Return, %	0.440***	0.410***	0.500***
	(0.030)	(0.031)	(0.093)
Number of Observations	150,229	139,458	10,538
R2	0.009	0.008	0.011
Firm fixed effects	Yes	Yes	Yes
Clustered standard-errors	Yes	Yes	Yes

Appendix A7. Research Question 2 Robustness Test (Higher Propensity Score: 0.04)

This table presents an interaction analysis of Globe ratings and SFDR on the effect of fund flows. Column (1) shows the Art. 6 (treatment) and Art. 8 & Art. 9 (control) setting, Column (2) shows the Art. 8 (treatment) and Art. 6 (control) setting, and Column (3) shows the Art. 9 (treatment) and Art. 6 (control) setting. Compared to Table 5, this table uses a propensity score difference of 0.04. The model estimates fund fixed effects and clusters standard errors on the fund level. T-statistics are reported in parentheses where *, **, and ***, show significance at 10%, 5% and 1% level.

	Fund Flows		
Panel A. Pre-SFDR	**(1) Art. 6**	**(2) Art. 8**	**(3) Art. 9**
Globe Rating x Treat	0.025	-0.023	0.220
	(0.062)	(0.066)	(0.200)
Globe Rating	0.031	0.052	0.130
	(0.043)	(0.049)	(0.130)
Total Net Assets, €m	0.002***	0.002***	0.002***
	(0.0002)	(0.0002)	(0.0004)
Fund Age	0.045***	0.050***	0.038***
	(0.003)	(0.003)	(0.012)
Return, %	0.400***	0.440***	0.470***
	(0.036)	(0.036)	(0.130)
Number of Observations	113,599	104,328	8,007
R2	0.014	0.016	0.017
Firm fixed effects	Yes	Yes	Yes
Clustered standard-errors	Yes	Yes	Yes

Panel B. Post-SFDR	**(1) Art. 6**	**(2) Art. 8**	**(3) Art. 9**
Globe Rating x Treat	0.095	-0.140**	0.049
	(0.064)	(0.066)	(0.250)
Globe Rating	-0.053	0.048	-0.180
	(0.048)	(0.046)	(0.170)
Total Net Assets, €m	0.001***	0.001***	0.001**
	(0.0002)	(0.0001)	(0.0004)
Fund Age	0.016***	0.021***	0.016*
	(0.002)	(0.003)	(0.008)
Return, %	0.420***	0.380***	0.530***
	(0.029)	(0.030)	(0.092)
Number of Observations	156,691	144,115	10,842
R2	0.009	0.008	0.013
Firm fixed effects	Yes	Yes	Yes
Clustered standard-errors	Yes	Yes	Yes

AI Disclosure

This thesis has utilized ChatGPT in two primary ways. Firstly, it has been employed to identify and rectify errors in the written code, as well as to provide suggestions for improving the formatting and presentation of visual outputs. Secondly, it has been used to correct and enhance the text, contributing to the overall clarity, coherence, and precision of the written content.

The integration of ChatGPT has contributed to improving the overall quality of the thesis by enabling validation and enhancement of the written code and by improving the formatting and clarity of visual outputs. Additionally, it has supported the refinement of idiomatic language and improved the clarity of written content.

We recognize that the use of AI tools, including ChatGPT, includes certain risks that may potentially compromise the quality of the thesis. These risks include the possibility that the AI-generated code could be incorrect or unreliable, requiring manual verification and correction. Additionally, there is a risk that its output of text may be superficial or generic and lack logical coherence. This necessitated careful manual revision and adjustment to ensure that the text was not only accurate but also logically structured and aligned with the thesis specific goals.

To mitigate these risks, we have implemented several precautionary measures. Specifically, we have limited the role of ChatGPT to providing inspiration and feedback on the written code, rather than relying solely on its outputs. This approach ensured that the code included in the thesis is reliable and has been thoroughly checked for errors. Moreover, all language revisions produced by ChatGPT were carefully reviewed and adjusted manually to enhance clarity, precision, and logical flow.