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Buying green, not selling brown: Portfolio substance behind SFDR labels

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ABSTRACT

We ask whether Sustainable Finance Disclosure Regulation (SFDR) classifications primarily identify pre-existing portfolio differences or are associated with post-enforcement portfolio changes. Using 33 quarters of position-level holdings for 4,666 European UCITS equity funds, we match 718 SFDR funds (713 initially Article 8) to never-classified peers on pre-2021 size, age, fees, and flows. SFDR funds hold cleaner portfolios, with carbon intensity 26.1 tonnes of CO2 per USD million of revenue lower and ESG risk percentile 6.2 percentage points lower than matched peers. The extensive and intensive margins, entry and exit margins, and portfolio concentration are similar. SFDR funds allocate 0.8 percentage points more of their rebalancing activity to buying green names, while brown holdings and conditional brown selling do not differ significantly. Pooled pre/post tests show that the ESG risk and Buy green gaps are already present before enforcement and do not increase significantly afterward, while the carbon-intensity and green-holdings gaps narrow. The evidence is more consistent with pre-existing portfolio differentiation among funds subsequently classified under SFDR than with these gaps being created by enforcement alone. Anticipation and partial post-enforcement adjustment cannot be ruled out.

1. Introduction

The EU Sustainable Finance Disclosure Regulation (SFDR), which has applied since March 2021, introduced product-level sustainability disclosures commonly associated with Articles 6, 8, and 9[1]. The regulation governs disclosure rather than prescribing portfolio construction, leaving open a basic question. Do SFDR classifications primarily identify funds that already held cleaner portfolios, or do these portfolio differences emerge or change after enforcement?

The distinction matters because Article 8 and Article 9 funds held EUR 6.1 trillion, or 60 percent of the EU fund market, at the end of 2024 (Morningstar, 2025). Recent evidence documents post-SFDR portfolio decarbonization (Dai et al., 2026), while the European Commission's 2025 proposal moves SFDR toward explicit product categories with minimum portfolio requirements and common

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[1] Article 8 products promote environmental or social characteristics, while Article 9 products have sustainable investment as an objective. Products that do not fall under these enhanced Article 8 or Article 9 disclosure regimes are commonly referred to in market practice as Article 6 products. Although Articles 8 and 9 are disclosure categories rather than regulatory labels, they are widely treated as sustainability labels in the market.

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exclusions (European Commission, 2025).

Existing SFDR evidence offers different views of what classifications capture. Becker et al. (2022) document investor responses to SFDR classifications, while Scherer and Hasaj (2023) question the information conveyed by Article 9. Cremasco and Boni (2024) document similarities between Article 9 and Article 6 funds, and Martinez-Meyers et al. (2024) find lower ESG risk and improved ESG performance following SFDR. Abouarab et al. (2025) and Dai et al. (2026) document post-SFDR decarbonization linked to portfolio tilting and investment decisions. Other work questions the comparability of sustainable-investment definitions and documents changing sustainability-information needs among institutional investors (Cochran et al., 2025; Gebhardt et al., 2024). Recent evidence also documents substantial overlap in portfolio holdings across SFDR categories, with differences associated with SFDR classifications being smaller than those associated with broader fund categories (Sanctuary et al., 2025). Two issues remain less clear in this literature: whether portfolio differences are already present before enforcement and whether the carbon tilt reflects green buying or brown selling.

We address these questions by tracing portfolio gaps around enforcement and separating green buying from brown selling. Using 33 quarters of data for 4,666 European UCITS equity funds, we match 718 Article 8 or Article 9 funds to never-classified peers on pre-2021 fund characteristics. The sample is dominated by Article 8 funds: 713 of the 718 treated funds are initially Article 8, compared with only five Article 9 funds. We therefore treat the Article 9 evidence as exploratory. Table 1.

SFDR funds hold cleaner portfolios than matched peers, with carbon intensity 26.1 tonnes of CO2 per USD million of revenue lower and ESG risk 6.2 percentage points lower (Table 2). The extensive and intensive margins, entry and exit margins, and portfolio concentration are similar. SFDR funds direct 0.8 percentage points more of their rebalancing toward buying green names (Table 3), while brown holdings and conditional brown selling do not differ significantly (Table 4). Several of the main portfolio gaps are already present before enforcement. ESG risk and Buy green gaps do not increase significantly afterward, while the carbon-intensity and green-holdings gaps narrow (Table 5). The pattern is more consistent with pre-existing portfolio differentiation among funds subsequently classified under SFDR than with gaps created by enforcement alone, although anticipation and partial adjustment cannot be ruled out.

We make two contributions. First, we show that portfolio-cleanliness differences between SFDR funds and matched never-classified peers are already present before enforcement. This adds a pre-enforcement dimension to evidence on post-SFDR portfolio decarbonization (Atta-Darkua et al., 2023; Martinez-Meyers et al., 2024; Abouarab et al., 2025; Dai et al., 2026) and sorting into sustainable assets (Pástor et al., 2021). Second, we separate green buying from brown divestment. The carbon-based tilt is concentrated in greater Buy green activity and higher green holdings, with no corresponding evidence of lower brown holdings or stronger conditional brown selling, complementing evidence on low-carbon portfolio tilting (Ceccarelli et al., 2024; Abouarab et al., 2025).

2. Data and sample

We combine Morningstar Direct and LSEG data. Morningstar Direct provides 13.2 million quarterly position-level holdings for 4,666 European UCITS equity funds over 33 quarters, from 2017Q4 to 2025Q4, together with SFDR classifications and fund characteristics.[2] LSEG provides security-level ESG and emissions data for 21,243 ISINs.

When at least one of Scope 1 or Scope 2 emissions is reported, we sum the available reported components, treating the missing component as zero. Estimated Total emissions are used only when both reported components are missing.[3] We measure rebalancing through the extensive, intensive, entry, and exit margins, and portfolio concentration using the Herfindahl index of position weights, winsorized at the 1st and 99th percentiles.

For the directional tests, we classify investee firms each quarter by carbon-intensity terciles, with the bottom tercile defined as green and the top tercile as brown. The classification is assigned once per issuer-quarter. Total rebalancing activity (Activity) is the sum of absolute changes in portfolio weights across all positions.[4] Buy green and Sell brown measure the shares of this activity attributable to increases in green positions and reductions in brown positions, respectively. Middle-tercile and unclassified positions remain in the Activity denominator but do not enter the four directional components. Green intensity combines Buy green and Sell brown net of Buy brown and Sell green. These green and brown classifications are relative empirical measures and do not correspond to SFDR sustainable-investment definitions, EU Taxonomy alignment, Paris alignment, or absolute sustainability or decarbonization thresholds. Variable definitions are provided in Table A1.

We define SFDR funds as funds observed as Article 8 or Article 9 at any point in the raw Morningstar history. We match each SFDR fund 1:1 to a peer never observed as Article 8 or Article 9 using pre-2021 fund characteristics. Never-classified funds are not necessarily Article 6 because their histories may contain Not Classified, Not Stated, or missing classifications. The baseline sample contains 718 matched pairs. Outcome samples vary with data availability and coverage. ESG risk is available from 2020Q1 and yields 25,405 fund-quarter observations. Carbon intensity requires at least 50 percent portfolio coverage and yields 20,149 observations, while the directional tests use 14,838 fund-quarters with at least half of rebalancing activity classified by carbon intensity.[5]

[2] The unit of analysis is the fund rather than the individual share class. We do not require funds to survive through 2025Q4, so funds that disappear during the sample period are retained in the historical panel for the quarters in which they are observed.

[3] A reported-emissions-only robustness requiring both Scope 1 and Scope 2 to be reported is provided in Online Appendix Table OA3.

[4] Portfolio-weight changes are measured within fund as quarter-to-quarter changes in each security's portfolio weight. Accordingly, the directional measures capture changes in portfolio weights between reporting dates rather than transaction-level trade volumes.

[5] Pairwise correlations for the matched sample are reported in Table A2.

Table 1
Descriptive statistics and SFDR classification paths.

Panel A. SFDR classification paths

Classification path	Funds
Article 8 only	713
Article 9 only	3
Article 9 to Article 8	2
Article 8 to Article 9	0
Other A8/A9 path	0
Explicit exit to Not Classified after A8/A9	0
Never-classified matched controls	718

Panel B. Descriptive statistics

Variable	SFDR Mean	SFDR SD	SFDR N	Control Mean	Control SD	Control N	Diff	SMD
Log AUM (lag)	7.552	1.238	18,025	7.737	0.974	16,282	-0.185	-0.166
Log age (lag)	0.874	0.384	18,025	0.958	0.372	16,282	-0.084	-0.222
TER (lag)	1.664	0.65	18,025	1.71	0.853	16,282	-0.046	-0.061
Net flows (lag)	-0.007	0.91	18,025	-0.015	0.581	16,282	0.008	0.011
Extensive	0.161	0.168	18,743	0.169	0.186	17,000	-0.008	-0.044
ESG risk pct.	0.482	0.285	13,663	0.568	0.286	11,826	-0.086	-0.302
Herfindahl	656.341	1697.451	18,743	689.791	1542.146	17,000	-33.45	-0.021
Carbon intensity	126.294	137.298	11,787	155.375	149.221	9,344	-29.08	-0.203

Notes. Panel A reports SFDR classification paths in the raw Morningstar history for funds in the matched sample. Never-classified controls are funds never observed as Article 8 or Article 9 and are not necessarily Article 6 funds. Panel B reports descriptive statistics for the matched fund-quarter sample. SFDR funds are matched 1:1 to never-classified peers using pre-2021 fund characteristics and nearest-neighbor propensity-score matching with a 0.20-standard-deviation caliper on the logit score. Diff is the SFDR minus control mean difference and SMD is the standardized mean difference. The SMDs reported in Panel B are descriptive standardized differences calculated on the fund-quarter sample; post-match balance on the pre-2021 fund-level matching covariates is discussed in Section 3. Sample sizes vary with data availability. Variable definitions are provided in Table A1.

Table 2
Portfolio cleanliness, rebalancing, and concentration.

	(1) ESG risk pct.	(2) Carbon intensity	(3) Extensive	(4) Herfindahl
SFDR fund	-0.062***	-26.129***	-0.007	-18.699
	(0.009)	*(5.524)*	*(0.005)*	*(77.762)*
Log AUM (lag)	0.016***	0.368	-0.007***	4.208
	(0.004)	*(1.982)*	*(0.002)*	*(22.976)*
Log age (lag)	0.030*	8.190	-0.009	294.972**
	(0.016)	*(7.095)*	*(0.007)*	*(115.167)*
TER (lag)	-0.025***	-3.184	0.012***	24.234
	(0.006)	*(3.875)*	*(0.003)*	*(47.439)*
Net flows (lag)	0.001	-1.038	0.001	8.575
	(0.002)	*(1.100)*	*(0.001)*	*(6.836)*
Category FE	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes
Clusters (funds)	1,387	1,178	1,431	1,431
Observations	25,405	20,149	34,307	34,307
R-squared	0.560	0.356	0.090	0.087

Notes. This table reports OLS estimates on the matched fund-quarter sample, with one regression per column. SFDR funds are Article 8 or Article 9 funds matched 1:1 to never-classified peers. All regressions include lagged fund-level controls, Morningstar category fixed effects, and year-quarter fixed effects. The intercept and fixed-effect coefficients are suppressed. Standard errors clustered by fund are reported in parentheses. Sample sizes vary with outcome availability. Variable definitions are provided in Table A1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

3. Empirical strategy

First, we estimate the probability that a fund is classified as Article 8 or Article 9 with a logit model of pre-2021 fund characteristics,

$$P(SFDR_i = 1 \mid X_i) = \Lambda(\theta_0 + \theta_1\, logAUM + \theta_2\, logAge + \theta_3 TER + \theta_4\, Flows + \eta_c + \rho_d) \quad (1)$$

where Log AUM, Log age, TER, and Net flows are lagged fund size, age, expense ratio, and net flows, respectively, while η_c denotes Morningstar category effects and ρ_d denotes domicile effects. We match each SFDR fund 1:1 to a never-classified peer using nearest-neighbor matching on the estimated propensity score, with a caliper of 0.20 standard deviations of the logit score, following Austin (2011). On the pre-2021 fund-level characteristics used in matching, post-match standardized mean differences are -0.066 for Log

Table 3
Directional rebalancing and the carbon-based green tilt.

	(1) Buy green	(2) Sell brown	(3) Green intensity
SFDR fund	0.008***	-0.007***	0.007**
	(0.003)	*(0.002)*	*(0.003)*
Log AUM (lag)	-0.001	0.002**	0.002*
	(0.001)	*(0.001)*	*(0.001)*
Log age (lag)	-0.002	0.003	0.001
	(0.004)	*(0.003)*	*(0.005)*
TER (lag)	-0.003	-0.002	-0.004
	(0.002)	*(0.002)*	*(0.003)*
Net flows (lag)	0.001	-0.001	0.001
	(0.001)	*(0.001)*	*(0.002)*
Category FE	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes
Cluster (fund)	Yes	Yes	Yes
Observations	14,838	14,838	14,838
Clusters (funds)	1,135	1,135	1,135
Mean SFDR	0.114	0.083	0.003
Mean control	0.099	0.093	-0.005
R-squared	0.462	0.313	0.081

Notes. This table reports OLS estimates for directional rebalancing outcomes on the matched fund-quarter sample. Green and brown classifications and the directional measures are defined in Section 2 and Table A1. Sell brown measures the share of total rebalancing activity devoted to reductions in brown positions, not conditional brown divestment. All regressions include lagged Log AUM, Log age, TER, and Net flows, Morningstar category fixed effects, and year-quarter fixed effects. Standard errors clustered by fund are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4
Portfolio composition and conditional brown selling.

	(1) Green held	(2) Brown held	(3) Sell brown | brown held
SFDR fund	0.026***	0.004	-0.002
	(0.004)	*(0.005)*	*(0.003)*
Log AUM (lag)	0.001	-0.002	0.004***
	(0.002)	*(0.002)*	*(0.001)*
Log age (lag)	-0.027***	-0.001	-0.004
	(0.007)	*(0.007)*	*(0.004)*
TER (lag)	-0.025***	-0.021***	0.009***
	(0.004)	*(0.003)*	*(0.002)*
Net flows (lag)	-0.001	0.002	0.001
	(0.001)	*(0.001)*	*(0.001)*
Category FE	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes
Cluster (fund)	Yes	Yes	Yes
Observations	34,250	34,250	27,422
Clusters (funds)	1,431	1,431	1,239
R-squared	0.553	0.477	0.062

Notes. This table reports OLS estimates on the matched fund-quarter sample, with one regression per column. Green and brown names follow the issuer-quarter carbon-intensity classification used in Table 3. Green held and Brown held measure beginning-of-quarter portfolio shares, while Sell brown | brown held measures the fraction of beginning-of-quarter brown holdings sold during the quarter and is defined for fund-quarters with at least 1% of the portfolio invested in brown names. All regressions include lagged fund-level controls, Morningstar category fixed effects, and year-quarter fixed effects. Standard errors clustered by fund are reported in parentheses. Variable definitions are provided in Table A1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

AUM, -0.222 for Log age, -0.044 for TER, and 0.046 for Net flows. Residual imbalance remains in fund age, and we retain all four characteristics as controls in the outcome regressions.

On the matched sample, we estimate Eq. (2) separately for each outcome,

$$Y_{i,t} = \alpha + \beta\, SFDR_i + \gamma' X_{i,t-1} + \delta_c + \tau_t + \varepsilon_{i,t} \quad (2)$$

where $SFDR_i$ is the time-invariant indicator for funds observed as Article 8 or Article 9, $X_{i,t-1}$ contains the lagged fund-level controls, δ_c denotes Morningstar category fixed effects, and τ_t denotes year-quarter fixed effects. Standard errors are clustered at the fund level. The coefficient β measures the conditional difference between SFDR funds and their matched never-classified peers. We estimate Eq. (2) for portfolio cleanliness, rebalancing and concentration, directional rebalancing, and portfolio composition and conditional divestment. The main estimates are reported in Tables 2-4.

Table 5
Portfolio gaps before and after SFDR enforcement.

	ESG risk pct.	Carbon intensity	Buy green	Sell brown	Green intensity	Green held	Brown held	Sell brown | brown held
SFDR fund (pre-enforcement gap)	-0.076***	-35.966***	0.007**	-0.005*	0.010**	0.032***	0.004	-0.003
	(0.013)	*(7.661)*	*(0.003)*	*(0.003)*	*(0.005)*	*(0.006)*	*(0.006)*	*(0.003)*
SFDR fund x Post	0.003	12.879**	0.001	-0.005*	-0.007	-0.009**	-0.001	0.001
	(0.010)	*(6.294)*	*(0.003)*	*(0.003)*	*(0.006)*	*(0.004)*	*(0.004)*	*(0.003)*
Post-enforcement gap	-0.073***	-23.087***	0.008***	-0.009***	0.003	0.023***	0.003	-0.003
	(0.010)	*(5.517)*	*(0.003)*	*(0.003)*	*(0.004)*	*(0.004)*	*(0.004)*	*(0.003)*
Log AUM (lag)	0.015***	0.072	-0.001	0.002*	0.002	0.001	-0.002	0.003***
	(0.004)	*(2.082)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.002)*	*(0.002)*	*(0.001)*
Log age (lag)	0.015	9.610	-0.001	0.003	0.003	-0.028***	-0.003	-0.004
	(0.017)	*(7.378)*	*(0.004)*	*(0.003)*	*(0.005)*	*(0.007)*	*(0.007)*	*(0.004)*
TER (lag)	-0.024***	-3.683	-0.002	-0.001	-0.003	-0.023***	-0.021***	0.008***
	(0.006)	*(4.054)*	*(0.002)*	*(0.002)*	*(0.003)*	*(0.003)*	*(0.003)*	*(0.002)*
Net flows (lag)	0.002	-1.344	0.001	-0.001	0.001	-0.001	0.002	0.001
	(0.003)	*(1.168)*	*(0.001)*	*(0.001)*	*(0.002)*	*(0.001)*	*(0.001)*	*(0.001)*
Category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Fund	Fund	Fund	Fund	Fund	Fund	Fund	Fund
Observations	21,392	19,218	13,966	13,966	13,966	33,408	33,408	26,543
Clusters (funds)	1,090	1,041	933	933	933	1,342	1,342	1,121
R-squared	0.501	0.356	0.458	0.313	0.081	0.553	0.482	0.064

Notes. This table reports pooled OLS estimates on outcome-specific common samples of funds observed both before and after SFDR enforcement. SFDR fund captures the pre-enforcement difference between SFDR and matched never-classified funds, SFDR fund x Post captures the change in this difference from 2021Q1 onward, and Post-enforcement gap is their linear combination. The standalone Post indicator is absorbed by year-quarter fixed effects. All regressions include the lagged fund-level controls reported in the table, Morningstar category fixed effects, and year-quarter fixed effects. Standard errors clustered by fund are reported in parentheses. Variable definitions are provided in Table A1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Because an insignificant regression coefficient does not establish similarity between groups, we complement the baseline regressions with two one-sided tests (TOST) of equivalence applied to the matched-sample mean differences, with fund-clustered standard errors. We test

$$H_{0L} : \mu SFDR - \mu C \ \leq -\Delta \ and \ H_{0U} : \mu SFDR - \mu C \ \geq \Delta, \tag{3}$$

where Δ is the equivalence margin. Equivalence requires rejection of both null hypotheses at the 5 percent level. Because there is no natural economic or regulatory threshold, we use 0.20 pooled standard deviations as a broad benchmark and report stricter margins of 0.15 and 0.10. The tests are reported in Table A3.

To examine whether portfolio gaps predate SFDR enforcement and change afterward, we estimate a pooled pre/post specification on outcome-specific common samples of funds observed both before and after enforcement,

$$Y_{i,t} = \alpha + \beta \ SFDR_i \ + \lambda(SFDR_i \times Post_t) \ + \gamma' X_{i,t-1} + \delta_c \ + \ \tau_t \ + \ \varepsilon_{i,t} \tag{4}$$

where $Post_t$ equals one from 2021Q1 onward. Because $Post_t$ is common to all funds in a given quarter, its standalone effect is absorbed by the year-quarter fixed effects. The $SFDR_i$ coefficient β therefore captures the pre-enforcement gap between SFDR and matched never-classified funds. The interaction coefficient λ measures the change in that gap from 2021Q1 onward, and $\beta + \lambda$ is the corresponding post-enforcement gap. Standard errors are clustered by fund, and results are reported in Table 5.[6]

This specification does not provide causal identification of an SFDR effect. A portfolio difference already present before enforcement is consistent with selection into subsequent SFDR classification, but may also reflect anticipatory adjustment or persistent differences between funds. Residual selection may reflect passive or index status, investment mandate, benchmark choice, marketing strategy, client base, or fund-family characteristics not fully captured by the available controls. We examine several of these observable dimensions using style, domicile, fund-family, and benchmark specifications in Table A5. We therefore interpret the interaction as evidence on whether cross-sectional gaps change around enforcement.

4. Results

4.1. Labeled funds hold cleaner portfolios

SFDR funds hold cleaner portfolios across both metrics (Table 2, columns 1 and 2). ESG risk percentile is 6.2 percentage points

[6] Results are robust to excluding 2021Q1 and defining the post-enforcement period from 2021Q2 onward (Online Appendix Table OA6).

lower and carbon intensity 26.1 tonnes of CO2 per USD million of revenue lower than for matched peers, equivalent to about 11 and 17 percent of the respective control means. Fig. 1 shows the corresponding distributions.

4.2. Similar extensive/intensive and entry/exit margins and portfolio concentration

SFDR funds show no significant differences in the extensive margin of rebalancing or in portfolio concentration (Table 2). TOST results support equivalence for the extensive/intensive and entry/exit margins and the Herfindahl index even at the strictest 0.10 pooled-SD margin, while ESG risk and carbon intensity do not meet the equivalence criterion at any of the three margins (Table A3).

4.3. The carbon-based green tilt

Table 3 examines the direction of rebalancing. SFDR funds direct 0.8 percentage points more of quarterly rebalancing toward buying green names, about 8 percent relative to the control mean, significant at the 1 percent level. Sell brown is 0.7 percentage points lower, meaning a smaller share of rebalancing goes to brown sales, while Green intensity is 0.7 percentage points higher.

Buy green remains positive across alternative matching and weighting specifications and after excluding energy holdings (Online Appendix Table OA4). When green and brown are defined using issuer ESG scores, however, the directional coefficients are insignificant, consistent with carbon and broader ESG measures identifying different firms (Avramov et al., 2022; Berg et al., 2022). The Buy green estimate also weakens in the restricted fund-family and benchmark samples discussed in Section 4.6.

4.4. Buying green, not selling brown

The negative Sell brown coefficient in Table 3 indicates a smaller share of total rebalancing devoted to brown sales, not stronger selling conditional on holding brown assets. Table 4 shows that the portfolio share invested in green names is 2.6 percentage points higher for SFDR funds, while brown holdings and conditional brown selling do not differ significantly. The differences are concentrated in green buying and green holdings, with no evidence of stronger conditional brown selling.

4.5. Pre-existing differences and post-enforcement changes

Table 5 examines whether portfolio differences predate enforcement and change from 2021Q1 onward. Before enforcement, funds subsequently classified under SFDR already show lower ESG risk and carbon intensity and higher Buy green. The ESG risk and Buy green interactions are insignificant, indicating no detectable increase in these gaps after enforcement.

Carbon intensity shows partial convergence. The pre-enforcement gap is -36.0 tonnes of CO2 per USD million of revenue and narrows to -23.1 tonnes after enforcement, with the interaction significant at the 5 percent level. The green-holdings gap also narrows. The SFDR-control gap in Sell brown becomes more negative, although the interaction is significant only at the 10 percent level; brown holdings and conditional brown selling remain insignificant.

The timing evidence is more consistent with pre-existing portfolio differentiation than with gaps created by enforcement alone, while anticipation and partial post-enforcement adjustment cannot be ruled out.

4.6. Article 8 estimates, exploratory Article 9 evidence, and additional robustness

Table A4 decomposes the baseline matched sample by each treated fund's first observed Article 8 and Article 9 classification. Of the 718 treated funds, 713 are initially Article 8 and only five Article 9; the pooled evidence therefore primarily reflects Article 8 funds. The corresponding Article 8 estimates closely reproduce the pooled results. Estimates for the five initially Article 9 funds are exploratory. The treated sample falls to only three funds for some outcomes, so these estimates are reported for transparency rather than as evidence of Article 8 versus Article 9 heterogeneity.

The negative ESG risk and carbon-intensity estimates remain across the style, domicile, fund-family, and benchmark specifications (Table A5). Buy green is stable with style and domicile fixed effects but weakens in the restricted fund-family and benchmark samples.

Online Appendix results show modest sector tilts (OA1), stable cleanliness estimates across alternative specifications (OA2) and a reported-emissions-only construction (OA3), and similar timing results when 2021Q1 is excluded (OA6). Oster (2019) sensitivity tests are reported in OA5, while excluding the two Article 9-to-Article 8 switchers and their matched controls leaves the main estimates unchanged (OA7).

5. Discussion and conclusion

The empirical evidence, driven primarily by Article 8 funds, is more consistent with pre-existing portfolio differentiation than with gaps created by enforcement alone. The Article 9 evidence remains exploratory given the very small sample. SFDR funds hold portfolios with lower carbon intensity and lower ESG risk and direct more of their rebalancing to buying green names. The Buy green estimate is stable with style and domicile fixed effects but weakens in the restricted fund-family and benchmark samples. The ESG risk and Buy green gaps are already present before SFDR enforcement and do not increase significantly afterward, while the carbon-intensity and green-holdings gaps narrow. The extensive/intensive and entry/exit margins and portfolio concentration are similar, while brown holdings and conditional brown selling show no systematic differences. These timing results add a pre-enforcement

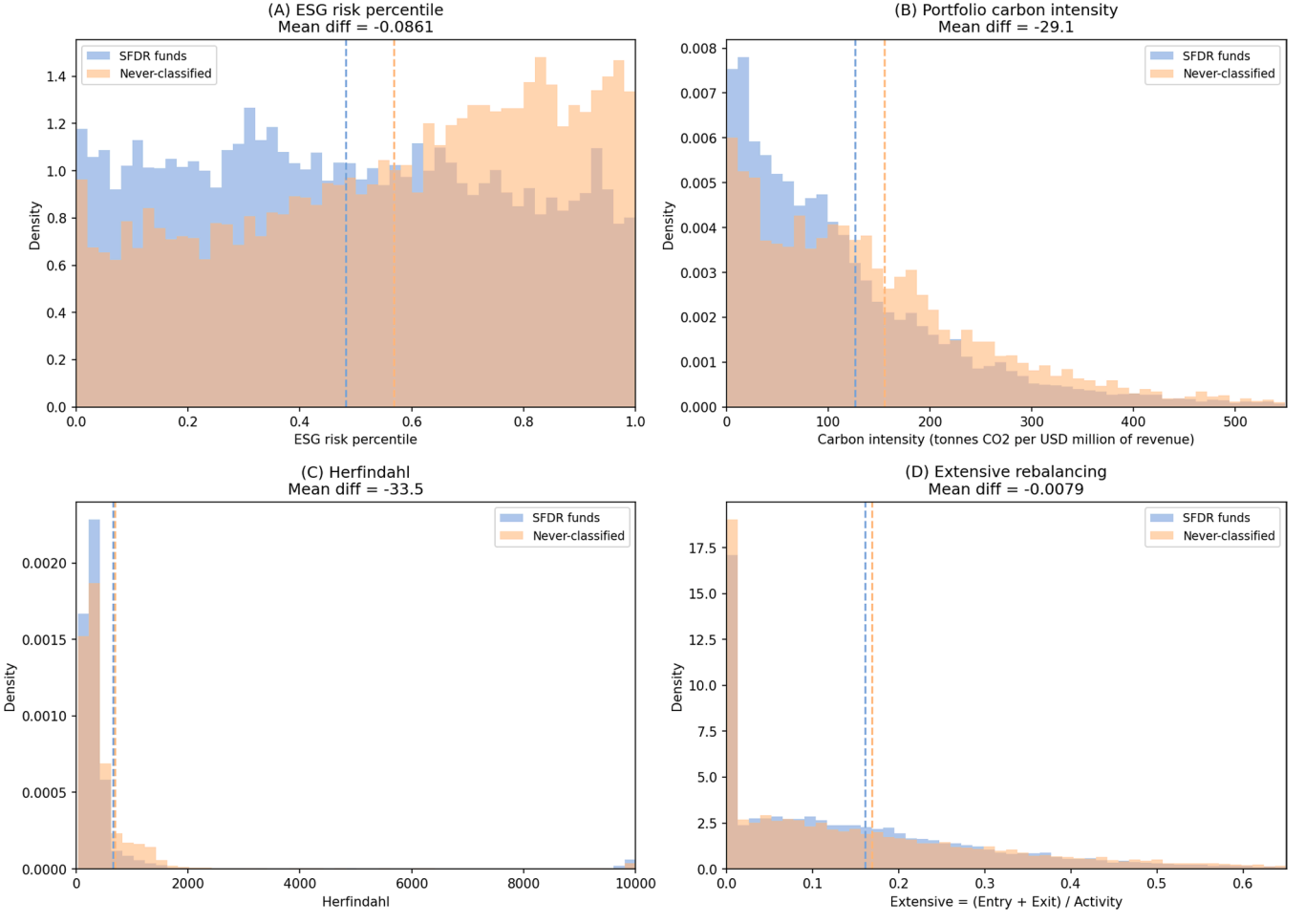


Fig. 1. Portfolio characteristics. SFDR vs matched never-classified peers.

Notes. Each panel plots the distribution of SFDR funds and matched never-classified peers, with group means indicated by dashed vertical lines. Panels A-D report ESG risk percentile, carbon intensity, the Herfindahl index, and the extensive rebalancing margin, respectively. Panel titles report the raw SFDR minus control mean difference for the corresponding non-missing matched sample. The x-axes in Panels C and D are truncated at the 95th percentile for readability; all observations are retained in the analyses. Variable definitions are provided in Table A1.

perspective to recent evidence on post-SFDR portfolio adjustment, although anticipation and partial post-enforcement adjustment cannot be ruled out. Martinez-Meyers et al. (2024) document changes in ESG performance and risk, while Abouarab et al. (2025) and Dai et al. (2026) document post-SFDR decarbonization and low-carbon portfolio tilting. Since our design is observational, we do not interpret these patterns as causal effects of SFDR classification.

The Commission's 2025 proposal moves SFDR toward product categories with minimum portfolio requirements and common exclusions (European Commission, 2025). Our green and brown measures are relative carbon-intensity classifications and do not correspond to SFDR sustainable-investment definitions, EU Taxonomy alignment, Paris alignment, or regulatory thresholds. The effect of the proposed requirements may depend on how binding they are relative to funds' pre-existing portfolios. Requirements that mainly formalize existing differences may imply limited portfolio adjustment, whereas more binding requirements may lead to greater changes in portfolio composition.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation and revision of this work, the corresponding author used Claude (Anthropic) and ChatGPT (OpenAI) to support language editing, consistency checks across the manuscript and tables, cross-reference verification, and manuscript shortening. The tools were also used to assist with checking reported results against the authors' underlying analysis outputs. All empirical specifications, data construction choices, and reported results were determined and verified by the authors. After using these tools, the corresponding author reviewed and edited the content as needed and takes full responsibility for the content of the manuscript.

CRediT authorship contribution statement

Lidia Loban: Writing – original draft, Validation, Supervision, Methodology, Investigation, Formal analysis, Data curation, Conceptualization, Writing – review & editing, Funding acquisition. **Isabel Casas:** Writing – original draft, Validation, Methodology, Data curation, Writing – review & editing. **Natalia Restrepo:** Writing – original draft, Supervision, Conceptualization, Writing – review & editing.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.frl.2026.110890.

Appendix

Table A1
Variable definitions.

Variable	Definition	Source
Treatment variables		
SFDR fund	Indicator equal to one if the fund is classified as Article 8 or Article 9 under SFDR at any point in the sample, and zero for matched never-classified funds. The indicator is time-invariant so that pre-label differences can be estimated.	Morningstar Direct
Never-classified	Matched control fund never observed as Article 8 or Article 9 in the raw Morningstar SFDR history. This group is not synonymous with Article 6 because raw histories can also contain Not Classified, Not Stated, or missing classifications.	Morningstar Direct
Article 8 fund	Treatment indicator for the decomposition in Table A4, indicator equal to one for baseline treated funds whose first observed Article 8/Article 9 classification in the raw Morningstar history is Article 8, and zero for their originally matched never-classified controls	Morningstar Direct
Article 9 fund	Treatment indicator for the decomposition in Table A4, indicator equal to one for baseline treated funds whose first observed Article 8/Article 9 classification in the raw Morningstar history is Article 9, and zero for their originally matched never-classified controls.	Morningstar Direct
Portfolio cleanliness		

(*continued on next page*)

Table A1 (*continued*)

Variable	Definition	Source
ESG risk pct.	Within-year percentile of the portfolio ESG risk score, where higher values denote higher ESG risk. Available from 2020Q1.	LSEG
Carbon intensity	Portfolio-weighted carbon intensity in tonnes of CO2 per USD million of revenue. When at least one of Scope 1 or Scope 2 is reported, the available reported components are summed, treating the missing component as zero. Estimated Total emissions are used only when both reported components are missing. Defined when portfolio coverage is at least 50 percent.	LSEG
Rebalancing margins and concentration		
Activity	Sum across portfolio positions of the absolute change in portfolio weight: $Activity_{it} = \Sigma_j \lvert \Delta w_{ijt} \rvert$.	Authors' calculations using Morningstar Direct
Extensive	Share of quarterly rebalancing activity attributable to positions entering or leaving the portfolio: (Entry + Exit) / Activity.	Authors' calculations using Morningstar Direct
Intensive	Share of quarterly rebalancing activity attributable to resizing existing positions; equal to one minus Extensive.	Authors' calculations using Morningstar Direct
Entry	Share of quarterly rebalancing activity attributable to new positions entering the portfolio.	Authors' calculations using Morningstar Direct
Exit	Share of quarterly rebalancing activity attributable to positions leaving the portfolio.	Authors' calculations using Morningstar Direct
Herfindahl	Sum of squared portfolio weights multiplied by 10,000, winsorized at the 1st and 99th percentiles within quarter.	Authors' calculations using Morningstar Direct
Directional rebalancing		
Green names	Investee firms in the bottom within-quarter tercile of issuer carbon intensity. The classification is assigned once per issuer-quarter. Green is a relative empirical classification and does not correspond to an SFDR sustainable-investment, EU Taxonomy, Paris alignment, or absolute decarbonization classification.	Authors' calculations using LSEG
Brown names	Investee firms in the top within-quarter tercile of issuer carbon intensity. The classification is assigned once per issuer-quarter. Brown is a relative empirical classification and does not correspond to an SFDR sustainable-investment, EU Taxonomy, Paris alignment, or absolute decarbonization classification.	Authors' calculations using LSEG
Buy green	Share of total quarterly rebalancing activity attributable to increases in the portfolio weights of green names: $\Sigma_j \in$Green $\max(\Delta w_{ijt}, 0)$ / $Activity_{it}$.	Authors' calculations using Morningstar Direct and LSEG
Sell brown	Share of total quarterly rebalancing activity attributable to reductions in the portfolio weights of brown names: $\Sigma_j \in$Brown $\max(-\Delta w_{ijt}, 0)$ / $Activity_{it}$.	Authors' calculations using Morningstar Direct and LSEG
Buy brown	Share of total quarterly rebalancing activity attributable to purchases or increases of brown names:$\Sigma_j \in$Brown $\max(\Delta w_{ijt}, 0)$ / $Activity_{it}$.	Authors' calculations using Morningstar Direct and LSEG
Sell green	Share of total quarterly rebalancing activity attributable to sales or reductions of green names: $\Sigma_j \in$Green $\max(-\Delta w_{ijt}, 0)$ / $Activity_{it}$.	Authors' calculations using Morningstar Direct and LSEG
Green intensity	Net green tilt of rebalancing activity: Buy $green_{it}$ + Sell $brown_{it}$ - Buy $brown_{it}$ - Sell $green_{it}$. Middle-tercile and unclassified positions enter the Activity denominator but not these four directional components.	Authors' calculations using Morningstar Direct and LSEG
Portfolio composition and conditional divestment		
Green held	Beginning-of-quarter portfolio weight in green names, defined by the bottom within-quarter carbon-intensity tercile.	Authors' calculations using Morningstar Direct and LSEG
Brown held	Beginning-of-quarter portfolio weight in brown names, defined by the top within-quarter carbon-intensity tercile.	Authors' calculations using Morningstar Direct and LSEG
Sell brown | brown held	Fraction of the beginning-of-quarter brown inventory that the fund sells during the quarter. Defined on fund-quarters holding at least 1 percent in brown names.	Authors' calculations using Morningstar Direct and LSEG
Controls		
Log AUM	Natural logarithm of fund total net assets in USD, lagged one quarter.	Morningstar Direct
Log age	Natural logarithm of fund age in years, lagged one quarter.	Morningstar Direct
TER	Total expense ratio in percent, lagged one quarter.	Morningstar Direct
Net flows	Quarterly net flows over lagged total net assets, winsorized and lagged one quarter.	Morningstar Direct
Morningstar category	Morningstar global category, used in matching and as a fixed effect.	Morningstar Direct
Domicile	Country of fund domicile, used in matching.	Morningstar Direct

Notes. This table defines the variables used in the analysis and reports their data sources. The sample comprises European UCITS equity funds observed quarterly from 2017Q4 to 2025Q4. Fund classifications, fund characteristics, and portfolio holdings are obtained from Morningstar Direct. ESG risk, carbon-emissions data, and the issuer-level green/brown classification are obtained from LSEG. Trading, rebalancing, and portfolio-composition measures are constructed by the authors from Morningstar Direct holdings combined with LSEG issuer information.

Table A2
Correlation matrix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) SFDR fund	1.00								
(2) Log AUM	-0.08	1.00							
(3) Log age	-0.11	0.06	1.00						
(4) TER	-0.03	-0.05	0.19	1.00					
(5) Net flows	0.01	0.05	-0.04	0.00	1.00				
(6) ESG risk pct.	-0.15	0.06	0.00	-0.11	0.01	1.00			

(*continued on next page*)

Table A2 (*continued*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(7) Extensive	-0.02	-0.01	-0.07	0.05	0.01	-0.04	1.00		
(8) Herfindahl	-0.01	-0.01	0.07	0.03	0.00	0.04	-0.10	1.00	
(9) Carbon intensity	-0.10	0.06	0.02	-0.01	0.01	0.01	0.06	0.00	1.00

Notes. This table reports pairwise Pearson correlations at the fund-quarter level for the matched sample. The lower triangle of the correlation matrix is reported. Pairwise sample sizes may vary because of differences in variable availability. Variable definitions are provided in Table A1.

Table A3
Equivalence tests under alternative equivalence margins.

Panel A. Equivalence margin = 0.20 pooled SD

Outcome	Mean SFDR	Mean control	Difference	Δ (Equivalence margin)	Clustered SE	90% CI	TOST p-value	Equivalent	N SFDR	N control	Fund clusters
Extensive	0.161	0.169	-0.008	0.035	0.005	[-0.016, 0.001]	<0.001	Yes	18,743	17,000	1,436
Entry	0.157	0.165	-0.008	0.035	0.005	[-0.016, 0.001]	<0.001	Yes	18,743	17,000	1,436
Exit	0.004	0.004	0.001	0.005	0.001	[-0.001, 0.001]	<0.001	Yes	18,743	17,000	1,436
Intensive	0.839	0.831	0.008	0.035	0.005	[0.001, 0.016]	<0.001	Yes	18,743	17,000	1,436
ESG risk pct.	0.482	0.568	-0.086	0.057	0.014	[-0.110, -0.063]	0.979	No	13,663	11,826	1,388
Herfindahl	656.341	689.791	-33.450	325.087	75.686	[-158.023, 91.122]	<0.001	Yes	18,743	17,000	1,436
Carbon intensity	126.294	155.375	-29.080	28.539	7.238	[-40.996, -17.165]	0.530	No	11,787	9,344	1,183

Panel B. Equivalence margin = 0.15 pooled SD

Outcome	Mean SFDR	Mean control	Difference	Δ (Equivalence margin)	Clustered SE	90% CI	TOST p-value	Equivalent	N SFDR	N control	Fund clusters
Extensive	0.161	0.169	-0.008	0.027	0.005	[-0.016, 0.001]	<0.001	Yes	18,743	17,000	1,436
Entry	0.157	0.165	-0.008	0.026	0.005	[-0.016, 0.001]	<0.001	Yes	18,743	17,000	1,436
Exit	0.004	0.004	0.001	0.004	0.001	[-0.001, 0.001]	<0.001	Yes	18,743	17,000	1,436
Intensive	0.839	0.831	0.008	0.027	0.005	[0.001, 0.016]	<0.001	Yes	18,743	17,000	1,436
ESG risk pct.	0.482	0.568	-0.086	0.043	0.014	[-0.110, -0.063]	0.999	No	13,663	11,826	1,388
Herfindahl	656.341	689.791	-33.450	243.816	75.686	[-158.023, 91.122]	0.003	Yes	18,743	17,000	1,436
Carbon intensity	126.294	155.375	-29.080	21.404	7.238	[-40.996, -17.165]	0.855	No	11,787	9,344	1,183

Panel C. Equivalence margin = 0.10 pooled SD

Outcome	Mean SFDR	Mean control	Difference	Δ (Equivalence margin)	Clustered SE	90% CI	TOST p-value	Equivalent	N SFDR	N control	Fund clusters
Extensive	0.161	0.169	-0.008	0.018	0.005	[-0.016, 0.001]	0.027	Yes	18,743	17,000	1,436
Entry	0.157	0.165	-0.008	0.017	0.005	[-0.016, 0.001]	0.028	Yes	18,743	17,000	1,436
Exit	0.004	0.004	0.001	0.003	0.001	[-0.001, 0.001]	<0.001	Yes	18,743	17,000	1,436
Intensive	0.839	0.831	0.008	0.018	0.005	[0.001, 0.016]	0.027	Yes	18,743	17,000	1,436
ESG risk pct.	0.482	0.568	-0.086	0.029	0.014	[-0.110, -0.063]	1.000	No	13,663	11,826	1,388
Herfindahl	656.341	689.791	-33.450	162.544	75.686	[-158.023, 91.122]	0.044	Yes	18,743	17,000	1,436
Carbon intensity	126.294	155.375	-29.080	14.269	7.238	[-40.996, -17.165]	0.980	No	11,787	9,344	1,183

Notes. This table reports the two one-sided equivalence tests (TOST) specified in Equation (3), comparing SFDR and matched control funds. Panels A-C use equivalence margins of 0.20, 0.15, and 0.10 pooled standard deviations, respectively. Difference is the SFDR minus control mean difference, and the equivalence margin is expressed in the original units of each outcome. Equivalence requires rejection of both one-sided null hypotheses at the 5 percent level; the reported TOST p-value is the larger of the two one-sided p-values. Standard errors are clustered by fund. Variable definitions are provided in Table A1.

Table A4
Article 8 and Article 9 estimates within the baseline matched sample.

Panel A. Baseline matched-sample decomposition

Initial classification	Treated funds	Original paired controls	Share of baseline treated
Article 8	713	713	99.3%
Article 9	5	5	0.7%
Total	718	718	100.0%

Panel B. Article 8 estimates

(*continued on next page*)

Table A4 (*continued*)

Panel A. Baseline matched-sample decomposition						
Initial classification	**Treated funds**	**Original paired controls**	**Share of baseline treated**			
Variable	**ESG risk pct.**	**Carbon intensity**	**Buy green**	**Green held**	**Brown held**	**Sell brown | brown held**
Article 8 fund	-0.062***	-25.731***	0.008***	0.026***	0.004	-0.002
	(0.009)	(5.535)	(0.003)	(0.004)	(0.005)	(0.003)
Log AUM (lag)	0.016***	0.361	-0.001	0.001	-0.002	0.004***
	(0.004)	(1.982)	(0.001)	(0.002)	(0.002)	(0.001)
Log age (lag)	0.030*	8.480	-0.002	-0.028***	-0.001	-0.004
	(0.016)	(7.092)	(0.003)	(0.007)	(0.007)	(0.004)
TER (lag)	-0.026***	-3.157	-0.003	-0.024***	-0.021***	0.009***
	(0.006)	(3.894)	(0.002)	(0.003)	(0.003)	(0.002)
Net flows (lag)	0.001	-1.076	0.001	-0.001	0.002	0.001
	(0.002)	(1.101)	(0.001)	(0.001)	(0.001)	(0.001)
Category FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Fund	Fund	Fund	Fund	Fund	Fund
Observations	25,269	20,054	14,761	34,061	34,061	27,271
Treated funds	701	628	610	711	711	639
Control funds	676	543	518	710	710	592
Clusters (funds)	1,377	1,171	1,128	1,421	1,421	1,231
R-squared	0.561	0.356	0.462	0.555	0.475	0.062
Panel C. Article 9 estimates (exploratory)						
Variable	**ESG risk pct.**	**Carbon intensity**	**Buy green**	**Green held**	**Brown held**	**Sell brown | brown held**
Article 9 fund	-0.125	-207.741***	-0.010	0.021**	-0.013	-0.038***
	(0.112)	(45.667)	(0.034)	(0.010)	(0.018)	(0.008)
Log AUM (lag)	0.103**	64.460***	0.017	-0.013	0.033	0.009
	(0.041)	(20.703)	(0.015)	(0.013)	(0.032)	(0.012)
Log age (lag)	0.502***	-163.721***	-0.107***	0.023	0.047*	-0.027*
	(0.084)	(17.968)	(0.017)	(0.015)	(0.028)	(0.014)
TER (lag)	0.017	-18.594	0.011	-0.005	-0.009	-0.007
	(0.127)	(65.125)	(0.045)	(0.005)	(0.008)	(0.005)
Net flows (lag)	0.049***	20.592***	-0.035	0.001	-0.006	0.008
	(0.014)	(7.645)	(0.029)	(0.003)	(0.008)	(0.018)
Category FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Fund	Fund	Fund	Fund	Fund	Fund
Observations	136	95	77	189	189	151
Treated funds	5	3	3	5	5	4
Control funds	5	4	4	5	5	4
Clusters (funds)	10	7	7	10	10	8
R-squared	0.755	0.777	0.397	0.620	0.809	0.394

Notes. This table reports separate Article 8 and Article 9 estimates within the baseline matched sample. Panel A decomposes the 718 SFDR funds according to their first observed Article 8/Article 9 classification. Panels B and C retain each treated fund's originally matched never-classified control; no new matching is performed. All regressions include lagged Log AUM, Log age, TER, and Net flows, Morningstar category fixed effects, and year-quarter fixed effects. Standard errors clustered by fund are reported in parentheses. Panel C is exploratory because only five treated funds are initially classified as Article 9, with fewer available for some outcomes. Variable definitions are provided in Table A1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A5

Robustness to style, domicile, fund-family, and benchmark differences.

Panel A. ESG risk percentile							
Variable	**(1) Baseline**	**(2) + Style FE**	**(3) + Style & Domicile FE**	**(4) Mixed-family baseline**	**(5) + Fund-family FE**	**(6) Mixed-benchmark baseline**	**(7) + Benchmark FE**
SFDR fund	-0.062***	-0.062***	-0.062***	-0.055***	-0.073***	-0.063***	-0.062***
	(0.009)	(0.009)	(0.009)	(0.012)	(0.012)	(0.013)	(0.013)
Log AUM (lag)	0.016***	0.014***	0.013***	0.020***	0.010**	0.016***	0.013**
	(0.004)	(0.004)	(0.004)	(0.006)	(0.005)	(0.005)	(0.006)
Log age (lag)	0.030*	0.012	0.018	0.025	-0.010	0.014	0.026
	(0.016)	(0.015)	(0.015)	(0.020)	(0.024)	(0.023)	(0.024)
TER (lag)	-0.025***	-0.019***	-0.022***	-0.026***	-0.006	-0.020**	-0.016**
	(0.006)	(0.006)	(0.006)	(0.008)	(0.010)	(0.008)	(0.008)
Net flows (lag)	0.001	0.001	0.001	-0.001	-0.002	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)

(*continued on next page*)

Table A5 (*continued*)

Panel A. ESG risk percentile							
Variable	**(1) Baseline**	**(2) + Style FE**	**(3) + Style & Domicile FE**	**(4) Mixed-family baseline**	**(5) + Fund-family FE**	**(6) Mixed-benchmark baseline**	**(7) + Benchmark FE**
Morningstar category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Equity Style Box FE	No	Yes	Yes	No	No	No	No
Domicile FE	No	No	Yes	No	No	No	No
Fund-family FE	No	No	No	No	Yes	No	No
Benchmark FE	No	No	No	No	No	No	Yes
Cluster	Fund	Fund	Fund	Fund	Fund	Fund	Fund
Observations	25,405	25,405	25,405	13,366	13,366	14,935	14,935
Clusters (funds)	1,387	1,387	1,387	726	726	804	804
Treated funds	706	706	706	376	376	423	423
Control funds	681	681	681	350	350	381	381
R-squared	0.560	0.596	0.599	0.608	0.683	0.523	0.558
Panel B. Carbon intensity							
Variable	**(1) Baseline**	**(2) + Style FE**	**(3) + Style & Domicile FE**	**(4) Mixed-family baseline**	**(5) + Fund-family FE**	**(6) Mixed-benchmark baseline**	**(7) + Benchmark FE**
SFDR fund	-26.129***	-22.645***	-23.146***	-22.101***	-16.106***	-32.691***	-29.242***
	(5.524)	(5.264)	(5.068)	(6.237)	(5.866)	(7.034)	(6.497)
Log AUM (lag)	0.368	1.793	1.315	1.592	0.824	1.027	0.482
	(1.982)	(1.970)	(1.926)	(2.175)	(2.080)	(2.164)	(2.108)
Log age (lag)	8.190	6.121	3.331	1.249	-3.002	26.864***	27.033***
	(7.095)	(6.847)	(7.077)	(8.854)	(10.097)	(8.686)	(8.716)
TER (lag)	-3.184	-3.228	-5.497	4.229	-0.319	-3.824	-5.446
	(3.875)	(3.703)	(3.818)	(4.726)	(5.373)	(4.615)	(4.453)
Net flows (lag)	-1.038	-1.064	-1.152	-0.849	-0.895	1.065	1.352
	(1.100)	(1.114)	(1.144)	(1.418)	(1.437)	(1.059)	(0.984)
Morningstar category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Equity Style Box FE	No	Yes	Yes	No	No	No	No
Domicile FE	No	No	Yes	No	No	No	No
Fund-family FE	No	No	No	No	Yes	No	No
Benchmark FE	No	No	No	No	No	No	Yes
Cluster	Fund	Fund	Fund	Fund	Fund	Fund	Fund
Observations	20,149	20,149	20,149	10,320	10,320	12,120	12,120
Clusters (funds)	1,178	1,178	1,178	594	594	700	700
Treated funds	631	631	631	328	328	391	391
Control funds	547	547	547	266	266	309	309
R-squared	0.356	0.387	0.398	0.414	0.496	0.365	0.399
Panel C. Buy green							
Variable	**(1) Baseline**	**(2) + Style FE**	**(3) + Style & Domicile FE**	**(4) Mixed-family baseline**	**(5) + Fund-family FE**	**(6) Mixed-benchmark baseline**	**(7) + Benchmark FE**
SFDR fund	0.008***	0.008***	0.008***	0.004	0.003	0.007**	0.005*
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Log AUM (lag)	-0.001	-0.002*	-0.002**	-0.004**	-0.003**	-0.002*	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log age (lag)	-0.002	-0.001	0.001	-0.004	-0.006	-0.007	-0.003
	(0.003)	(0.004)	(0.004)	(0.005)	(0.006)	(0.005)	(0.004)
TER (lag)	-0.003	-0.003*	-0.002	0.003	-0.001	-0.005**	-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Net flows (lag)	0.001	0.001	0.001	0.001	0.002	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Morningstar category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Equity Style Box FE	No	Yes	Yes	No	No	No	No
Domicile FE	No	No	Yes	No	No	No	No
Fund-family FE	No	No	No	No	Yes	No	No
Benchmark FE	No	No	No	No	No	No	Yes

(*continued on next page*)

Table A5 (*continued*)

Panel A. ESG risk percentile							
Variable	**(1) Baseline**	**(2) + Style FE**	**(3) + Style & Domicile FE**	**(4) Mixed-family baseline**	**(5) + Fund-family FE**	**(6) Mixed-benchmark baseline**	**(7) + Benchmark FE**
Cluster	Fund	Fund	Fund	Fund	Fund	Fund	Fund
Observations	14,838	14,838	14,838	7,456	7,456	9,155	9,155
Clusters (funds)	1,135	1,135	1,135	577	577	673	673
Treated funds	613	613	613	317	317	378	378
Control funds	522	522	522	260	260	295	295
R-squared	0.462	0.467	0.471	0.505	0.544	0.462	0.513

Notes. This table reports robustness tests for ESG risk percentile (Panel A), carbon intensity (Panel B), and Buy green (Panel C). Columns (1)-(3) use the baseline outcome-specific samples and sequentially add Equity Style Box and domicile fixed effects. Columns (4)-(5) use the subsample of fund families containing both SFDR and control funds, with column (4) reporting the same-sample baseline and column (5) adding fund-family fixed effects. Columns (6)-(7) apply the same approach to prospectus benchmarks. All regressions include lagged Log AUM, Log age, TER, and Net flows, Morningstar category fixed effects, and year-quarter fixed effects. Standard errors are clustered by fund. Variable definitions are provided in Table A1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Data availability

The data that has been used is confidential.

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