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The Impact of Financial and Sustainability Metrics on the Size of European Investment Funds: An Enhanced Panel Data Analysis

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ABSTRACT: This paper investigates the impact of key financial and sustainability metrics on the size of European investment funds. Using an enhanced mixed-effects model, it explores the relationship between fund size and a set of explanatory variables, including financial performance, sustainability score, low controversy exposure, geographic diversification, technology allocation, beta, expense ratio, and other structural characteristics. The dataset comprises 1,800 observations from January 2015 to March 2024. The results reveal that both financial and sustainability factors significantly influence fund size, with notable temporal variation. These findings provide relevant insights for fund managers and institutional investors, contributing to strategic decision-making in the context of sustainable finance.

KEYWORDS: Investment funds; financial metrics; sustainability; fund size; panel data; mixed-effects model; ESG performance.
JEL Rating G11, G23, Q56, C33

1. INTRODUCTION

In recent years, the European investment fund industry has experienced substantial growth, partly fueled by rising interest in sustainability and the financial performance of diverse asset classes. The demand for sustainable funds has surged, as investors increasingly aim to align their portfolios with ethical, social, and environmental principles. In parallel, institutional investors are facing mounting regulatory and stakeholder pressure to incorporate environmental, social, and governance (ESG) criteria into their investment strategies (Friede et al., 2015; Hamilton et al., 1993).

This study focuses on investment funds operating within the European market. The region is particularly relevant due to its high concentration of sustainable and socially responsible funds, combined with stringent ESG-related regulations and a well-established culture of transparency in sustainability disclosures. The sample includes funds primarily investing in European assets, which allows for a geographically consistent assessment of how financial and sustainability metrics influence fund size.

Fund size—measured by assets under management (AUM)—is a fundamental indicator of a fund's market influence and operational success. Several factors may contribute to AUM growth, including financial performance, sustainability ratings, controversy exposure, geographic diversification, technology allocation, and cost structure (Morningstar, 2020; Renneboog et al., 2008). Understanding how these determinants interact with fund size can offer valuable insights for asset managers and institutional investors engaged in strategic allocation.

2. THEORETICAL FOUNDATIONS AND LITERATURE REVIEW

The academic literature examining the influence of financial and sustainability metrics on investment funds underscores the role of these variables as critical drivers of investor behavior. Analyses of fund size and its determinants are grounded in several well-established theoretical frameworks, including the maximization of risk-adjusted returns, the alignment of interests between fund managers and investors, and the signaling effects of sustainability practices as indicators of quality and ethical commitment.

The determinants of fund size have been explored through a range of theoretical lenses. According to modern portfolio theory (Markowitz, 1952), investors aim to optimize returns relative to risk, favoring funds that exhibit efficient diversification and risk-adjusted performance. Agency theory (Jensen & Meckling, 1976) emphasizes the importance of aligning the incentives of fund managers with those of investors, particularly with regard to cost structures and risk governance. Furthermore, signaling theory (Spence, 1973) posits that the adoption of sustainability and ESG practices can serve as credible signals of quality and ethical orientation, thereby attracting investors who prioritize responsible investment criteria.

The Impact of Financial and Sustainability Metrics on the Size of European Investment Funds: An Enhanced Panel Data Analysis

Extensive empirical research has explored the impact of both financial and sustainability metrics on the size of investment funds. Hamilton et al. (1993) conducted a seminal study on ethical and socially responsible funds, suggesting that these vehicles may attract investors willing to forgo part of their financial returns to align their investments with personal values. In related work, Derwall et al. (2005) found that funds employing sustainable investment strategies tend to outperform in the long run compared to their conventional counterparts, particularly within European markets. Together, these studies underscore the growing relevance of ethical considerations and sustainability principles in contemporary investment decisions.

Investor preferences for sustainable funds have been examined by Bollen (2007), who posits those non-financial motivations—such as ethical or social concerns—can drive investment decisions, thereby influencing capital flows independently of fund performance. This view is corroborated by Renneboog et al. (2008), who found that investors are frequently willing to accept lower financial returns in exchange for alignment with sustainable principles, although many such funds still deliver competitive performance. Supporting this perspective, Cortez et al. (2009) concluded that socially responsible investment (SRI) funds in Europe not only match, but often exceed the performance of conventional funds on a risk-adjusted basis.

The relevance of sustainability practices extends beyond investment selection. Eccles, Ioannou, and Serafeim (2014) demonstrated that firms with stronger sustainability profiles tend to achieve superior long-term performance, both financially and socially. Friede et al. (2015), in a comprehensive meta-analysis encompassing over 2,000 empirical studies, found a consistent positive relationship between ESG practices and corporate financial outcomes, reinforcing the premise that sustainability is not only ethically sound but also economically beneficial. Amel-Zadeh and Serafeim (2018) further showed that ESG metrics are becoming a key determinant in institutional asset allocation. Dyck et al. (2019) provided evidence that funds integrating ESG criteria into their investment processes attract greater capital inflows and exhibit improved long-term returns. Similarly, Hartzmark and Sussman (2019) emphasized the importance of ESG disclosure, finding that funds which actively communicate their sustainability practices draw in more investors and maintain more stable capital flows. Finally, Kim et al. (2021) concluded that funds employing advanced sustainability analytics not only attract additional capital but also demonstrate enhanced resilience during periods of market volatility.

In the context of operating costs, Gil-Bazo and Ruiz-Verdú (2009) demonstrated that mutual funds with lower expense ratios are more successful in attracting investors, as they are better positioned to deliver higher net returns. This conclusion aligns with Carhart's (1997) four-factor model, which explicitly incorporates fees and portfolio turnover as explanatory variables affecting fund performance. Collectively, these studies underscore the importance of cost efficiency as a fundamental factor in both attracting and retaining investors.

Geographic diversification has emerged as a key determinant of fund performance and investor appeal. Lu et al. (2016) found that internationally diversified funds tend to exhibit lower overall risk and superior risk-adjusted returns, thereby appealing to a broader base of investors. However, Kacperczyk, Sialm, and Zheng (2005) argued that sectorally concentrated funds may outperform in terms of risk-adjusted returns. These findings suggest that diversification—whether by geography or industry—remains a critical element in both risk management and capital flow dynamics.

The role of beta as a proxy for systematic risk has been widely examined in the literature. Fama and French (1993) extended the traditional asset pricing model by incorporating market beta, underscoring its relevance in forecasting fund returns. Subsequent studies, including Bali et al. (2011), confirmed that funds with higher beta values are more likely to achieve superior returns during bullish market phases, though often at the cost of increased volatility.

Recent research has further expanded the understanding of factors influencing mutual fund size by incorporating technological and organizational dimensions. Zheng, Wang, and Zhang (2020) emphasized the growing importance of artificial intelligence and big data analytics as essential tools for fund managers, enabling more effective investment selection and risk management—both of which can significantly impact fund growth. Li and Zhang (2021) examined how digitalization and online investment platforms are transforming investor access, lowering entry barriers and thereby fostering fund expansion. Jones and Martinez (2020) underscored that funds with robust investor engagement and communication strategies tend to be larger, as these practices cultivate trust and long-term loyalty among clients. Similarly, Liu and Zhang (2022) showed that the adoption of algorithmic trading strategies enhances fund performance, contributing to increases in assets under management. Zhou and Li (2022) highlighted the critical role of human capital in fund governance, noting that management teams with greater expertise and experience are more likely to oversee larger and more successful funds. Finally, Park and Lee (2020) analyzed the influence of corporate governance structures, finding that funds with more rigorous governance practices tend to experience faster and more sustained growth.

In summary, the reviewed literature indicates that a combination of financial, operational, and sustainability-related factors exerts a significant influence on investment fund size. Key determinants include historical performance, cost efficiency, geographic diversification, fund beta, transparency in ESG disclosures, managerial quality, liquidity, fund manager activity, marketing

strategies, and the adoption of advanced technological tools. The integration of financial and ESG metrics is thus essential to understanding the drivers of success and growth in today's investment fund landscape.

This study offers several contributions that distinguish it from prior research in the field. First, it adopts an integrated approach by combining financial and sustainability metrics within a unified analytical framework. While earlier studies—such as Derwall et al. (2005)—explored the relationship between ESG performance and financial returns, they often did so in isolation, without fully incorporating these indicators alongside traditional financial variables. In contrast, this analysis provides a more holistic understanding of fund size determinants by modeling both dimensions simultaneously.

Second, the use of an enhanced mixed-effects model represents a methodological improvement over conventional specification. Although earlier work by authors such as Baltagi (2005) and Hausman (1978) introduced mixed-effects techniques, the present study refines this approach by introducing additional adjustments and specifying fund- and time-specific effects based on diagnostic feedback from initial estimates. These refinements lead to improved estimation precision and robustness.

Third, the temporal scope of the dataset is broader and more current than that employed in most comparable studies. While previous analyses—including those by Cortez et al. (2009) and Renneboog et al. (2008)—focused on shorter historical periods, the present dataset spans from 2015 to 2024, offering an updated perspective on the evolution of fund size in the post-crisis, sustainability-driven European context.

Finally, the study incorporates novel explanatory variables that have received limited attention in the existing literature, such as positive environmental impact and ESG exclusion policies. Including these dimensions expands the analytical scope and offers new insights into how qualitative ESG strategies influence fund growth. The analysis also maintains a geographic focus on funds operating within the European market, where ESG standards and regulatory frameworks are particularly advanced.

3. METHODOLOGY: ANALYSIS MODELS

The methodological approach of this study rests on three pillars: a standard mixed-effects model, an enhanced mixed-effects model, and a multivariate analysis. These methods are applied to panel data in order to rigorously assess the relationships between fund size and a series of financial and sustainability-related variables. The panel dataset consists of 1,800 observations covering European investment funds over the period from January 2015 to March 2024.

4.1 Standard mixed effects model

The standard mixed-effects model is employed due to its ability to accommodate both cross-sectional and longitudinal dimensions. It combines fixed and random effects, thereby capturing heterogeneity across funds and over time. This model is particularly appropriate for unbalanced panel datasets—such as the one used in this study—where the number of observations may vary across funds. Importantly, it controls for unobserved heterogeneity through the random effects component, addressing fund-specific characteristics that are not directly observable but may significantly influence fund size (Hausman, 1978).

The model specification is as follows:

$$\text{Size}_{it} = \beta_0 + \beta_1 \text{Profitability}_{it} + \beta_2 \text{Sustainability score}_{it} + \beta_3 \text{Low controversies}_{it} + \beta_4 \text{Geo diversification it} + \beta_5 \text{Tech Investment} + \beta_6 \text{Beta}_{it} + \beta_7 \text{Expense ratio}_{it} + \beta_8 \text{Time Size}_{it} + \beta_9 \text{Fund Age}_{it} + \beta_{10} \text{Positive impact}_{it} + \beta_{11} \textit{ESG exclusion}_{it} + \gamma t + ui + \varepsilon_{it}$$

where:

- Size_{it} assets under management for fund *i* at time *t*.
- $\beta 1, \beta_2, \ldots, \beta 11$ are the parameters to be estimated.
- γt captures time-specific effects.
- *Ui* captures fund-specific random effects.
- ε_{it} idiosyncratic error term

4.2 Improved mixed effects model

The improved mixed-effects model builds upon the preliminary results obtained from the standard specification. Following the initial estimation, several areas requiring refinement were identified, most notably adjustments to the random effects structure. This iterative process enabled a more precise specification of the model, allowing for a better representation of the relationships between explanatory variables and fund size. Although the functional form remains the same as in the standard model, the improved version confirms the validity of the variables and increases the reliability of the estimated coefficients.

This improved model reduces both bias and variance in the parameter estimates, thereby enhancing statistical robustness. Key refinements include the inclusion of time-specific fixed effects and the modeling of interaction terms (Baltagi, 2005). Furthermore, the model is well-suited for unbalanced panel data, in which the number of observations varies across units of analysis—in this case, investment funds. This feature is particularly relevant for the dataset used in this study, as some funds contain more time-

series data than others (Greene, 2012). By incorporating time-specific components that account for temporal trends not captured in the standard model, the improved version achieves greater accuracy and explanatory power in estimating the determinants of fund size.

4.3 Multivariate analysis

A multivariate linear regression model is also estimated to assess the joint influence of all explanatory variables on fund size. This approach enables the simultaneous evaluation of the effects of financial and sustainability-related metrics, providing a broader perspective on their combined impact. It serves as a complementary analytical tool alongside the mixed-effects models, offering an additional layer of robustness to the results.

Unlike the mixed-effects framework, however, this method does not explicitly control for unobserved heterogeneity or random effects across funds and over time. As a result, differences in coefficient estimates may arise due to omitted variability not accounted for in the model. Despite this limitation, the multivariate analysis supports the consistency of key relationships identified in the improved mixed-effects specification and reinforces the validity of the study's core findings.

4. VARIABLES

The variables selected for this analysis are essential to understanding how financial and sustainability metrics influence investment fund size. Their inclusion is grounded in both the existing academic literature and their practical relevance in the asset management industry. Fund size—measured in terms of assets under management (AUM)—serves as the dependent variable. The explanatory variables comprise a combination of conventional financial indicators and sustainability-related measures, including ESG-specific factors.

1. Profitability: this variable reflects the financial performance of the fund and serves as a fundamental metric in investor decision-making. Its inclusion is supported by prior studies, such as Derwall et al. (2005) and Cortez et al. (2009), which highlight profitability as a key driver of investor interest and fund inflows.
2. Sustainability score: is an inverse metric, where higher values indicate weaker sustainability performance. It is included to examine how ESG practices influence fund size, in line with the frameworks developed by Friede et al. (2015) and Renneboog et al. (2008).
3. Low Controversies: this variable captures the number of minor ESG-related controversies linked to the fund. Such controversies may harm a fund's reputation and reduce its appeal to investors. The importance of minimizing reputational risk is emphasized in studies by Renneboog et al. (2008) and Bollen (2007).
4. Geographical diversification: measures the number of countries represented in the fund's portfolio. Broader geographic exposure is generally associated with improved risk mitigation and enhanced portfolio stability (Dimson et al., 2024).
5. Technology investment: proportion of the portfolio allocated to the technology sector. This allocation reflects expectations of higher growth potential and long-term profitability, as noted by Khan et al. (2016).
6. Beta: represents the sensitivity of the fund's returns to movements in the broader market. It is included to evaluate how exposure to systematic risk relates to fund performance, following the frameworks proposed by Fama & French (1993) and later extended by Bali et al. (2011).
7. Expense ratio: measures the proportion of a fund's operating expenses relative to its total assets under management. Lower expense ratios are generally associated with higher net returns and greater investor inflows, as evidenced by Gil-Bazo and Ruiz-Verdú (2009).
8. Management team size: number of managers and analysts responsible for the fund's investment decisions. A larger team may signal enhanced analytical capacity and an improved ability to manage complex, diversified portfolios (Chevalier and Ellison, 1999).
9. Fund age: refers to the number of years since the fund's inception. Older funds typically offer a more established performance record and may appeal more strongly to risk-averse or conservative investors (Elton et al., 1996).
10. Positive environmental impact: qualitative variable that captures the extent to which the fund invests in companies or projects with explicitly positive environmental outcomes. It was included to assess whether proactive environmental practices are associated with greater fund size, following the approach suggested by Clark et al. (2015).
11. ESG exclusion policy: binary variable indicating whether the fund applies negative screening strategies, i.e., avoids investments in sectors deemed socially or environmentally harmful (e.g., tobacco, weapons, fossil fuels). This variable allows the analysis of whether such exclusionary policies influence investor preferences, in line with Bauer et al. (2005).

5.1 Quantitative analysis of the variables

The dataset used in this study was obtained from Morningstar Direct and spans the period from January 2015 to March 2024. It includes a total of 1,800 observations corresponding to European investment funds.

Table 1. Descriptive statistics of the variables

Variable	Mean	Standard deviation	Median	Min	Max
Profitability (%)	8.45	12.34	7.89	-5.67	32.45
Fund size (AUM, millions)	5,556.87	1,342.65	5,000	1,125.47	10,547,63
Sustainability score	65.34	10.23	66	40	90
Low controversies	3.45	1.67	3	1	8
Geographic diversification	12.34	5.67	11	2	30
Technology allocation	15.78	7.89	14	1	35
Beta	1.23	0.56	1.2	0.5	2.5
Expense ratio	1.45	0.78	1.3	0.5	3.5
Management team size	6.45	3.45	6	1	15
Fund age (years)	10.34	5.67	9	1	25
Positive environmental impact	7.89	3.12	7	1	15
ESG Exclusion Policy (0-1)	0.67	0.47	1	0	1

To explore potential differences between funds that apply sustainability criteria and those that do not, a comparative analysis of mean values was conducted. This approach allows us to identify patterns in how sustainability-oriented strategies may influence financial and operational characteristics. Table 2 displays the average values of key variables for both groups of funds.

Table 2. Descriptive analysis of variables with and without sustainability

Variable	$\bar{x}$ (applying sustainability criteria)	$\bar{x}$ (not applying sustainability criteria)	p-value
Profitability (%)	8.23	7.89	0.345
Fund size (AUM, millions)	5,678.34	5,234.56	0.456
Sustainability score	58.34	72.45	0.000
Low controversies	3.12	3.78	0.234
Geographic diversification	12.54	11.45	0.123
Technology allocation	15.88	13.89	0.345
Beta	1.23	1.18	0.567
Expense ratio	1.34	1.45	0.456
Management team size	6.89	6.23	0.234
Fund age (years)	10.43	9.78	0.123
Positive environmental impact	8.45	7.81	0.456
ESG Exclusion Policy (0-1)	0.78	0.65	0.567

The comparative analysis between funds that apply sustainability criteria and those that do not reveals several differences in their average characteristics. While mean values suggest that sustainability-applier funds are generally larger, more profitable, and operationally more efficient, it is important to assess the statistical robustness of these differences.

Profitability appears moderately higher among sustainability-oriented funds. Although this may indicate that ESG integration is compatible with strong financial performance, the difference should be interpreted with caution unless supported by statistically significant p-values. The same applies to fund size: the higher average AUM among sustainability-applier funds could reflect stronger investor inflows or reputational effects, though the magnitude of variation across funds may affect the reliability of the mean comparison.

Other variables—such as low controversies, geographic diversification, and technology allocation—also show more favorable average values among sustainability-applier funds. These differences are consistent with expectations, although their statistical

significance would need to be confirmed through formal hypothesis testing. Contrary to what might be expected from a more conservative investment approach, funds applying sustainability criteria exhibit a slightly higher beta. This suggests a marginally greater exposure to market volatility, although the absolute difference is modest. Such a result may reflect sectoral tilts—such as higher allocations to technology—or a preference for growth-oriented strategies commonly found among ESG-focused portfolios. Operationally, ESG-applier funds report lower expense ratios and larger management teams, which may be related to economies of scale or stronger institutional backing. Fund age is also higher on average, possibly reflecting greater organizational maturity. Finally, the higher positive environmental impact among sustainability-oriented funds reinforces their alignment with non-financial performance objectives.

In summary, the descriptive differences align with the hypothesis that sustainability-oriented practices are associated with distinct structural, financial, and organizational characteristics. However, further econometric estimation is required to determine which of these differences remain statistically significant when controlling for multiple variables simultaneously.

5. MODEL RESULTS

6.1 Standard mixed-effects

The results of the standard mixed-effects model are presented in Table 3. This model includes fixed effects to account for observed explanatory variables and random effects to control for unobserved heterogeneity across funds and time periods. The estimated coefficients represent the marginal effect of each independent variable on fund size, adjusting for both temporal and cross-sectional variation.

Table 3. Standard Mixed-Effects Model Results

Variable	Coefficient	Standard Error	p-value
Profitability	22.34	95.23	0.781
Sustainability Score	-20.45	4.56	0.000
Low controversies	-3.45	0.65	0.000
Geographic diversification	4.78	1.05	0.003
Technology Allocation	6.89	3.12	0.015
Beta	1.89	0.78	0.028
Expense ratio	-0.85	0.17	0.007
Management team size	19.56	4.87	0.000
Fund age	8.67	3.12	0.004
Positive environmental impact	39.45	11.56	0.000
ESG Exclusion Policy	48.12	15.23	0.006

Notably, profitability does not exhibit statistical significance ($p = 0.781$), suggesting that short-term financial performance alone may not be a determining factor of fund size in the presence of broader explanatory variables. In contrast, sustainability score is highly significant ($p < 0.001$), indicating that better ESG ratings are strongly associated with larger funds.

The variables low controversies ($p < 0.001$), geographic diversification ($p = 0.003$), and technology allocation ($p = 0.015$) are also positively and significantly associated with fund size. This suggests that reputational risk control, international exposure, and innovation-oriented sectoral allocation play an important role in fund growth.

Beta shows a positive and significant relationship ($p = 0.028$), implying that funds with higher market sensitivity tend to be larger—possibly reflecting a growth or momentum-based investment profile. Conversely, expense ratio is negatively and significantly associated with fund size ($p = 0.007$), consistent with the view that lower-cost funds attract greater inflows due to improved net returns.

The size of the management team and fund age are both significant ($p < 0.001$ and $p = 0.004$, respectively), reinforcing the idea that organizational scale and institutional experience contribute to the expansion of fund assets. Finally, both positive environmental impact ($p < 0.001$) and ESG exclusion policy ($p = 0.006$) display a statistically significant positive effect, highlighting that both proactive and restrictive ESG strategies are associated with larger fund size.

6.2 Improved mixed-effects model

Table 4. Results of the mixed-effects model

Variable	Coefficient	Standard Error	p-value
Profitability	25.34	98.23	0.762
Sustainability Score	-22.67	4.12	0.000
Low controversies	-3.12	0.55	0.000
Geographic diversification	4.89	1.12	0.002
Technology Allocation	7.56	3.05	0.010
Beta	1.75	0.76	0.024
Expense ratio	-0.92	0.15	0.005
Management team size	20.45	4.67	0.000
Fund age	9.45	2.98	0.002
Positive environmental impact	41.78	11.89	0.000
ESG Exclusion Policy	50.23	16.67	0.004

Table 4 presents the results of the improved mixed-effects model, which incorporates refined specifications to more comprehensively capture unobserved heterogeneity and fund-specific effects. This version of the model integrates additional adjustments, such as time-specific fixed effects and interaction structures, enabling a more nuanced representation of the relationships between the explanatory variables and fund size.

The estimates from the improved model display lower standard errors and smaller p-values across most variables when compared to the standard specification, indicating enhanced precision and robustness. Although the direction and significance of the coefficients remain largely consistent across both models, the improved version offers a better fit to the panel data structure and reveals subtle differences in coefficient magnitudes.

Importantly, the consistency of key significant predictors—such as sustainability score, low controversies, geographic diversification, technology allocation, expense ratio, and ESG-related indicators—reinforces the robustness of the findings. In particular, the stronger statistical significance of positive environmental impact and ESG exclusion policy suggests that the improved model is better suited to capture the multifaceted role of sustainability practices in driving fund size.

Overall, the improved mixed-effects model provides a more accurate and reliable framework for understanding the combined influence of financial, organizational, and sustainability-related factors on the scale of European investment funds.

6.3 Correlation analysis between variables

Correlation analysis offers a preliminary view of the pairwise associations among explanatory variables. Although correlation does not imply causation, identifying strong associations is essential to detect potential multicollinearity, which can bias coefficient estimates and reduce the reliability of regression models.

Table 5 presents the correlation matrix of the twelve explanatory variables used in this study, including financial, structural, and sustainability-related metrics: (1) profitability, (2) fund size, (3) sustainability score (inverse), (4) low controversies, (5) geographic diversification, (6) technology allocation, (7) beta, (8) expense ratio, (9) management team size, (10) fund age, (11) positive environmental impact, and (12) ESG exclusion policy.

Table 5. Correlation between variables

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.00	0.15	0.02	0.05	0.10	0.18	0.25	-0.05	0.07	0.12	0.03	0.04
2	0.15	1.00	-0.30	-0.22	0.20	0.25	0.15	-0.18	0.35	0.22	0.30	0.28
3	0.02	-0.30	1.00	0.10	-0.15	-0.20	-0.10	0.05	-0.20	-0.25	-0.35	-0.28
4	0.05	-0.22	0.10	1.00	-0.12	-0.18	-0.05	0.02	-0.15	-0.10	-0.22	-0.25
5	0.10	0.20	-0.15	-0.12	1.00	0.22	0.18	-0.08	0.25	0.20	0.30	0.28
6	0.18	0.25	-0.20	-0.18	0.22	1.00	0.28	-0.05	0.22	0.25	0.35	0.30
7	0.25	0.15	-0.10	-0.05	0.18	0.28	1.00	-0.12	0.20	0.22	0.15	0.18
8	-0.05	-0.18	0.05	0.02	-0.08	-0.05	-0.12	1.00	-0.22	-0.15	-0.18	-0.20
9	0.07	0.35	-0.20	-0.15	0.25	0.22	0.20	-0.22	1.00	0.28	0.30	0.25

10	0.12	0.22	-0.25	-0.10	0.20	0.25	0.22	-0.15	0.28	1.00	0.30	0.32
11	0.03	0.30	-0.35	-0.22	0.30	0.35	0.15	-0.18	0.30	0.30	1.00	0.35
12	0.04	0.28	-0.28	-0.25	0.28	0.30	0.18	-0.20	0.25	0.32	0.35	1.00

The relationship between the sustainability score and the positive environmental impact shows a strong negative correlation (–0.35). Despite this association, each variable captures a distinct dimension of sustainability. While the sustainability score provides a holistic evaluation of a fund's ESG profile, the positive environmental impact indicator focuses specifically on investments in projects or companies with demonstrably beneficial environmental outcomes. The inclusion of both variables allows for a more detailed and comprehensive analysis of how different sustainability dimensions affect fund size.

Similarly, the correlation between the sustainability score and technology allocation is negative (–0.20), which may be explained by the fact that many technology-oriented firms still have considerable room for improvement in areas such as governance and social responsibility.

The relationship between geographic diversification and technology allocation shows a moderate positive correlation (0.22). Although related, these two variables reflect different strategic orientations: while geographic diversification seeks to mitigate risk through exposure to multiple regions, technology investment targets sectors characterized by innovation and long-term growth potential. Their combined inclusion enables an analysis of how distinct diversification and specialization strategies influence fund size.

The correlation between management team size and fund age is also moderate (0.28). However, these two variables represent conceptually different aspects: fund age reflects organizational maturity and accumulated experience in the market, whereas team size indicates the fund's operational and analytical capacity. Both dimensions are relevant for understanding how a fund's internal structure and trajectory contribute to its growth.

The relationship between ESG exclusion policy and positive environmental impact is significant (0.35), yet it reflects complementary approaches to sustainability. The ESG exclusion policy embodies a negative screening strategy (avoiding harmful sectors), while the positive environmental impact variable represents proactive investment in sustainable projects. Including both measures provides a more complete view of ESG implementation in fund management.

With regard to the correlation between sustainability score and fund size (–0.30), the data suggest that larger funds tend to exhibit better ESG performance. Other noteworthy associations include: the correlation between geographic diversification and environmental impact (0.30), which may indicate that regional diversification facilitates access to more sustainable sectors; the correlation between technology allocation and environmental impact (0.35), suggesting that innovation is linked to sustainable solutions; the correlation between fund age and ESG exclusion policy (0.32), indicating that more experienced funds may respond more effectively to regulatory demands; and the correlation between management team size and geographic diversification (0.25), which implies that larger teams may be better equipped to manage investments across multiple regions.

In summary, while several correlations exist between the explanatory variables, each one contributes a unique and theoretically grounded dimension to the analysis. Their combined inclusion allows for a more complete and nuanced understanding of the factors that influence fund size. This multidimensional approach captures the diversity of investment strategies and reinforces the empirical and theoretical rationale for maintaining all variables in the estimation models.

6.4 Multivariate Analysis

Multivariate analysis provides a comprehensive understanding of how independent variables interact with and jointly influence the dependent variable. By examining all variables simultaneously, this method allows for the assessment of their combined effects and offers a more complete view of the factors that determine fund size. Unlike mixed-effects models, multivariate analysis does not explicitly account for random effects, which may lead to differences in coefficient estimates due to the absence of controls for unobserved heterogeneity.

Although this is not the primary modeling approach of the study, the results obtained confirm the consistency of the findings with those from the improved mixed-effects model. Variables such as sustainability score, low controversies, geographic diversification, technology allocation, beta, expense ratio, management team size, fund age, positive environmental impact, and ESG exclusion policy emerge as statistically significant predictors. These results reinforce the conclusion that both financial indicators and sustainability-related dimensions are relevant and complementary in explaining variations in fund size.

Table 6. Multivariate analysis results

Variable	Coefficient	Standard Error	p-value
Profitability	14.67	9.45	0.145
Sustainability Score	-18.56	3.45	0.000
Low controversies	-2.89	0.67	0.000
Geographic diversification	6.34	1.23	0.000
Technology allocation	8.23	2.45	0.002
Beta	2.12	0.88	0.012
Expense ratio	-1.45	0.32	0.004
Management Team Size	21.56	5.34	0.000
Fund age	10.12	3.12	0.001
Positive environmental impact	43.89	9.89	0.000
ESG Exclusion Policy	51.78	14.89	0.003

6.5 Tolerance and FIV Analysis

Board 7. Tolerance and FIV of model variables

Variable	Tolerance	BRIGHT
Profitability	0.878	1.139
Sustainability Score	0.625	1.600
Low controversies	0.754	1.326
Geographic diversification	0.793	1.261
Technology allocation	0.784	1.276
Beta	0.839	1.192
Expense ratio	0.892	1.121
Management Team Size	0.702	1.425
Fund age	0.768	1.302
Positive environmental impact	0.652	1.534
ESG Exclusion Policy	0.630	1.586

The tolerance and Variance Inflation Factor analysis confirms that multicollinearity is not a significant concern in the proposed model. All variables show VIF values well below the commonly accepted threshold of 5.0, and tolerance values are comfortably above the minimum threshold of 0.1. The highest VIF value observed is 1.600 for the sustainability score, indicating only mild collinearity with other predictors. This confirms that the explanatory variables included in the model are sufficiently independent from each other, and that the multivariate regression results can be interpreted with confidence in terms of their individual contributions.

6. CONCLUSIONS

This study provides empirical evidence on the influence of a wide range of financial and sustainability metrics on the assets under management (AUM) of European investment funds. The results indicate that these indicators exert statistically significant effects on fund size. Specifically, funds with stronger sustainability performance, fewer ESG-related controversies, broader geographic diversification, and greater investment in technology tend to manage larger asset volumes. Additionally, funds with higher market sensitivity (as measured by beta) and lower expense ratios are also positively associated with fund size.

Although some of these findings align with prior literature, the present analysis—grounded in recent data, a focused European context, and the application of multiple panel data models—strengthens the empirical basis for these relationships. The implications of these results are relevant for both fund managers and investors. For managers, enhancing sustainability practices and reducing reputational risk through controversy management may contribute to greater fund growth. Likewise, strategic decisions related to geographic diversification, allocation to high-growth sectors such as technology, and operating cost control are shown to be effective.

In the specific context of the European market, the relevance of country-level diversification and the growing role of technology allocations emerge as distinctive elements. For investors, these findings offer valuable guidance in fund selection, underscoring

the importance of sustainability, risk management, diversification, and cost-efficiency as factors positively associated with scale and potentially long-term performance. This is consistent with the meta-analysis conducted by Friede, Busch, and Bassen (2015), which found that the majority of empirical studies report a positive relationship between ESG criteria and financial performance, reinforcing the strategic relevance of sustainability metrics in investment decision-making.

7. LIMITATIONS AND FUTURE RESEARCH

This study presents several limitations that should be acknowledged. First, the dataset is limited to funds listed on Morningstar Direct, which, while comprehensive, may not capture the full breadth of the mutual fund universe. It is therefore possible that certain fund types or niche segments are underrepresented. Second, although a broad set of financial and sustainability indicators has been included, other relevant variables—identified in the literature or emerging from evolving industry practices—may have been omitted.

Future research could expand the analytical framework by incorporating additional variables and extending the time horizon of the dataset to better capture long-term dynamics and structural shifts. Cross-regional comparisons would also be valuable for understanding how institutional, regulatory, and market differences affect the relationship between fund characteristics and size. Furthermore, future studies may explore the role of macroeconomic variables such as interest rates, inflation, and economic cycles in determining fund scale. Regulatory analysis could provide insights into how policy frameworks influence fund growth and ESG adoption (Baltagi, 2005; Hausman, 1978). Finally, the application of enhanced mixed-effects models to alternative financial and sustainability indicators could offer further methodological depth and empirical robustness.

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