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ESG Mutual Fund Attributes and Investor Behavior^{*}

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Abstract

In this paper, we investigate investor behavior related to the attributes of ESG mutual funds. Specifically, we examine whether financial and extrafinancial attributes enter the investor's decision problem additively or interact multiplicatively. We derive the return elasticity of investor demand under both hypotheses, which yields distinct predictions for the flow-performance relationship. Using a dataset of 6,965 European active equity mutual funds from August 2018 to June 2025, we empirically test these competing hypotheses. Our results indicate that the sensitivity of fund flows to lagged returns is greater for ESG funds than for conventional funds. Accordingly, we reject specifications in which financial and extrafinancial attributes enter the investor's decision problem additively. Our findings provide new insights into investor demand for fund attributes and ESG-washing practices.

Keywords: Sustainable investing; Mutual funds; Investor behavior; Cash flows.

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1. Introduction

In this paper, investor behavior in relation to financial and environmental, social and governance (ESG) characteristics in the market of mutual funds is investigated. Specifically, we analyze two alternative hypotheses concerning how financial and extrafinancial attributes influence the decision-making of investors engaged in sustainable investing, labeled ESG investors. On the one hand, we consider a specification in which financial and extrafinancial attributes enter the investor’s decision problem additively. On the other hand, we explore a specification in which these attributes interact multiplicatively, implying that the role of extrafinancial considerations depends on financial performance. We then derive the return elasticity of fund demand under both hypotheses, each leading to distinct empirical predictions for the flow-performance relationship.

Using a dataset covering 6,965 European active equity mutual funds over the period 2018M8-2025M6, we empirically test these two competing hypotheses and find that the sensitivity of fund flows to lagged returns is greater for ESG funds than for conventional funds. Therefore, we reject specifications in which financial and extrafinancial attributes enter the investor’s decision problem additively, in favor of specifications allowing for multiplicative interactions. Finally, zooming in on the extrafinancial attribute, we empirically show that the sensitivity of ESG investors to ESG fund names is greater than to ESG ratings. Our results are robust to alternative domicile and investment geographies, controlling for factors such as lifecycle, size, investor demand for ESG-labeled funds, market trends, and both financial and sustainable ratings. These findings shed new light on ESG-washing practices.

Our paper closely aligns with the theoretical literature on the sustainable investor maximization problem (Pedersen et al., 2021; Pástor et al., 2021; Avramov et al., 2022). This paper also contributes to the recent empirical literature on investing with nonpecuniary preferences (Starks, 2023) and, in particular, on whether these preferences can lead to a different flow-performance relationship (i.a., Pástor and Vorsatz, 2020; Bansal et al., 2022; Baily and Gnabo, 2023; Ceccarelli et al., 2024; Döttling and Sehoon, 2024; Gibbon et al., 2025).

In summary, our main objective is to further our understanding of investor preferences in sustainable finance. By questioning how financial and extrafinancial attributes interact in the investor’s decision problem, we derive the return elasticity of fund demand and provide empirical evidence consistent with multiplicative interactions between financial and extrafinancial attributes. Our contribution is twofold: (a) we extend the literature on investor behavior by discriminating between alternative specifications of how financial and nonpecuniary attributes are aggregated in investor decision-making, and (b) we contribute to the empirical literature on the flow-performance relationship by revisiting its determinants, notably by providing evidence of a stronger investor response to ESG fund names than to ESG scores.

The remainder of this paper is organized as follows. Section 2 presents the literature on responsible investor preferences and the flow–performance relationship for the mutual fund market. Section 3 introduces a methodological framework, including a microeconomic analysis and hypothesis development. Section 4 describes the data and presents a preliminary analysis of the descriptive statistics. Section 5 reports our empirical results and robustness checks. Section 6 presents implications for policymakers. Finally, Section 7 concludes the paper.

2. Related literature

2.1. ESG investors’ preferences

ESG investor preferences encompass both financial and nonpecuniary considerations (Starks, 2023). Recent contributions by Pedersen et al. (2021), Pástor et al. (2021), and Avramov et al. (2022) model these preferences using specifications in which financial and ESG attributes are aggregated additively in the investor’s decision problem. In a seminal paper, however, Bollen (2007) questions this assumption by contrasting additive and conditional specifications and investigating their implications for investor behavior and mutual fund attributes. His empirical findings suggest that financial and nonpecuniary attributes do not

enter the investor’s decision problem additively. Subsequent studies have produced mixed results (Benson and Humphrey, 2008; Renneboog et al., 2011), which has contributed to the continued use of additive specifications in the literature.

In addition to these contributions, a growing body of literature explores the ethical mutual fund attributes to which investors are sensitive, including characteristics related to climate change mitigation, biodiversity protection, and broader environmental, social, and governance issues. Surveys (Bauer et al., 2021; Filippini et al., 2024; Giglio et al., 2025), experiments (Heeb et al., 2023; Gutsche et al., 2023; Bonnefon et al., 2025), and mixed-method empirical studies (i.e., Riedl and Smeets, 2017) provide evidence of investor responsiveness to sustainability scores (Hartzmark and Sussman, 2019; Ceccarelli et al., 2024; Gantchev et al., 2024), fund names (El Ghouli and Karoui, 2021; Gibbon et al., 2025), and alignment with ethical investment policies (Kim and Yoon, 2023).

Fund flows are widely used to empirically test hypotheses about investor behavior. Since the way financial and nonfinancial attributes enter the investor’s decision problem shapes fund demand, preferences can be inferred from observed investment decisions.

2.2. Flow–performance relationship

Mutual fund cash flows have a crucial focus in the empirical literature. Early contributions documented a strong flow–performance nexus, often interpreted as evidence that investors reallocate capital in response to perceived managerial skill (Berk and Green, 2004). Recent research has challenged this interpretation, suggesting that investor behavior is driven more by heuristic signals than by sophisticated Bayesian learning about fund performance (Ben-David et al., 2022). Building on these insights, a growing strand of the literature extends the analysis of flow determinants to the domain of sustainable investing, examining whether nonfinancial attributes such as ESG characteristics influence fund flows.

In their pioneering works, Bollen (2007), Benson and Humphrey (2008) and Renneboog et al. (2011) obtain contrasting results regarding the flow–performance relationship across conventional and responsible investors. More recent studies have investigated the impact of

Morningstar Sustainability Rating (Ammann et al., 2019; Hartzmark and Sussman, 2019; Albuquerque et al., 2025) and fund names (El Ghouli and Karoui, 2021; Gibbon et al., 2025) on mutual fund flows, whereas other recent contributions have examined whether these differences stem from differences across retail and institutional shares (Klinkowska and Zhao, 2023) or in the growth rates of the two types of funds (Baily and Gnabo, 2023) rather than from differences in investor behavior.

Flows have also been examined during financial turmoil. Nofsinger and Varma (2014), Pástor and Vorsatz (2020), Bae et al. (2021) and Fatica and Panzica (2024) analyze fund flows during the global financial crisis and during the COVID-19 pandemic and find that responsible investors tend to exhibit more loyalty than do their conventional peers in times of crisis. However, Bansal et al. (2022) and Döttling and Sehoon (2024) report contrasting results, as they provide empirical evidence of fragile demand for socially responsible mutual funds (see also Gantchev et al., 2024; Albuquerque et al., 2025).

3. Methodological framework

3.1. Financial and extrafinancial considerations

Following Pedersen et al. (2021), we consider a single-period economy in which an investor allocates wealth across risky assets at time 0 and liquidates her position at time 1. Let X denote an $N \times 1$ vector of portfolio weights invested in risky assets. Terminal wealth is given by

$$\hat{W} = W \times (1 + r_f + X'r), \quad (1)$$

where $W > 0$ is initial wealth, r_f is the risk-free rate, and r is an $N \times 1$ vector of excess asset returns, assumed to be normally distributed with mean vector μ and covariance matrix Σ . Pedersen et al. (2021) assume that extrafinancial considerations enter the investor's decision problem through a holdings-based ESG component. In Pástor et al. (2021), preferences are

represented by the CARA utility function

$$U^P(\hat{W}, X) = -\exp(-\bar{\gamma} \hat{W} - b'X), \quad (2)$$

where b is an $N \times 1$ vector collecting the ESG characteristics of the assets held in the portfolio and $\bar{\gamma} > 0$ denotes absolute risk aversion (see also Avramov et al., 2022). Under this benchmark formulation, pecuniary outcomes and extrafinancial motives enter additively in the utility index.

3.2. From holdings-based ESG to fund-level ESG labeling

In the mutual fund market, investors typically do not observe, nor directly choose, the underlying portfolio holdings and their associated ESG characteristics at the time of investment. Instead, they rely on salient and easily observable fund-level signals (Ben-David et al., 2022), such as ESG-related fund names or labels.

Accordingly, we replace the holdings-based ESG component $b'X$ with a fund-level ESG labeling attribute. Maintaining the CARA structure of Eq. (2) and following Bollen (2007) in modeling nonpecuniary fund attributes as utility shifters, we write investor preferences as

$$U^B(\hat{W}, S) = -\exp(-\bar{\gamma} \hat{W} - \eta S), \quad (3)$$

where $S \in \{0, 1\}$ denotes the ESG label of the fund and $\eta \geq 0$ captures the nonpecuniary utility associated with investing in an ESG-labeled fund.

3.3. Additive versus multiplicative aggregation

We now allow financial and extrafinancial attributes to interact in the investor's decision problem. To this end, we introduce a behavioral parameter $\lambda \in [0, 1]$ that governs how the ESG label affects the valuation of financial outcomes.

Investor preferences are represented by the exponential utility function

$$U(\hat{W}, S, \lambda) = -\exp\left(-\bar{\gamma} \phi(S, \lambda) \hat{W} - \eta S\right), \quad (4)$$

where $\bar{\gamma} > 0$ denotes absolute risk aversion, $\eta \geq 0$ captures the nonpecuniary utility associated with investing in an ESG-labeled fund, and $S \in \{0, 1\}$ is a binary indicator equal to one for ESG-labeled funds. The scaling function $\phi(S, \lambda)$ captures how the ESG label modifies the effective weight placed on monetary payoffs.

To preserve the interpretation of λ as a relative weight placed on financial performance in ESG-labeled investments, we impose the normalization

$$\phi(0, \lambda) = 1 \quad \text{and} \quad \phi(1, \lambda) = \lambda, \quad (5)$$

so that conventional funds ($S = 0$) are evaluated through the standard monetary index $\hat{W}$, whereas ESG-labeled funds ($S = 1$) are evaluated through a scaled index $\lambda \hat{W}$. A convenient parametric specification satisfying Eq. (5) is

$$\phi(S, \lambda) = 1 - (1 - \lambda)S, \quad \lambda \in [0, 1], \quad (6)$$

which we use throughout the paper. Under this formulation, when $\lambda = 1$, we have $\phi(S, \lambda) = 1$ for all S , and Eq. (4) reduces to an additive specification in which extrafinancial considerations shift utility through ηS but do not affect the valuation of financial outcomes. When $\lambda < 1$, the ESG label rescales the monetary component of utility, implying a multiplicative (i.e., wealth-scaling) interaction between financial and extrafinancial attributes, in the sense that the nonpecuniary attribute modifies the effective importance of monetary payoffs in the investor's decision problem, rather than entering as a literal product of separate utility components.

3.4. Implications for investor demand and performance sensitivity

Under the CARA–Normal assumptions, optimal portfolio demand can be characterized using a certainty-equivalent representation. Starting from preferences given in Eq. (4) and the definition of terminal wealth $\hat{W} = W(1 + r_f + X'r)$, expected utility admits the closed-form expression

$$\mathbb{E}[U(\hat{W}, S, \lambda)] = -\exp\left(-\bar{\gamma}\phi(S, \lambda)W(1 + r_f) - \eta S - \bar{\gamma}\phi(S, \lambda)W X'\mu + \frac{\bar{\gamma}^2}{2}\phi(S, \lambda)^2 W^2 X'\Sigma X\right), \quad (7)$$

where we use the fact that $X'r$ is normally distributed with mean $X'\mu$ and variance $X'\Sigma X$.

Because the exponential function is monotone, maximizing expected utility in Eq. (7) is equivalent to maximizing the associated certainty equivalent

$$CE(X, S, \lambda) = \phi(S, \lambda) W X'\mu - \frac{\bar{\gamma}W^2}{2} \phi(S, \lambda)^2 X'\Sigma X + \frac{\eta}{\bar{\gamma}}S, \quad (8)$$

up to terms independent of the portfolio choice X . Formal derivations are provided in Appendix A.

Maximizing Eq. (8) with respect to X yields the optimal portfolio weight invested in the risky fund:

$$X^*(S, \lambda) = \frac{1}{\bar{\gamma}W} \cdot \frac{1}{\phi(S, \lambda)} \Sigma^{-1}\mu, \quad (9)$$

where W denotes initial wealth, μ the vector of expected excess returns, and Σ the variance–covariance matrix of returns.

Under the additive specification ($\lambda = 1$), we have $\phi(S, \lambda) = 1$ for all S , so that the responsiveness of optimal demand to expected returns is identical for ESG-labeled and conventional funds. In this case, extrafinancial considerations affect the level of investor utility through ηS , but they do not alter how investors react to financial performance.

In contrast, under the multiplicative specification ($\lambda < 1$), $\phi(1, \lambda) = \lambda < 1$ for ESG-labeled funds, whereas $\phi(0, \lambda) = 1$ for conventional funds. It follows directly from Eq. (9) that expected returns play a more central role in shaping demand for ESG-labeled funds than for conventional funds.

These differences yield the following testable implication.

Proposition 1. Compared with specifications in which financial and extrafinancial attributes enter the investor’s decision problem additively ($\lambda = 1$), specifications allowing for a multiplicative aggregation in which the ESG label scales the weight placed on financial outcomes ($\lambda < 1$) imply a higher sensitivity of ESG fund demand to expected returns.

Since mutual fund flows reflect changes in aggregate investor demand, Proposition 1 provides the theoretical foundation for our empirical analysis of the flow–performance relationship.

3.5. Hypothesis development

In the previous subsection, we evaluated investor sensitivity to changes in performance μ as a function of the behavioral parameter λ . When $\lambda = 1$, financial and extrafinancial attributes enter the investor’s decision problem additively. When $\lambda < 1$, the ESG label scales the effective weight placed on financial outcomes, implying a multiplicative interaction between financial and extrafinancial attributes in the utility index. The derivations leading to Proposition 1 yield theoretical implications that can be translated into testable hypotheses.

Accordingly, this subsection develops two alternative hypotheses regarding investor behavior. These hypotheses correspond to alternative empirical implications of Proposition 1. The first hypothesis corresponds to the additive specification:

H0. *The flow–performance relationship in ESG mutual funds does not differ from that in conventional mutual funds.*

This hypothesis is motivated by the possibility that financial and extrafinancial attributes enter the investor’s decision problem additively, such that extrafinancial considerations do

not affect investors’ sensitivity to financial performance. Under this specification, as in Pedersen et al. (2021), Pástor et al. (2021), and Avramov et al. (2022), the flow–performance relationship in ESG mutual funds should be similar to that observed for conventional mutual funds. This hypothesis is consistent with empirical findings reported by Gantchev et al. (2024) and Albuquerque et al. (2025), who show that the flow–performance relationship for ESG funds is broadly comparable to, or marginally weaker than, that for conventional funds.

The second hypothesis corresponds to specifications allowing for multiplicative interactions between financial and extrafinancial attributes:

H1. *The flow–performance relationship in ESG mutual funds is stronger than that in conventional mutual funds.*

This hypothesis is motivated by specifications in which financial and extrafinancial attributes interact multiplicatively in the investor’s decision problem, implying that investors’ sensitivity to financial performance is amplified for ESG funds. In such cases, extrafinancial considerations reinforce, rather than substitute for, financial performance in shaping fund demand. This hypothesis is supported by recent empirical contributions, including Bansal et al. (2022), Baily and Gnabo (2023), Klinkowska and Zhao (2023), and Ceccarelli et al. (2024), which document a stronger flow–performance relationship for ESG funds relative to conventional funds.

4. Data and summary statistics

Examining the role of nonpecuniary preferences in the flow–performance relationship first requires identifying the ESG attributes to which investors are sensitive. This preliminary step is essential for classifying mutual funds as ESG or conventional and for selecting the ESG variables to be used as controls. The empirical analysis of the flow–performance relationship across conventional and ESG funds requires the collection and management of a fund-level dataset that enables the estimation of this relationship. To meet these data requirements, we construct a panel comprising 6,965 European active equity mutual funds over the period

2018M8–2025M6. This section describes the dataset construction process.

4.1. Data: ESG variables

The literature shows that investors are sensitive to sustainability signals such as fund names, sustainability ratings and membership in a nonprofit organization dedicated to sustainable finance. Each of these ESG indicators presents pros and cons that have been discussed in recent contributions. For instance, Ammann et al. (2019) and Hartzmark and Sussman (2019) provide empirical evidence that sustainability ratings significantly influence fund flows. However, Chatterji et al. (2016) and Berg et al. (2022) highlight that such ratings often suffer from considerable divergence across providers, raising concerns about consistency. Similarly, while Kim and Yoon (2023) show that PRI signatories attract substantial inflows, they find no corresponding improvements in fund-level ESG scores or ESG integration among U.S. funds. Alternatively, investors’ sensitivity to fund names has been documented by El Ghouli and Karoui (2021) and by Gibbon et al. (2025), indicating that fund names can be used as a consistent ESG indicator. Moreover, fund names have been reported as important drivers of fund flows by regulatory institutions (ESMA, 2023, 2025).

In this context, we use fund names to classify those mutual funds as ESG or conventional. Following the approach initiated by Nofsinger and Varma (2014) and enriched by Candelon et al. (2021), Briere and Ramelli (2022), and Capotă et al. (2022), our classification relies on a dictionary of ESG-related keywords. Specifically, we choose to build the ESG dummy (*ESG*) following Hassan et al. (2025), who built a dictionary of keywords based on ESMA (2024) guidelines for fund names. The advantage of this approach is that it relies on the European regulatory framework, which is known and used as a benchmark in all of Europe. Potential name changes during the study period were checked to ensure that no funds were misclassified.

Finally, we include the fund-level Morningstar Sustainability Rating as a control variable in our regression framework to account for investor demand for sustainable products, as in Dumitrescu et al. (2023). Following Baily and Gnabo (2023) and Albuquerque et al.

(2025), the *Morningstar5Globes* dummy variable takes the value 1 if the fund is awarded 5 sustainability globes by Morningstar, and 0 otherwise.

A key advantage of Morningstar is that it provides both financial and ESG data that are free of survivorship bias: the Morningstar Direct database contains data on both active and dead funds. Our sample period spans from August 2018 to June 2025, with the start determined by the availability of historical records of sustainability fund information.

4.2. Data: Financial variables

In the empirical literature, investors' revealed preferences regarding financial and ESG attributes are typically examined through fund flows. Following this practice, we compute fund net flows as the percentage change in total net assets between two consecutive months, which is standard in the literature (Ferreira et al., 2012):

$$Flow_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1} \times (1 + R_{i,t})}{TNA_{i,t-1}}. \quad (10)$$

where $TNA_{i,t}$ and $R_{i,t}$ are the total net asset and the total return of fund i at month t , respectively. Fund returns include fees as in Baily and Gnabo (2023) and Ceccarelli et al. (2024). To mitigate the effect of outliers, flows are winsorized at the 1st and 99th percentiles as in Gibbon et al. (2025). Following the literature, we add a set of financial control variables to our dataset: the logarithm of funds' age $Ln(Age)$, the logarithm of funds' size $Ln(TNA)$ and funds' return volatility $SdvReturn$. The last variable is calculated as the standard deviation of a fund's return estimated over the previous twelve months. All the return data are denominated in USD. Finally, we also include the funds' Morningstar Rating *Morningstar5Stars* that is calculated as a dummy variable that takes the value 1 if the fund is awarded 5 stars by Morningstar, and 0 otherwise.

4.3. Data: Collection and treatment

From the Morningstar Direct database, we apply several filters. First, we restrict our sample to equity mutual funds domiciliated in Europe. We exclude passive funds, including

index funds, passively managed ETFs and funds of funds, to focus exclusively on actively managed funds. Moreover, we further exclude the smallest funds in our sample, removing those with less than US 10 million of TNA to avoid any distortion of the flows (Pástor and Vorsatz, 2020). Afterward, we retain only the oldest share class of each fund to avoid duplicate entries and remove funds with fewer than 24 monthly return observations to ensure a sufficient data history for meaningful analysis. Finally, we obtain a final sample of 6,965 European active equity mutual funds for the period 2018M8–2025M6, with monthly fund information. Fund-level financial and ESG data are collected from Morningstar.

We apply different imputation methods depending on the nature of the data to address missing values. For categorical variables, missing values at time t are imputed using the corresponding value from time $t - 1$, assuming temporal stability in Morningstar ratings. For random financial variables, missing values are imputed using predicted values from a 5-factor CAPM regression model. The latter imputation requires additional factor data obtained from Kenneth French’s website. This approach leverages the relationship between fund returns and market factors to estimate plausible values for missing data.

4.4. Data: Summary statistics

Table 1 reports the descriptive statistics for conventional and ESG funds in our sample for the period from August 2018 to June 2025. Raw returns and alpha refer to trailing 12-month performance, volatility is the standard deviation of monthly returns over the same period, and TNA denotes total net assets in billions of USD. The Morningstar Sustainability Rating captures sustainability (globes), whereas the Morningstar Rating captures overall quality (stars).

In terms of performance, the average monthly raw return during this period was 0.07% for conventional funds and 0.08% for ESG funds, with corresponding 12-month volatility of 5.21% and 5.22%, respectively. These results align with market conditions and previous empirical contributions, as the European equity market delivered strong performance over the period 2018–2025. Moreover, active funds generated additional value, achieving an average

Table 1: Descriptive statistics by fund classification

Variable	Conventional	ESG
Raw return (12M, %)	0.073	0.077
Alpha (12M, %)	0.187	0.263
TNA (USD billions)	0.482	0.343
Age (months)	155.74	130.41
Volatility (12M, %)	5.206	5.218
Morningstar Sustainability Rating (Globes)	3.169	3.643
Morningstar Rating (Stars)	3.135	3.041
Number of Funds	6,508	457
Number of Months	83	83

Notes: Entries are means. Returns, alpha, and volatility are expressed in percentage points. TNA is in billions of USD. Morningstar ratings are unitless (globes and stars).

five-factor alpha of 0.19% for conventional funds and 0.26% for ESG funds. Morningstar ratings also exhibit a consistent pattern: conventional funds tend to have greater overall ratings (stars), whereas ESG funds score higher on sustainability ratings (globes), which is consistent with their respective investment objectives. Across both conventional and ESG funds, the average total net assets per fund is 0.83 billion USD, and the average age is approximately 11.9 years.

5. Empirical analysis

In Section 3, we derive two distinct predictions from alternative models of investor behavior. These predictions lead to a testable set of competing hypotheses, H_0 and H_1 , which concern the additive versus multiplicative interaction between financial and ESG attributes within the investor’s decision problem. This section is dedicated to empirically testing these hypotheses; it presents the econometric specification in Section 5.1, the main empirical results in Section 5.2 and four robustness checks in Section 5.3.

5.1. Econometric specification

Our empirical analysis is based on the analysis of the response of ESG and conventional investors to changes in mutual fund performance. If we observe that ESG fund flows are more sensitive to changes in financial returns (positive or negative) than are conventional flows, we

can support H_1 , consistent with specifications allowing for multiplicative interactions between financial and ESG attributes.

The model should therefore include the interaction terms between past financial returns, which are split into positive and negative returns, and ESG attributes. Four interaction variables ($PosPerf_{i,t-1} \times ESG_i$, $NegPerf_{i,t-1} \times ESG_i$, $PosPerf_{i,t-1} \times CONV_i$ and $NegPerf_{i,t-1} \times CONV_i$) are hence considered, where $CONV_i$ is a dummy variable taking a value of 1 if the mutual fund is classified as conventional relative to its name and 0 otherwise, whereas ESG_i is built similarly for ESG mutual funds.

The flow–performance regression therefore has the following form, as in Bollen (2007), Capotă et al. (2022) and Baily and Gnabo (2023):

$$\begin{aligned}
Flow_{i,t} = & \alpha_0 + \alpha_1.ESG_i \\
& + \beta_0.PosPerf_{i,t-1} \times ESG_i + \beta_1.PosPerf_{i,t-1} \times CONV_i \\
& + \beta_2.NegPerf_{i,t-1} \times ESG_i + \beta_3.NegPerf_{i,t-1} \times CONV_i \\
& + \theta.Control_{i,t-1} + \lambda.Trend.ESG_{i,t-1} + Months_t + Style_i \\
& + \epsilon_{i,t},
\end{aligned} \tag{11}$$

where $Flow$ is the fund flow, $Control$ is a set of control variables including fund-level data as in other studies (Bollen, 2007; Benson and Humphrey, 2008; Renneboog et al., 2011; Ferreira et al., 2012; Baily and Gnabo, 2023; Capotă et al., 2022). These control variables include age ($\ln(Age)$), total net assets ($\ln(TNA)$), the volatility of the return ($ReturnVolatility$) and the two scores attributed by Morningstar ($Morningstar5Globes$ and $Morningstar5Stars$). These two last control variables are dummies that are introduced to control the demand driven by high performance and sustainability Morningstar ratings, i.e, 5 stars and 5 globes, respectively. Then, as in Capotă et al. (2022), $Trend.ESG$ is the time fixed effects for ESG mutual funds to capture the specific growth of this market. As in Baily and Gnabo (2023), $Month$ is the time fixed effects and $Style$ is the investment style fixed effects that are also

introduced to account for potential unobserved heterogeneity across funds.

Given the construction of the indicator variables, coefficients β_0 , β_1 , β_2 and β_3 measure the sensitivity of mutual flows to lagged returns for the following subsets:

$$\left\{ \begin{array}{l} \beta_0 \text{ ESG mutual funds following positive returns,} \\ \beta_1 \text{ Conventional mutual funds following positive returns,} \\ \beta_2 \text{ ESG mutual funds following negative returns,} \\ \beta_3 \text{ Conventional mutual funds following negative returns.} \end{array} \right. \quad (12)$$

The H_1 hypothesis would therefore be supported for $\beta_0 > \beta_1$ and $\beta_2 > \beta_3$.

All the variables are available on a monthly frequency from 2018M8 to 2025M6 for 6,965 European mutual funds. The balanced panel described by Eq. (11) is estimated via fixed effects OLS. Clustered standard errors are computed as in Ferreira et al. (2012) and Baily and Gnabo (2023), and $\epsilon_{i,t}$ are i.i.d. residuals.

5.2. Main results

The objective of this empirical analysis is to test the theoretical predictions of our model regarding investor behavior. Specifically, the study examines hypotheses H_0 and H_1 , which correspond to alternative predictions based on additive and multiplicative interactions between financial and ESG attributes within the investor's utility function.

Relying on the econometric framework specified by Eq. (11), we estimate the flow–performance relationship for both conventional and ESG investors. The results of these estimations are reported in Table 2. Specifically, the regression of fund flows on past performance is conducted using two alternative proxies for performance: raw returns and the 5-factor alpha. The left and right columns of Table 2 present the outcomes of the estimation corresponding to each performance measure. For each specification, regression results are provided, corresponding to the full sample of 6,965 European mutual funds over the period 2018M8-2025M6.

Table 2: Flow–performance relationship - European mutual funds - Invested internationally

	Raw returns	5F alpha
<i>ESG</i>	0.013*** (0.003)	0.016*** (0.003)
<i>PosPerf_{t-1} × ESG</i>	0.078*** (0.013)	0.004*** (0.001)
<i>PosPerf_{t-1} × CONV</i>	0.059*** (0.007)	0.002*** (0.0004)
<i>NegPerf_{t-1} × ESG</i>	0.045*** (0.010)	0.004*** (0.001)
<i>NegPerf_{t-1} × CONV</i>	0.038*** (0.005)	0.003*** (0.0003)
<i>ln(Age_{t-1})</i>	-0.008*** (0.0005)	-0.002*** (0.001)
<i>ln(TNA_{t-1})</i>	-0.002*** (0.0002)	-0.008*** (0.0005)
<i>ReturnVolatility_{t-1}</i>	-0.0008*** (0.0003)	-0.002*** (0.0002)
<i>Morningstar5Globes_{t-1}</i>	0.0005*** (0.0002)	0.0009 (0.0006)
<i>Morningstar5Stars_{t-1}</i>	0.011*** (0.0007)	0.003*** (0.0002)
Trend.ESG control	Yes	Yes
Month + Style FE	Yes	Yes
Adj. R^2	0.073	0.063

Notes: This table reports the estimates obtained for a panel of 6,965 mutual funds domiciled in Europe over the period 2018M8–2025M6 with one lag. The dependent variable is the fund net flow and the independent variables are past performance, ESG, and control variables. ESG is a dummy variable for sustainability, that takes the value 1 if the fund name includes targeted ESG keywords, and 0 otherwise. In columns (1) and (2), performance is measured by raw returns and 5-factor alpha, respectively. Results are estimated via a FE OLS estimation with time and investment style fixed effects and with standard errors clustered at the time and fund level. Standard errors are reported in parentheses below the estimates. ***, ** and * indicate significance at 99%, 95% and 90% levels, respectively.

The estimates are reported in Table 2. We first observe that the coefficient on the dummy variable ESG is positive and significantly different from zero, highlighting the ability of ESG labelling to drive investor demand. These results are consistent with those of several recent studies (El Ghouli and Karoui, 2021; Gibbon et al., 2025). These findings also suggest that ESG mutual funds generate flows independent of their underlying financial performance, reinforcing the idea that nonfinancial attributes are important drivers of the mutual fund market. Concerning the interaction terms, the estimates indicate a stronger sensitivity of ESG funds to past financial performance. In the case of the five-factor alpha, ESG mutual fund flows remain higher than those to conventional funds.

Taken together, these results suggest that investors in ESG funds exhibit heightened sensitivity to past performance, suggesting a utility dependence between financial and nonpecuniary preferences. The stronger flow sensitivity observed for ESG funds enables us to reject the null hypothesis that the interaction between financial and ESG attributes is additive. These empirical findings on the flow–performance relationship are consistent with those documented by Bollen (2007), Renneboog et al. (2011) and, more recently, Bansal et al. (2022), Baily and Gnabo (2023), Klinkowska and Zhao (2023) and Ceccarelli et al. (2024). From this perspective, our findings challenge the validity of the additive models commonly used in the recent literature (e.g., Pedersen et al., 2021; Pástor et al., 2021; Avramov et al., 2022), as they lead us to reject the hypothesis of an additive interaction between the financial and ESG attributes modeling investor preferences. With respect to the other determinants of cash flows in the ESG finance market, our results are broadly consistent with the literature. Specifically, our empirical findings on fund-level controls, such as size, age, name, and ratings, align with those reported in recent contributions by Hartzmark and Sussman (2019), Pástor and Vorsatz (2020), Baily and Gnabo (2023), Ceccarelli et al. (2024), and Gibbon et al. (2025). Specifically, we observe that larger mutual funds (size measured as $\ln(TNA)$) attract fewer net flows. Similarly, the significantly negative coefficients on $\ln(Age)$ indicate that younger funds continue to draw more investor interest than do older funds. Moreover, flows decline with volatility, a result that is intuitive and consistent with investor risk aversion. Finally, both Morningstar ratings (*Morningstar5Globes* and *Morningstar5Star*) are positive and significantly different from 0. This finding confirms that in addition to the importance of ESG labelling measured by the variable *ESG* and past performance measures, investors are sensitive to financial and ESG signals. Importantly, these results are robust across different performance measures, as the same patterns are observed whether raw returns or the 5-factor alpha are used.

5.3. Robustness checks

To assess the robustness of our findings, we replicate the empirical analysis in two steps. First, in Section 5.3.1, we examine whether the flow–performance relationship holds within the subsample of funds domiciliated in the European Union. Second, we restrict the sample to mutual funds that invest at least 80% of their assets in Europe, allowing us to verify that our results are not driven by funds with broader geographic exposure.

5.3.1. Result replication for EU-domiciled mutual funds

To assess the robustness of our findings, we perform an additional analysis by restricting the sample to funds domiciled in the European Union. This restriction aims to approximate a context in which the regulatory environment for sustainable finance is more stringent, notably due to the application of the Sustainable Finance Disclosure Regulation (SFDR), the EU taxonomy for sustainable activities and the ESMA guidelines on fund names using ESG or sustainability-related terms.

Although the EU’s sustainable finance framework applies to funds marketed in the EU regardless of their domicile, funds domiciled within the EU are highly likely to be marketed in the EU and therefore subject to EU regulation requirements. Consequently, domiciliation serves as a proxy for greater regulatory pressure in terms of sustainability disclosure and product classification and branding. Although this approach does not measure the regulatory effect directly, it provides a reasonable approximation.

By comparing the results from the full sample with those from the EU-domiciled subsample, we test whether our conclusions hold under a more homogeneous regulatory framework. Consistent results across these samples could suggest that our findings are not driven by differences in regulatory environments, while significant deviations could indicate that regulatory constraints influence fund characteristics or performance.

Therefore, as a first robustness check, we replicate the previous results for the mutual funds domiciled in EU countries, i.e., excluding 1,307 of them domiciled in Switzerland, Jersey, Guernsey, Liechtenstein, the United Kingdom, and Norway. The estimation results

are reported in Table 3. The left and right panels of Table 3 report the outcomes of the estimation using raw returns and the 5-factor alpha, respectively, as alternative measures of financial performance.

Table 3: Flow–performance relationship - EU-domiciled mutual funds - Invested internationally

	Raw returns	5F alpha
<i>ESG</i>	0.013*** (0.003)	0.015*** (0.003)
<i>PosPerf_{t-1} × ESG</i>	0.083*** (0.013)	0.005*** (0.001)
<i>PosPerf_{t-1} × CONV</i>	0.064*** (0.007)	0.002*** (0.0004)
<i>NegPerf_{t-1} × ESG</i>	0.042*** (0.010)	0.004*** (0.001)
<i>NegPerf_{t-1} × CONV</i>	0.039*** (0.006)	0.003*** (0.0003)
<i>ln(Age_{t-1})</i>	-0.008*** (0.0005)	-0.008*** (0.0005)
<i>Ln(TNA_{t-1})</i>	-0.002*** (0.0002)	-0.002*** (0.0001)
<i>ReturnVolatility_{t-1}</i>	-0.002*** (0.0002)	-0.003*** (0.0005)
<i>Morningstar5Globes_{t-1}</i>	0.002*** (0.0005)	0.001*** (0.0005)
<i>Morningstar5Stars_{t-1}</i>	0.009*** (0.0007)	0.011*** (0.0008)
Trend.ESG control	Yes	Yes
Month + Style FE	Yes	Yes
Adj. <i>R</i> ²	0.076	0.066

Notes: This table reports the estimates obtained for a panel of 5,658 mutual funds domiciled in the European Union over the period 2018M8–2025M6 with one lag. The dependent variable is the fund net flow and the independent variables are past performance, ESG, and control variables. ESG is a dummy variable for sustainability, that takes the value 1 if the fund name includes targeted ESG keywords, and 0 otherwise. In columns (1) and (2), performance is measured by raw returns and 5-factor alpha, respectively. Results are estimated via a FE OLS estimation with time and investment style fixed effects and with standard errors clustered at the time and fund level. Standard errors are reported in parentheses below the estimates. ***, ** and * indicate significance at 99%, 95% and 90% levels, respectively.

The results in Table 3 are qualitatively similar to those obtained in Table 2, indicating that the flow–performance relationship is stronger for ESG investors than for conventional investors, confirming the rejection of H_0 , which corresponds to specifications in which financial and extrafinancial attributes enter the investor’s decision problem additively.

5.3.2. Result replication for EU-domiciled mutual funds invested in Europe

In the second robustness check, we replicate the previous analysis by restricting the sample to mutual funds domiciled in the European Union and investing at least 80% of their assets

in Europe, which allows us to verify whether the sensitivity of ESG investors remains stable regardless of the geographical destination of their investments. After applying these filters, we obtain a panel of 1,339 mutual funds.

Table 4: Flow–performance relationship - EU-domiciled mutual funds - Invested in Europe

	Raw returns	5F alpha
<i>ESG</i>	0.009*** (0.003)	0.007*** (0.003)
<i>PosPerf_{t-1} × ESG</i>	0.057*** (0.010)	0.008*** (0.002)
<i>PosPerf_{t-1} × CONV</i>	0.041*** (0.005)	0.002*** (0.0006)
<i>NegPerf_{t-1} × ESG</i>	0.070*** (0.013)	0.005*** (0.002)
<i>NegPerf_{t-1} × CONV</i>	0.050*** (0.006)	0.004*** (0.0005)
<i>ln(Age_{t-1})</i>	-0.00002*** (0.000001)	-0.00002*** (0.00001)
<i>Ln(TNA_{t-1})</i>	-0.002*** (0.0002)	-0.002*** (0.0003)
<i>ReturnVolatility_{t-1}</i>	-0.0001 (0.0004)	-0.0004 (0.0003)
<i>Morningstar5Globes_{t-1}</i>	0.0014 (0.0008)	0.0016 (0.0008)
<i>Morningstar5Stars_{t-1}</i>	0.008*** (0.0009)	0.009*** (0.0009)
Trend.ESG control	Yes	Yes
Month + Style FE	Yes	Yes
Adj. R^2	0.039	0.034

Notes: This table reports the estimates obtained for a panel of 1,339 mutual funds domiciled in the European Union over the period of 2018M8–2025M6 with one lag. The dependent variable is the fund net flow and the independent variables are past performance, ESG, and control variables. ESG is a dummy variable for sustainability, that takes the value 1 if the fund name includes targeted ESG keywords, and 0 otherwise. In columns (1) and (2), performance is measured by raw returns and 5-factor alpha, respectively. Results are estimated via a FE OLS estimation with time and investment style fixed effects and with standard errors clustered at the time and fund level. Standard errors are reported in parentheses below the estimates. ***, ** and * indicate significance at 99%, 95% and 90% levels, respectively.

The results in Table 4 are qualitatively similar to those obtained in Table 2 and in Table 3, indicating that the flow–performance relationship is stronger for ESG investors than for conventional investors, confirming the rejection of H_0 , which assumes the utility dependence between the investor’s financial and nonpecuniary preferences, regardless of the geographical destination of the investments.

6. Policy implications

In line with the literature, our empirical findings indicate that investors value the extra-financial attributes of mutual funds. As shown in Hartzmark and Sussman (2019), El Ghouli and Karoui (2021), and Gibbon et al. (2025), investing in high-ESG-score funds or in ESG-labeled funds can satisfy the nonpecuniary considerations of ESG investors.

In addition to these contributions, our findings suggest that the role of extrafinancial attributes in investors' decision-making depends on financial performance. Investors allocate capital to ESG funds when extrafinancial characteristics are combined with satisfactory financial outcomes. Moreover, our empirical analysis provides insights into which extrafinancial attributes drive investor demand. Specifically, our results indicate that ESG fund names are more important drivers of fund flows than sustainability ratings. Consequently, fund managers' signals, such as fund names, play a central role in shaping investment decisions in the sustainable finance market. From this perspective, ESG-washing practices may be interpreted as a response to investor demand for ESG-labeled funds that deliver financial performance comparable to that of conventional funds (ESMA, 2025).

The challenges faced by asset managers in aligning the supply of sustainable funds with investor demand may incentivize reliance on superficial or potentially misleading sustainability signals, rather than the design of mutual funds with substantive ESG characteristics. Such constraints hinder the efficient allocation of private capital toward public policy objectives, including the transition to a low-carbon economy.

7. Conclusion

This paper investigates how financial and extrafinancial attributes of ESG mutual funds enter investors' decision-making. Drawing on the literature on investors' nonpecuniary preferences, we consider two alternative specifications allowing for additive or multiplicative interactions between financial and extrafinancial mutual fund attributes.

First, we derive the return elasticity of fund demand under each specification, leading

to distinct empirical predictions for the flow-performance relationship. Second, we empirically test these competing hypotheses using a unique dataset covering 6,965 European active equity mutual funds over the period 2018M8-2025M6. Specifically, we regress fund flows on lagged performance for ESG and conventional funds, controlling for a rich set of fund characteristics. Our empirical results show that, compared with conventional investors, ESG investors are more sensitive to lagged performance. Hence, our findings are more consistent with specifications allowing for multiplicative interactions between financial and extrafinancial attributes. In addition, we provide empirical evidence that ESG fund names play a more important role in investors' decision-making than ESG ratings. These findings shed new light on ESG-washing practices in financial markets, particularly in light of the difficulty investors face in assessing the credibility of ESG claims. They also highlight the importance of policymakers in strengthening supervisory oversight and regulatory frameworks aimed at curbing ESG-washing.

Some limitations remain. In particular, our analysis focuses on European active mutual funds. Extending the empirical framework to U.S. markets and/or to passive funds would be a promising avenue for future research, allowing for a broader assessment of differences in fund strategies and investor behavior. Despite these limitations, our findings pave the way for improvements to existing supervisory and regulatory frameworks and open up new avenues for research on investor demand for sustainable financial products.

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Appendix A. Proofs and derivations

A.1 Derivation of Eq. (7)

Starting from the utility representation

$$U(\hat{W}, S, \lambda) = -\exp\left(-\bar{\gamma}\phi(S, \lambda)\hat{W} - \eta S\right), \quad (\text{A.1})$$

where $\bar{\gamma} > 0$ denotes absolute risk aversion, $\eta \geq 0$ captures the nonpecuniary payoff associated with the ESG label, and $\phi(S, \lambda) = 1 - (1 - \lambda)S$. Terminal wealth is given by

$$\hat{W} = W \times (1 + r_f + X'r), \quad (\text{A.2})$$

where $W > 0$ is initial wealth, r_f is the risk-free rate, and r is an $N \times 1$ vector of excess asset returns, assumed to be normally distributed with mean vector μ and covariance matrix Σ .

Substituting terminal wealth from Eq. (A.2) into Eq. (A.1) gives

$$\begin{aligned} U(\hat{W}, S, \lambda) &= -\exp\left(-\bar{\gamma}\phi(S, \lambda)\hat{W} - \eta S\right) \\ &= -\exp\left(-\bar{\gamma}\phi(S, \lambda)W(1 + r_f + X'r) - \eta S\right) \\ &= -\exp\left(-\bar{\gamma}\phi(S, \lambda)W(1 + r_f) - \bar{\gamma}\phi(S, \lambda)WX'r - \eta S\right). \end{aligned} \quad (\text{A.3})$$

Taking expectations with respect to asset returns, we start from Eq. (A.3):

$$\mathbb{E}[U(\hat{W}, S, \lambda)] = \mathbb{E}\left[-\exp\left(-\bar{\gamma}\phi(S, \lambda)W(1 + r_f) - \bar{\gamma}\phi(S, \lambda)WX'r - \eta S\right)\right]. \quad (\text{A.4})$$

Since the terms $-\bar{\gamma}\phi(S, \lambda)W(1 + r_f)$ and $-\eta S$ are deterministic, they can be factored out of the expectation. This yields the factorized expression

$$\mathbb{E}[U(\hat{W}, S, \lambda)] = -\exp\left(-\bar{\gamma}\phi(S, \lambda)W(1 + r_f) - \eta S\right) \cdot \mathbb{E}\left[\exp\left(-\bar{\gamma}\phi(S, \lambda)WX'r\right)\right]. \quad (\text{A.5})$$

Since $X'r \sim \mathcal{N}(X'\mu, X'\Sigma X)$, the moment generating function of the normal distribution implies

$$\mathbb{E}\left[\exp\left(-\bar{\gamma}\phi(S, \lambda)WX'r\right)\right] = \exp\left(-\bar{\gamma}\phi(S, \lambda)WX'\mu + \frac{\bar{\gamma}^2}{2}\phi(S, \lambda)^2W^2X'\Sigma X\right). \quad (\text{A.6})$$

Combining Eqs. (A.5) and (A.6) yields

$$\begin{aligned} \mathbb{E}\left[U(\hat{W}, S, \lambda)\right] = & -\exp\left(-\bar{\gamma}\phi(S, \lambda)W(1+r_f) - \bar{\gamma}\phi(S, \lambda)WX'\mu\right. \\ & \left.- \eta S + \frac{\bar{\gamma}^2}{2}\phi(S, \lambda)^2W^2X'\Sigma X\right). \end{aligned} \quad (\text{A.7})$$

□

A.2 Derivation of Eq. (8)

Maximizing expected utility in Eq. (A.7) is equivalent to maximizing its exponent, since the expression is of the form $-\exp(\cdot)$ that is strictly increasing. So maximizing $-\exp(Z)$ is equivalent to maximizing Z and we can write from Eq. (A.7):

$$Z(X, S, \lambda) = -\bar{\gamma}\phi(S, \lambda)W(1+r_f) - \bar{\gamma}\phi(S, \lambda)WX'\mu - \eta S + \frac{\bar{\gamma}^2}{2}\phi(S, \lambda)^2W^2X'\Sigma X. \quad (\text{A.8})$$

Terms that do not depend on the portfolio choice X can be dropped for the maximization problem. Hence, maximizing $Z(X, S, \lambda)$ over X is equivalent to maximizing

$$\tilde{Z}(X, S, \lambda) = -\bar{\gamma}\phi(S, \lambda)WX'\mu + \frac{\bar{\gamma}^2}{2}\phi(S, \lambda)^2W^2X'\Sigma X, \quad (\text{A.9})$$

up to X -independent terms. It is convenient to work with a certainty-equivalent objective

by multiplying $\tilde{Z}(X, S, \lambda)$ by $-1/\bar{\gamma}$, which preserves the maximizer:

$$CE(X, S, \lambda) = -\frac{1}{\bar{\gamma}} \tilde{Z}(X, S, \lambda) \quad (\text{A.10})$$

$$= \phi(S, \lambda) W X' \mu - \frac{\bar{\gamma} W^2}{2} \phi(S, \lambda)^2 X' \Sigma X, \quad (\text{A.11})$$

up to terms independent of X . Finally, the nonpecuniary term $-\eta S$ in the exponent contributes additively to the certainty equivalent as $(\eta/\bar{\gamma})S$ (it is independent of X but relevant for the level comparison across S), yielding

$$CE(X, S, \lambda) = \phi(S, \lambda) W X' \mu - \frac{\bar{\gamma} W^2}{2} \phi(S, \lambda)^2 X' \Sigma X + \frac{\eta}{\bar{\gamma}} S, \quad (\text{A.12})$$

up to terms independent of X .

□

A.3 Derivation of Eq. (9)

Starting from the certainty equivalent in Eq. (A.12), the first-order condition with respect to the portfolio vector X is obtained by setting the partial derivative equal to zero:

$$\frac{\partial CE(X, S, \lambda)}{\partial X} = \phi(S, \lambda) W \mu - \bar{\gamma} W^2 \phi(S, \lambda)^2 \Sigma X = 0. \quad (\text{A.13})$$

Rearranging Eq. (A.13) gives

$$\Sigma X = \frac{1}{\bar{\gamma} W} \cdot \frac{1}{\phi(S, \lambda)} \mu. \quad (\text{A.14})$$

Assuming that Σ is positive definite, premultiplying by Σ^{-1} yields the unique maximizer

$$X^*(S, \lambda) = \frac{1}{\bar{\gamma} W} \cdot \frac{1}{\phi(S, \lambda)} \Sigma^{-1} \mu. \quad (\text{A.15})$$

□

A.4 Proof of Proposition 1

From Eq. (A.15), optimal portfolio demand is inversely proportional to the scaling factor $\phi(S, \lambda)$. Since $\phi(0, \lambda) = 1$ for conventional funds and $\phi(1, \lambda) = \lambda$ for ESG-labeled funds, it follows that

$$\frac{\partial X^*(1, \lambda)}{\partial \mu} = \frac{1}{\lambda} \frac{\partial X^*(0, \lambda)}{\partial \mu}. \quad (\text{A.16})$$

When $\lambda < 1$, the sensitivity of optimal demand to expected returns is strictly larger for ESG-labeled funds than for conventional funds.

□