

MAURIZIO DALLOCCHIO
EDOARDO GIOVANNONI
EMANUELE TETI

SUSTAINABLE INVESTING AND FUND PERFORMANCE EVIDENCE FROM CLOSED-END FUNDS UNDER THE SFDR

As ESG considerations have become increasingly central to investment strategies, sustainability-oriented investing has attracted growing attention. This paper examines whether closed-end equity funds classified under SFDR Articles 8 and 9 exhibit different financial performance from conventional Article 6 funds. Using a cross-sectional regression on 56 closed-end equity funds, the analysis controls for volatility, fund size, and geographic exposure. The findings show that SFDR classification is significantly associated with returns: Article 8 and Article 9 funds underperform their Article 6 counterparts over a three-year horizon. Volatility is negatively associated with performance, while fund size and geographic exposure are not statistically significant. The paper suggests that this underperformance may reflect short-term market conditions and that sustainability-related benefits may materialize over longer horizons.

CORPORATE FINANCE//ESG//IMPACT INVESTING//RETURNS//SUSTAINABILITY



MAURIZIO DALLOCCHIO

is Full Professor of Corporate Finance at SDA Bocconi School of Management and Bocconi University. He served as Dean of SDA Bocconi from 2003 to 2007.

EDOARDO GIOVANNONI

is an intern at a private equity fund.

EMANUELE TETI

is Full Professor of Corporate Finance at the University of Pisa and Affiliate Professor of Corporate Finance at SDA Bocconi School of Management. He is also Adjunct Professor of Corporate Finance at Bocconi University in Milan, where he teaches in the CLEAM and CLEACC degree programs.

INTRODUCTION

In recent years, the integration of Environmental, Social, and Governance (ESG) criteria into investment strategies has evolved from a niche approach to a central component of modern finance. This transformation has been particularly pronounced in Europe, where policymakers have introduced an extensive regulatory framework to promote sustainable finance, including the Sustainable Finance Disclosure Regulation (SFDR) and the EU Taxonomy Regulation. These initiatives aim to enhance transparency, reduce greenwashing, and redirect capital flows toward more sustainable economic activities (European Commission, 2018; 2021). As a result, sustainability considerations are increasingly shaping capital allocation decisions across both public and private markets.

At the same time, the rapid expansion of sustainable investing has been accompanied by an ongoing academic debate regarding its financial implications. A substantial body of literature suggests that ESG integration is not detrimental to financial performance and may even enhance risk-adjusted returns (Friede et al., 2015; Revelli and Viviani, 2015). However, more recent studies provide mixed evidence, particularly in the context of private markets and impact-oriented investments, where the dual objective of generating financial returns and achieving social or environmental impact may introduce trade-offs (Brest et al., 2018; Barber et al., 2021). This divergence has intensified the discussion on whether sustainability-oriented investment strategies represent a competitive asset class or imply a cost in terms of financial performance.

A clarification of terminology is necessary at the outset. Although this study refers to funds classified under SFDR Articles 8 and 9 as sustainability-oriented, it is important to recognize that regulatory classifications do not fully coincide with the theoretical definition of impact investing. In the academic literature, impact investing is typically defined as an investment approach that intentionally generates measurable and additional social and environmental outcomes alongside financial returns (Brest et al., 2018). By contrast, SFDR Article 8 funds promote environmental or social characteristics, while Article 9 funds pursue sustainable investment objectives; however, neither category strictly requires the demonstration of additionality or measurable impact in the strict sense adopted in the impact investing literature. Therefore, in this paper, SFDR classification is used as an operational proxy to distinguish between sustainability-oriented and conventional investment strategies, rather than as a direct measure of impact investing. Although imperfect, SFDR classification represents one of the few observable and standardized indicators available to distinguish between sustainability-oriented and conventional investment strategies across a broad set of funds. This choice is driven by data availability and the need for a consistent and observable classification across funds, but it also introduces

limitations, as funds within the same category may adopt heterogeneous ESG approaches.

Despite the growing body of research, empirical evidence on the financial performance of sustainability-oriented funds remains inconclusive and fragmented. Existing studies differ substantially in terms of datasets, methodologies, and definitions of sustainability. For instance, early contributions such as Friede et al. (2015) and Revelli and Viviani (2015) focus on broad ESG integration and socially responsible investing, often relying on public market data. More recent studies, including Brest et al. (2018) and Barber et al. (2021), shift the focus toward impact-oriented investments, highlighting potential trade-offs between financial returns and social objectives, particularly in private markets.

However, these contributions present several limitations. First, many studies rely on datasets that predate the recent expansion of sustainable finance and therefore do not capture the current market environment. Second, a large portion of the literature focuses on public equity markets, where ESG strategies may differ significantly from those implemented in private or semi-private investment vehicles. Third, and most importantly, existing empirical analyses rarely incorporate regulatory classifications of sustainability, such as the SFDR framework, which has become a central reference point in the European investment landscape. Moreover, the growing debate surrounding fund reclassifications, disclosure quality, and greenwashing concerns further increases the relevance of studying SFDR-classified funds in the current regulatory environment.

As a result, there is limited empirical evidence on whether funds classified under SFDR Articles 8 and 9 exhibit systematically different financial performance from conventional Article 6 funds within a consistent and recent regulatory setting. Addressing this gap is particularly relevant in light of the increasing role of regulation in shaping investment strategies and investor behavior. This relevance has been further reinforced by recent debates concerning fund reclassifications, greenwashing risks, and the interpretation of SFDR

Articles 8 and 9 as *de facto* sustainability labels rather than purely disclosure-based categories.

Against this background, the central research question of this study is:

Do sustainability-oriented closed-end equity funds, as proxied by SFDR Article 8 and Article 9 classifications, exhibit significantly different financial performance from conventional Article 6 funds?

The objective of this paper is to empirically assess whether sustainability-oriented funds, as identified through SFDR classification, exhibit systematically different financial performance from conventional funds, and to interpret these differences in light of the existing literature and recent market dynamics. The empirical strategy adopted in this study directly follows from the theoretical debate outlined above. Since the literature suggests that sustainability-oriented investment strategies may influence financial performance through both benefits, such as risk management and resilience, and costs, such as investment constraints and higher operational burdens, the analysis focuses on whether SFDR classification is associated with systematic differences in fund returns after controlling for key fund characteristics.

From a theoretical perspective, two competing expectations can be formulated. On the one hand, sustainability constraints may limit the investment opportunity set, increase operational costs, and reduce short-term profitability, suggesting potential underperformance among sustainability-oriented funds. On the other hand, ESG integration may enhance long-term value creation through improved risk management, alignment with structural economic trends, and increased resilience to market shocks. Given these contrasting arguments, the empirical analysis does not impose a strictly directional hypothesis but instead tests whether a statistically significant difference in performance exists between sustainability-oriented and conventional funds.

To address this question, this study employs a cross-sectional regression based on a sample of closed-end equity funds classified under the

SFDR framework. The analysis controls for key determinants of fund performance, including risk, fund size, and geographic exposure, allowing for a more accurate assessment of the relationship between sustainability classification and fund returns. By focusing on a recent dataset and explicitly incorporating the SFDR framework, this paper contributes to the literature by providing updated empirical evidence on the financial implications of sustainability-oriented investment strategies within a regulated European context.

The findings show that sustainability classification, based on the SFDR framework, is significantly associated with returns, with Article 8 and Article 9 funds underperforming their Article 6 counterparts over a three-year horizon. Risk emerges as a significant driver of performance, while fund size and geographic exposure do not appear to have a statistically meaningful impact.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature and clarifies the conceptual distinctions within sustainable investing. Section 3 describes the data and methodology. Section 4 presents the empirical results. Section 5 discusses the findings and their implications, and Section 6 concludes.

LITERATURE REVIEW

Before reviewing the empirical literature, it is useful to distinguish among different approaches to sustainable investing, which are often used interchangeably but represent conceptually distinct strategies.

First, ESG integration refers to the systematic inclusion of environmental, social, and governance factors in financial analysis, primarily to improve risk-adjusted returns. Second, Socially Responsible Investing (SRI) typically involves negative or positive screening, excluding certain sectors, such as tobacco or weapons, or selecting firms based on ESG criteria. Third, thematic investing focuses on specific sustainability-related sectors, such as renewable energy or clean technology, without necessarily aiming to generate measurable impact. Finally,

impact investing represents the most intentional approach, targeting investments that generate measurable and additional social or environmental outcomes alongside financial returns.

While these categories may overlap in practice, they differ in terms of intentionality, measurement, and investment constraints. This distinction is particularly relevant for this study, as SFDR classifications, Articles 6, 8, and 9, cut across these approaches and do not map perfectly onto a single category of sustainable investing.

The performance of impact investment funds has attracted growing attention from academics and practitioners due to the dual objective of generating financial returns while also achieving social and environmental impact. This concern has led to several studies comparing impact investing performance with traditional investment strategies, driven by growing demand for sustainable and responsible investing. A relevant contribution in this field is the meta-analysis carried out by Friede, Busch and Bassen (2015), which compared findings from more than 2,000 empirical studies. The authors concluded that “ESG factors are not detrimental to financial performance and are likely beneficial in many cases.” Similarly, Revelli and Viviani (2015) examined 85 studies comparing Socially Responsible Investment (SRI) funds with traditional funds, finding no statistically significant differences in performance.

These studies represent a substantial foundation in the academic literature. However, the following discussion reviews more recent empirical research to provide an updated overview of the financial performance of impact funds.

A central issue in the impact investing literature is the potential trade-off between financial returns and measurable ESG impact. One of the most relevant papers, published by Brest et al. (2018), suggests that adding social or environmental objectives could constrain some investment opportunities, leading to lower risk-adjusted returns. This view presents a fundamental contradiction within the literature: whether impact investing represents capital that accepts lower financial returns to achieve social outcomes or a competitive

asset class capable of delivering competitive risk-adjusted returns.

Together with academic studies, this theoretical concern has driven several empirical studies to test whether this trade-off exists in practice. In fact, some studies have found reduced financial performance among impact funds, while others have reported parity or even outperformance, depending on fund characteristics and investment strategies. One of the most cited studies on impact fund performance is the Cambridge Associates and GIIN “Impact Investing Benchmark” (Bouri et al., 2015). The study analyzed 51 impact investing funds with vintage years, or years of launch, between 1998 and 2014 and benchmarked them against a larger sample of 705 conventional funds. The findings showed that the performance of impact funds was aligned with that of traditional private equity when adjusted for similar risk and size profiles. In particular, on average, impact funds achieved a median net IRR of 6.9%, below the 8.1% net IRR of their conventional counterparts. However, top-quartile impact funds outperformed top-quartile traditional funds. Moreover, specific categories of impact funds, such as those under \$100 million in assets under management (AUM), demonstrated higher performance, sometimes exceeding similar conventional funds.

Some contemporary critics have questioned the relevance of this study due to the age of its dataset. In fact, developments after 2014 are not captured in it. However, it remains a foundational reference in the literature on impact investing, demonstrating that, after adjusting for certain factors, such as size and geographic exposure, impact funds are able to generate competitive financial returns without necessarily sacrificing profitability.

On the other hand, Barber, Morse, and Yasuda (2021) examined a global sample of 159 impact-oriented venture capital and private equity funds and matched them with traditional venture funds. They found that impact funds earned significantly lower IRRs, approximately 4.7 percentage points below those of their conventional counterparts. This finding suggests that investors may sometimes

accept lower returns to achieve measurable impact. The apparent contradiction with Bouri et al. (2015) can partly be attributed to sample differences. In fact, the Barber et al. dataset included funds with broader investment mandates and a greater focus on early-stage venture capital funds, highlighting the heterogeneity of impact funds and their potential for more volatile returns.

These findings, which show a contradiction within the literature, raise the question of whether lower returns can justify the recent increased attention to sustainable firms and to what extent investors, through capital allocation, can drive real-world impact. A possible answer is given by Kölbel et al. (2020), who argue that capital allocation is most effective in private markets, such as private equity and venture capital, where capital constraints are rigid. In fact, private companies must make themselves attractive to investors, who are now taking the impact of ESG more seriously and pushing private companies to adapt in order to obtain financing. On the other hand, the same authors state that public companies, which already have access to capital through the stock market, have little real-world impact, and ESG considerations are largely reputational.

Broader evidence from ESG-related public market studies also suggests that the relationship between sustainability orientation and financial performance is not uniform. Meta-analytic and review-based evidence indicates that ESG factors are generally not detrimental to financial performance and may be associated with positive outcomes, although results vary across contexts, methodologies, and time horizons (Friede, Busch and Bassen, 2015; Clark, Feiner and Viehs, 2015).

Additionally, one of the most recent findings from private market data is an empirical study carried out by Preqin (2024), which compares ESG private equity funds with conventional funds of the same vintage year, 2020. Findings show similar performance: median net IRR of 16.3% for ESG funds and 16% for traditional funds. This outcome suggests that impact-focused funds, at least in recent years, have performed in line with broader private equity benchmarks.

Similarly, Addy et al. (2019) show that impact

investing can require a long-term perspective because upfront capital is typically used to implement ESG innovation, such as building new eco-friendly infrastructure. This upfront investment might reduce short-term profitability, but over time, it can lower return volatility and enhance performance. In fact, while traditional private equity may achieve earlier returns due to lower initial expenses, impact funds are generally less exposed to short-term market cycles than conventional funds (GIIN, 2023).

More recently, the academic and regulatory debate has increasingly focused on the implications of the Sustainable Finance Disclosure Regulation (SFDR) for fund classification, investor behavior, and market dynamics. Although SFDR was originally conceived as a disclosure framework aimed at improving transparency, Articles 8 and 9 have progressively been interpreted by market participants as sustainability labels, raising concerns regarding potential greenwashing and inconsistent classification practices (Bodellini, 2023).

Recent evidence also documents substantial fund reclassification activity following the implementation of SFDR and subsequent regulatory clarifications. Several asset managers have reclassified funds between Article 6, Article 8, and Article 9 categories in response to evolving disclosure requirements and supervisory scrutiny, highlighting the dynamic nature of these classifications (Morningstar, 2024).

At the same time, investor flows appear to respond differently across SFDR categories. While Article 8 funds have generally attracted stronger inflows, Article 9 funds have experienced periods of significant outflows and heightened regulatory attention, suggesting that SFDR classifications influence investor perceptions and market positioning beyond their formal disclosure function (EFAMA, 2024; Morningstar, 2024).

These developments have reinforced the view that SFDR classifications should not be interpreted as homogeneous measures of sustainability, but rather as regulatory categories whose informational content and economic significance remain the subject of ongoing debate. Consequently, analyzing whether Article 8 and Article 9 funds exhibit systematically

different financial performance from Article 6 funds has become increasingly relevant from both an academic and policy perspective.

The empirical and theoretical contributions discussed above highlight a fundamental tension in the literature on sustainable and impact investing. On the one hand, several studies suggest that integrating ESG considerations can enhance long-term value creation through improved risk management, stronger stakeholder alignment, and greater resilience during market downturns (Clark et al., 2015; Friede et al., 2015). From this perspective, sustainability-oriented funds may benefit from lower volatility and more stable cash flows, ultimately supporting competitive or even superior risk-adjusted returns.

On the other hand, a growing body of research points to potential constraints associated with sustainability-oriented strategies. These include a reduced investment universe, higher operational and due diligence costs, and the possibility that investors may accept lower financial returns in exchange for achieving social or environmental impact (Brest et al., 2018; Barber et al., 2021). Empirical evidence from private markets, in particular, often shows lower realized returns for impact-oriented funds, especially in the short term.

These contrasting findings suggest that the relationship between sustainability orientation and financial performance is ultimately an empirical question, likely influenced by fund characteristics, market conditions, and time horizons. In particular, the recent introduction of the SFDR framework provides a unique opportunity to revisit this debate within a consistent regulatory classification, allowing for a more structured comparison between sustainability-oriented and conventional funds.

Building on this literature, the present study tests whether funds classified under SFDR Articles 8 and 9 exhibit significantly different financial performance from Article 6 funds, after controlling for key determinants such as risk, fund size, and geographic exposure. Given the conflicting theoretical predictions, no strictly directional hypothesis is imposed. Instead, the analysis evaluates the following working hypothesis:

H₁: Sustainability-oriented funds (SFDR Articles 8 and 9) exhibit statistically significant differences in financial performance from conventional funds (Article 6).

This hypothesis directly reflects the core debate identified in the literature, linking the theoretical ambiguity to the empirical strategy adopted in this study. Consequently, the empirical model is designed to isolate the association between sustainability classification and financial performance while controlling for alternative determinants that have been identified in the literature as important drivers of fund returns.

DATA AND METHODOLOGY

Research methodology

This study adopts a quantitative approach, using a linear regression model to examine and compare the financial performance of different funds. In addition, to enhance the accuracy of the analysis and ensure more reliable results, some control variables are included in the model to reduce residual variance and limit potential sources of noise.

The regression model is specified as follows:

$$\text{Return}_{3y} = \beta_0 + \beta_1 \cdot \text{Art8} + \beta_2 \cdot \text{Art9} + \beta_3 \cdot \text{Volatility}_{3y} + \beta_4 \cdot \log(\text{Fund Size}) + \beta_5 \cdot \text{Developed} + \varepsilon$$

The selected control variables reflect the main fund characteristics identified in the literature as potential determinants of performance. Volatility controls for differences in risk profiles, fund size captures potential scale effects and managerial resources, while geographic exposure accounts for differences in economic development, market conditions, and investment opportunities across regions.

In the model, the dependent variable is the cross-sectional three-year annualized return. Art8 and Art9 are the variables of interest, identifying funds classified under SFDR Articles 8 and 9, respectively. In addition, the control variables include volatility, calculated over the same time horizon as returns, fund size, and geographic exposure.

TABLE 1 SAMPLE SELECTION PROCESS

Step	Description	No. Funds
1	Initial universe of funds identified through Bloomberg FSRC screening	312
2	Active funds only (Market Status = Active)	245
3	Closed-end investment funds	128
4	Equity-focused funds (Asset Class Focus = Equity)	96
5	Funds with available SFDR classification (Articles 6, 8, and 9)	78
6	Funds with available three-year return data	64
7	Funds with complete data for all variables: return, volatility, AUM, and geographic exposure	56

The choice of a three-year annualized return as the dependent variable reflects data availability and comparability across funds, although it differs from IRR-based measures typically used in private equity.

To ensure the reliability of the regression results, a series of standard diagnostic tests were performed. First, multicollinearity among explanatory variables was assessed using variance inflation factors (VIFs). The results indicate that multicollinearity is not a concern, as all VIF values are well below commonly accepted thresholds. In particular, all VIF values are below 3, under the commonly accepted threshold of 10, confirming the absence of significant multicollinearity.

Second, the distribution of residuals was examined to verify the normality assumption. Visual inspection and standard normality tests suggest no significant deviations from normality.

Third, heteroskedasticity was tested using the Breusch–Pagan test. While no strong evidence of heteroskedasticity was detected, robust standard errors were employed as a precautionary measure to ensure that statistical inference remains valid even in the presence of mild heteroskedasticity.

Overall, these diagnostic checks support the stability and reliability of the estimated coefficients.

Data collection procedure

The dataset used for the regression analysis was extracted from Bloomberg. In particular, the FSRC Fund Screening function was employed. This search allowed for the identification of funds currently

active in the market, using the filter “Market Status: Active.” A subsequent filter was applied to isolate closed-end investment funds, using “Fund Type: Closed-End Investment Fund,” which invest only in equity, based on the classification “Fund Asset Class Focus: Equity.” Moreover, to obtain information on SFDR classification, the “Screening Criteria” tool was used by adding the keyword “SFDR Classification” in the Field tab and retaining funds classified under Article 6, Article 8, and Article 9.

Starting from an initial cross-sectional dataset, containing one-year and year-to-date (YTD) returns, all additional variables included in the regression model presented above were subsequently added based on availability in Bloomberg. The sample selection process is summarized in Table 1, which reports the successive filtering steps applied to the initial population of funds.

A clarification regarding the nature of the funds and the return measure is necessary to ensure consistency in the interpretation of the results. The sample consists of closed-end equity funds identified through the Bloomberg screening tool. These funds are structured as closed-end investment vehicles and are typically listed, meaning that their shares are traded on secondary markets. As such, they differ from traditional private equity funds, which are unlisted vehicles characterized by capital calls, distributions, and performance measures such as internal rate of return (IRR).

The return metric used in this study is the three-year annualized return reported by Bloomberg as of

May 2025. Consequently, the performance measure reflects the period approximately spanning May 2022 to May 2025. This time window is particularly relevant because it encompasses both the final phase of the strong expansion in sustainable investment flows observed during 2019–2021 and the subsequent market correction associated with rising interest rates, inflationary pressures, and a broader rotation away from growth-oriented sectors. As a result, the return measure captures a period characterized by significant changes in investor sentiment toward sustainability-oriented investments.

Despite these differences, the funds included in the sample often invest in private or illiquid assets and follow investment strategies that are conceptually similar to private equity, such as long investment horizons, active portfolio management, and value creation through strategic intervention. For this reason, elements of private equity terminology—such as the J-curve effect, illiquidity considerations, and exit dynamics—are used in a conceptual sense to interpret the results, rather than as direct descriptions of the underlying performance measurement framework.

This distinction is important when interpreting the findings, as the results should be understood as reflecting the market-based performance of closed-end investment vehicles with private equity characteristics, rather than pure private equity fund performance measured through IRR.

The use of Bloomberg as the primary data source is motivated by its comprehensive coverage of investment funds and its standardized reporting of financial and classification variables, including SFDR categorization.

Bloomberg provides a consistent and comparable dataset across funds, which is particularly important for cross-sectional analysis. In addition, it offers a high level of data reliability, as information is subject to verification and regular updates by both data providers and fund managers.

The relatively limited sample size reflects the strict filtering criteria applied to ensure data consistency and comparability. In particular, the requirement that all funds report complete information for the dependent variable (three-year

return) and all control variables (volatility, fund size, and geographic exposure), together with the availability of SFDR classification, significantly reduces the number of eligible observations. This trade-off between sample size and data completeness is common in empirical studies relying on proprietary financial databases.

Despite the relatively small number of observations, the sample can still be considered suitable for the purposes of this analysis. First, the study adopts a cross-sectional framework with a limited number of explanatory variables, which mitigates concerns related to overfitting.

Second, the sample is sufficiently heterogeneous in terms of fund size, volatility, and geographic exposure, allowing for meaningful variation in the key variables of interest. Finally, similar empirical studies in the private equity and alternative investment literature often rely on relatively small samples due to data constraints, particularly when focusing on recent periods and specialized classifications such as SFDR.

Sample description

The final dataset comprises 56 closed-end equity funds for which all the variables included in the regression are available on Bloomberg. For the analysis, SFDR classification is used as the independent variable, represented by dummy variables for Articles 8 and 9, with Article 6 serving as the reference category. The primary dependent variable is the three-year annualized return, which aligns with the long-term nature of closed-end fund investments. This choice also reflects the longest reliable return data available, given that the SFDR framework has been in effect only since 2021. Each fund observation also includes key data used as control variables in the regression analysis. In particular:

- **Risk (Volatility):** Risk is measured using the three-year annualized standard deviation of returns, providing a risk measure that is consistent with the performance metric, as both are calculated over the same time horizon.

TABLE 2. DESCRIPTIVE STATISTICS

Variable	Mean	Std. Dev.	Min	Max
Return3y	-0.48	8.05	-21.66	11.92
Volatility3y	19.71	9.32	5.33	59.35
Fund Size (log)	6.42	1.12	3.89	9.64
Developed	0.86	0.35	0.00	1.00
Art 8	0.28	0.45	0.00	1.00
Art 9	0.09	0.28	0.00	1.00

- **Assets Under Management (AUM):** Fund size, expressed in millions of dollars, serves as a proxy to assess whether size is associated with financial returns. This value is log-scaled to reduce the so-called “scale effect.” Fund size can vary widely, ranging from small niche funds to large institutional vehicles. Because extreme values can affect the regression results, log-transforming the data reduces the influence of outliers and makes the distribution more symmetric.
- **Geographic Exposure:** Geographic exposure is classified based on the primary investment region reported in Bloomberg. In particular, funds are assigned to categories such as the United States, Europe, the United Kingdom, Global, Asia-Pacific, and Latin America. For the purpose of the regression analysis, these categories are grouped into two broader clusters. Developed markets include the United States, Europe, the United Kingdom, and Global funds (given their predominant exposure to developed economies), while emerging markets include Asia-Pacific and Latin America. A binary dummy variable, Developed, is constructed, taking the value of 1 for funds primarily exposed to developed markets and 0 otherwise. This variable is included in the regression to control for potential differences in performance associated with varying levels of market maturity, institutional development, and macroeconomic risk.

The dataset, although limited in terms of data available, provides a diversified sample for assessing the relationship between sustainability classification and financial performance in the context of closed-end funds investing in equity.

Table 2 reports the main descriptive statistics of the variables used in the regression analysis, providing an overview of the distribution and variability within the sample.

The descriptive statistics highlight the heterogeneity of the sample in terms of both performance and risk. In particular, the average three-year return is slightly negative, reflecting the challenging market conditions over the period considered, while the relatively high dispersion suggests substantial variation across funds. The distribution of SFDR classifications indicates that the sample is primarily composed of Article 6 funds, with a smaller proportion of Article 8 and a limited number of Article 9 funds. Finally, the high share of funds classified as exposed to developed markets reflects the predominant geographic exposure of the sample.

RESULTS

The results of the analysis are presented in Table 3. Each row reports the estimated coefficients and associated p-values, indicating the level of statistical significance. The table allows readers to assess the direction and magnitude of each coefficient, as well as the statistical confidence associated with the estimated effects.

In the regression model, the dependent variable is the three-year annualized return, and the model includes a constant term (“Intercept”) and five explanatory variables. In particular:

- **Intercept:** The intercept represents the three-year return for the baseline category, Article 6 funds, with all control variables set to zero, that is, zero volatility, minimal fund size, and no exposure to emerging markets (i.e. the associated dummy is 0). While this scenario is not realistic in practice, the coefficient of 9.72 indicates that the model predicts an average

TABLE 3. REGRESSION RESULTS
 (***) $P < 0.01$; (**) $P < 0.05$; (*) $P < 0.10$)

Variable	Coefficient	p-value
Intercept	9.72	0.046**
Art 8	-5.52	0.003***
Art 9	-6.65	0.022**
Volatility	-0.59	0.000***
Fund Size	+0.28	0.705
Developed Markets	+2.09	0.290

annual return of approximately 9.72% for this type of fund when controlling for all variables. The result is statistically significant at the 5% level ($p = 0.046$).

- **Article 8:** The coefficient for Article 8 funds is negative and statistically significant, indicating that, when controlling for volatility, fund size, and geographic exposure, Article 8 funds underperform Article 6 funds by approximately 5.52 percentage points annually over three years. The result is significant at the 1% level ($p = 0.003$), suggesting that integrating environmental or social characteristics, as required for SFDR Article 8, is associated with lower financial returns.
- **Article 9:** Similar to Article 8, Article 9 funds, those with sustainable investment as their objective, underperform Article 6 funds by 6.65 percentage points annually on average. This result is also statistically significant at the 5% level.
- **Risk:** The risk coefficient, measured by annualized three-year standard deviation of returns, is highly significant. In particular, for each additional unit of risk, the average return decreases by 0.59 percentage points. This inverse relationship might appear counterintuitive from a classical finance perspective, where higher risk often implies higher return. However,

in the context of closed-end funds, it may reflect structural inefficiencies rather than compensation for risk. These inefficiencies could include an illiquidity premium and excessive leverage, which amplify gains and losses, or poor diversification strategies that increase volatility without generating superior returns (Schroders, 2024).

- **Fund Size:** The positive coefficient for fund size suggests that larger funds tend to deliver slightly higher returns, with a gain of 0.28 percentage points per additional unit of log-scaled AUM. However, although the economic effect is small, the variable is not statistically significant at conventional levels, meaning that fund size does not appear to influence fund returns.
- **Developed Markets:** The Developed Markets dummy is not statistically significant. Although the coefficient is positive, suggesting that funds with exposure to developed markets perform about 2.09 percentage points better, the p-value of 0.29 indicates that the effect is not statistically different from zero. This suggests that geographic exposure, developed versus emerging markets, does not significantly explain fund performance.

In conclusion, the empirical results show that sustainability classification, based on the SFDR framework, is significantly associated with returns, with Article 8 and Article 9 funds underperforming their conventional Article 6 counterparts. Risk is a key driver of negative performance, while fund size and geographic exposure do not appear to have a statistically significant impact on financial returns.

These findings may reflect the trade-off between sustainability goals and financial returns, in line with some views in the academic literature (e.g., Brest et al., 2018; Barber et al., 2021).

Table 4 presents the model summary, including the overall fit and explanatory power of the regression model.

The R-squared indicates that approximately 52%

of the variance in the three-year return is explained by the independent variables included in the model, namely SFDR classification, volatility, fund size, and geographic exposure. This level of explanatory power is relatively strong, especially in the context of cross-sectional financial data, where unobserved factors and market noise often limit R-squared values.

At the same time, the adjusted R-squared, which accounts for model complexity, namely the number of variables, is slightly lower at 47%. This confirms that a meaningful portion of the variation in fund performance is attributable to the selected explanatory variables.

The F-statistic of 11.16 provides evidence of the overall statistical significance of the model. This test evaluates the null hypothesis that all regression coefficients, excluding the intercept, are equal to zero. The very low p-value allows this null hypothesis to be rejected at conventional significance levels, confirming that the model provides a statistically meaningful explanation of the dependent variable.

In summary, the regression output shows a strong model fit in terms of the value and statistical significance of the coefficients and the explanatory power of the overall analysis. Although some variability in returns remains unexplained, the model demonstrates a statistically meaningful relationship between fund classification, financial characteristics, and long-term performance. This evidence suggests that ESG classification is significantly associated with financial returns.

DISCUSSION AND CHALLENGES OF FINDINGS

The following discussion aims to provide possible interpretative mechanisms for the empirical results obtained, rather than to establish causal relationships. The arguments presented are not directly tested within the regression framework but are grounded in the existing literature and are consistent with the variables included in the dataset as well as the time period under analysis. This caveat is particularly relevant for explanations related to sector allocation, which may influence performance

TABLE 4. MODEL SUMMARY STATISTICS

Model Statistic	Value
R-squared	51.77%
Adjusted R-squared	47.13%
F-statistic	11.16*** (p-value 0.000)

but cannot be directly evaluated using the available dataset. As such, these arguments should be interpreted as complementary explanations that help contextualize the observed performance differences between sustainability-oriented and conventional funds.

An important aspect in interpreting the results is the specific time horizon covered by the analysis. The three-year annualized returns used in this study likely capture a period characterized by significant shifts in ESG market dynamics, including strong inflows into sustainable assets during the 2019–2021 period, followed by a correction phase from 2022 onward, driven by rising interest rates, inflationary pressures, and a rotation away from growth-oriented sectors.

This sequence of expansion and subsequent repricing may have disproportionately affected sustainability-oriented funds, which were more exposed to sectors such as clean energy and technology. In this context, the observed underperformance of Article 8 and Article 9 funds may partly reflect a “greenium” effect—where assets initially traded at a premium due to high demand—followed by a normalization of valuations.

Regulatory constraints

The first driver potentially affecting the returns of sustainability-oriented funds is the regulatory framework, including the SFDR and the EU Taxonomy. While these frameworks have been essential in standardizing sustainability practices and increasing transparency in the investment landscape, they may have introduced constraints that contribute to the underperformance of impact funds relative to traditional private equity.

The reason lies in the constraints these regulations impose. By applying strict sustainability criteria and

limiting the scope of investable assets, regulations may reduce diversification opportunities and exclude high-performing sectors that do not meet ESG thresholds. This aspect is particularly relevant for closed-end funds classified under SFDR Article 9, which are subject to more demanding sustainability thresholds and asset selection limitations.

In response to these investment constraints, many GPs have chosen to avoid strict SFDR classification, opting to remain in Article 6 to preserve investment flexibility and maximize returns.

While regulatory constraints are not directly captured by the regression variables, they are inherently linked to the SFDR classification used as the key explanatory variable and therefore provide a plausible interpretation of the observed performance differences.

Market frictions

Even when regulatory requirements are met, other practical market challenges may affect fund performance at every stage of the investment lifecycle, including sourcing, execution, and exit, thereby contributing to a performance gap.

One of the most critical limitations is the limited investable universe. By focusing on businesses with strong ESG commitments or demonstrable social or environmental impact, these funds automatically exclude a broad range of potential targets, resulting in greater competition for a limited pool of suitable qualifying investments. Sectors such as renewable energy or social infrastructure often attract multiple bids from impact investors, increasing valuations and compressing future returns.

Moreover, some funds struggle to deploy committed capital effectively, with uninvested cash (the so-called “dry powder”) lowering overall performance.

Impact investing also faces higher operational costs. Due diligence must assess not only financial aspects but also environmental and social impact before investment, such as carbon footprint analysis and community impact studies.

In conclusion, Article 8 and Article 9 funds may face higher operational frictions than Article 6 funds, translating into lower net performance once all associated costs are accounted for.

These mechanisms are consistent with the negative coefficients observed for Article 8 and Article 9 funds in the regression analysis, although they are not directly measured within the dataset.

“Greenium” and valuation effects

The third possible driver of impact funds’ performance is the so-called “greenium” effect, which refers to the premium investors are willing to pay for assets considered sustainable.

Buying already expensive assets may limit future appreciation and capital gains, even though renewable companies often experience higher growth rates.

In addition, capital flowing into ESG assets between 2019 and 2021 further inflated valuations, with some investors speaking of a “green bubble.” Indeed, during this period, ESG equity funds saw record inflows, and many ESG-labeled stocks, especially in technology and clean energy, increased in price. However, this momentum reversed from 2022 onward, as inflation and rising interest rates put significant pressure on growth stocks. This correction may have particularly affected Article 8 and Article 9 funds if these funds were more exposed to sectors such as clean energy and technology, although sector allocations are not directly observed in the dataset used in this study.

This interpretation is consistent with the time horizon captured by the three-year return variable, which includes both the ESG-driven expansion phase and the subsequent market correction. At the same time, part of this effect may reflect changes in market sentiment and valuation dynamics affecting listed closed-end funds, rather than exclusively changes in the performance of the underlying portfolio assets.

Therefore, non-ESG assets may generate higher returns, partly because many investors avoided them, keeping valuations low. This effect is reinforced by sustainability-oriented funds that are willing to pay a premium for a company. On the other hand, the next buyer, who may be purely driven by financial return, might not be willing to pay the same premium. In fact, traditional private equity funds, such as Article 6 funds, will typically maximize exit returns by

selling the asset to the highest bidder. In contrast, an Article 9 fund may accept a lower bid from a more “mission-aligned” buyer in order to ensure continuity of impact. These factors can lead to longer holding periods or lower exit multiples for ESG funds, contributing to short-term underperformance compared with their unconstrained peers. These interpretations should be considered illustrative rather than conclusive, as sector-level exposures are not explicitly controlled for in the empirical model.

Managerial constraints and agency issues

Sustainability-oriented funds often balance a dual objective function: financial returns and sustainability goals. This aspect complicates investment decisions and creates agency tensions within fund management. In fact, GPs are typically incentivized through carried interest linked to financial performance, such as IRR or money-on-money multiples. However, in impact funds, some leading managers have adapted by linking a portion of their carried interest to the achievement of sustainability targets.

Although incentives are aligned with the fund’s objective, the remuneration structure introduces a trade-off in which GPs might avoid high-return opportunities that are misaligned with ESG criteria or invest in lower-return impact projects to achieve ESG targets. Overall, these investment choices may negatively affect fund performance while benefiting GPs’ remuneration.

If not carefully managed, this trade-off can lead to underperformance relative to traditional funds, whose investment strategies are focused primarily on maximizing value creation. On the other hand, if GPs’ incentives remain primarily financial, there is a risk that they will treat ESG as a secondary consideration, increasing greenwashing risk and failing to pursue high-impact opportunities.

Thus, this dual approach can also compromise performance, as the fund might not capture either top financial returns or the full benefits of an authentic impact strategy.

Short-term underperformance vs. long-term resilience

Finally, the current underperformance of Article

8 and Article 9 funds should be viewed within the broader context of the fund lifecycle and time horizon of impact strategies. In fact, many of these funds are relatively young, having been launched after the SFDR implementation in 2021, and, like most private equity vehicles, they are subject to the “J-curve” effect. Thus, early underperformance may occur before value creation materializes over longer horizons, a dynamic consistent with private equity-style investment patterns, although such effects cannot be directly observed using the market-based return measures employed in this study. However, this effect may be even more evident in impact-oriented strategies, where value creation is both financial and mission-driven and requires more time.

Research by Jeffers, Lyu and Posenau (2024) supports the view that impact funds may perform comparably to traditional private-market funds on a risk-adjusted basis. This suggests that the underperformance observed in this study may be short-term and may not persist in the long run, particularly if sustainability considerations gain greater importance in valuation and capital allocation decisions.

In summary, Article 8 and Article 9 sustainability-oriented closed-end equity funds have underperformed Article 6 funds during the period under analysis due to various possible factors, such as stricter regulatory requirements, limited investment opportunities, higher operational burdens, and valuation pressures. By committing to sustainability goals, these funds accept trade-offs, including the possibility of lower short-term financial performance, in exchange for the potential to drive long-term, meaningful impact.

Investors should recognize that impact-focused funds may accept short-term underperformance as the “price” for achieving broader sustainability objectives, with the expectation that long-term value creation and measurable impact will validate this strategy.

Overall, the results suggest that the growing focus on sustainability does not come without short-term financial implications. For investors, this implies that sustainability-oriented strategies may involve a trade-off between immediate financial performance

and longer-term value creation, particularly in periods characterized by strong market repricing.

More broadly, these findings contribute to the ongoing debate on sustainable finance by suggesting that the relationship between sustainability orientation and financial performance may be more dynamic than previously assumed. Rather than supporting either a strict “doing well by doing good” perspective or a permanent trade-off view, the results indicate that sustainability-oriented strategies may experience periods of relative underperformance depending on market conditions, valuation cycles, and regulatory developments. In this sense, the study refines existing evidence by highlighting the importance of timing and market context in assessing the financial implications of sustainability-oriented investing.

The results should also be interpreted in light of the rapidly evolving regulatory environment surrounding sustainable finance. Recent developments, including stricter SFDR guidance, enhanced sustainability reporting requirements, and increasing regulatory attention to greenwashing risk, may influence both investor behavior and fund management strategies. As regulatory standards continue to evolve, the economic significance of SFDR classifications and their relationship with financial performance may also change. Consequently, the results reported in this study should be viewed as evidence from a specific phase of the European sustainable finance transition rather than as a definitive assessment of the long-term performance of sustainability-oriented funds.

CONCLUSION AND LIMITATIONS

Article 8 and Article 9 sustainability-oriented closed-end equity funds underperformed Article 6 funds during the period under analysis. The empirical analysis shows that, over three years, funds categorized as Article 8 and Article 9 underperformed those labeled as Article 6, even after controlling for factors such as risk, fund size, and geographic exposure. These findings suggest the

presence of a short-term trade-off between pursuing sustainability goals and achieving high financial returns, an observation consistent with some of the existing academic literature presented in Section 2.

However, this underperformance should not be considered a sign of inefficiency, but rather a consequence of the dual objectives that impact funds pursue. Once the sustainable investing landscape becomes more mature and liquid, impact funds may have the potential to deliver competitive returns alongside measurable positive outcomes. At present, investors should recognize the possible implicit trade-off characterized by short-term underperformance as the cost of pursuing broader sustainability goals, with the expectation that long-term value creation and concrete impact will validate this approach.

Moreover, this research reveals that ESG integration in private equity is not simply a matter of compliance. It is a strategic decision that influences how portfolios are built, how firms interact with stakeholders, and how value is created. As impact measurements become more sophisticated, investor expertise deepens, and regulatory clarity improves, the current performance gap may close, or even reverse, over longer time horizons.

In conclusion, this paper provides evidence that, while some underperformance may exist in the short term, impact investing is becoming increasingly important due to its growing demand in the modern private equity landscape. For institutional investors with long-term mandates, pursuing ESG impact may offer strategic advantages in a world where sustainability is becoming a cornerstone of financial performance.

This evidence suggests that sustainability should not be interpreted as a simple trade-off between financial return and impact, but rather as a dynamic investment approach whose performance depends critically on timing, market conditions, and investment horizon. From a policy perspective, these findings also highlight the importance of regulatory clarity and credible sustainability disclosures in shaping investor expectations and capital allocation decisions.

Although the analysis appears to capture an important underlying trend, several limitations should be acknowledged when interpreting the results:

- SFDR framework limitations:* One relevant limitation concerns the reliability of SFDR classification as a proxy for sustainability. In fact, there are significant variations in how fund managers interpret and implement ESG strategies. In particular, funds can adopt heterogeneous investment strategies within the same category. For example, two funds, both classified as Article 8, may use different screening approaches or ESG implementation strategies. Moreover, even if the SFDR framework seeks to prevent forms of greenwashing, there is a risk of measurement error that may influence the observed relationship between ESG orientation and financial performance.
- Survivorship bias:* Additionally, the analysis may be affected by survivorship bias because Bloomberg automatically filtered only funds that are currently active, using “Market Status: Active.” Thus, the sample excludes funds that have been dissolved or failed to raise capital in subsequent fundraising rounds. By applying this filter, average returns may be overestimated, particularly for traditional private equity funds, which typically have longer operating histories. Consequently, the performance gap observed between impact and traditional private equity funds may be partially influenced by the absence of poorly performing funds from the sample.
- Sampling challenges:* Another significant limitation of the analysis concerns the representativeness of the sample. The regression is based on a dataset of only 56 funds, all closed-end vehicles investing in equity. While this approach allows a more consistent comparison within a similar investment universe, it reduces the statistical power of the test. In fact, a small sample increases the risk of statistical errors, including failing to detect effects that do exist or detecting effects that may not be robust. In addition, the results should be interpreted only in relation to sustainability-oriented closed-end equity funds classified under the SFDR framework, and should not be generalized to the broader investment fund universe, such as open-end funds or fixed-income funds.
- Endogenous selection into SFDR classification:* Another important limitation relates to the potential endogeneity of SFDR classification. Funds are not randomly assigned to Article 6, 8, or 9 categories; rather, this classification may reflect underlying characteristics such as investment strategy, target investor base, fund manager reputation, or prior performance. For instance, more established managers with strong track records or specific investor mandates may be more likely to adopt sustainability-oriented classifications. As a result, the observed differences in performance may partly capture these underlying selection effects rather than the pure impact of sustainability orientation itself. This issue cannot be fully addressed within the current empirical framework and represents an important avenue for future research.
- Sectoral exposure and investment strategy:* A further limitation concerns the potential influence of sectoral allocation on fund performance. Sustainability-oriented funds are often more heavily exposed to specific sectors such as renewable energy, green technology, or social infrastructure, which may exhibit different risk-return profiles compared with broader market investments. These sectoral tilts are not explicitly controlled for in the regression model due to data constraints. Consequently, part of the observed performance differences between sustainability-oriented and conventional funds may be driven by sector-specific dynamics rather than ESG orientation per se. Incorporating detailed sector-level controls would provide a more refined understanding of the drivers of fund performance. Future research incorporating

sector-level allocation data would help assess whether the observed performance differences are attributable to sustainability classification itself or to underlying sector composition.

• **Market-based return measurement:** A further limitation concerns the use of market-based returns for listed closed-end funds. Since the return measure is based on market prices rather than net asset value (NAV), the observed performance may partly reflect changes in investor sentiment, liquidity conditions,

and fluctuations in discounts or premiums relative to NAV. Consequently, the estimated relationships may capture not only the performance of the underlying assets but also market perceptions of sustainability-oriented investment strategies. While this aspect is inherent to the nature of the available data, it should be considered when interpreting the results. Future research based on NAV-level data or fund cash-flow information could help disentangle asset-level performance from market valuation effects.

MANAGERIAL IMPACT FACTOR

- **Financial discipline:** Sustainability-oriented funds should combine ESG objectives with rigorous investment selection to avoid short-term performance erosion.
- **Incentive alignment:** Fund managers should align sustainability targets, remuneration structures, and reporting systems to reduce agency tensions and greenwashing risk.
- **Long-term evaluation:** Investors should assess Article 8 and Article 9 funds over longer horizons, since sustainability-related value creation may not be fully reflected in short-term returns.
- **Regulatory clarity:** Clearer SFDR disclosure standards can improve fund comparability and support more efficient capital allocation.

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