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Does corporate social responsibility affect mutual fund performance and flows?

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ABSTRACT

We use an asset-weighted composite corporate social responsibility (CSR) fund score to study the effects of CSR on fund performance and flows. Compared to low-CSR funds, high-CSR funds display poorer performance, stronger performance persistence, a weaker performance-flow relationship, and comparable persistence in flows. These findings are consistent with investors in high-CSR funds deriving utility from non-performance attributes.

1. Introduction

Whether corporate social responsibility (CSR) enhances or reduces mutual fund performance is an important, long-standing question in the mutual fund literature.[1] The intensity of this debate has further increased in light of the tremendous growth in socially responsible investment (SRI) funds. According to the Social Investment Forum (SIF), U.S. SRI assets under fund management registered an increase from $12 billion in 1995 to $1,013 billion in 2012, and an increase in their relative market share from less than 1% to nearly 8% over the same period.[2] Despite this striking growth, the literature has reported no exceptional return performance for U.S. SRI funds.

To examine the impact of CSR on fund performance, the mutual fund literature has adopted a dichotomous approach by comparing a group of funds that fully conform to ethical standards (i.e., SRI funds) to the remaining funds that are called "conventional funds". However, in comparing SRI to conventional funds, the literature compares two samples with unequal sizes and dissimilar characteristics. It also ignores heterogeneity in the intensity of social screening among SRI funds (e.g., Barnett and Salomon, 2006). To overcome these issues, the current paper suggests a simple holdings-based measure to assess the level of a fund's CSR. The measure is a value-weighted score using firm-level CSR ratings of portfolio holdings. With this measure, we are able to examine the impact of CSR on fund performance on a continuum basis, without resorting to the dichotomous categorization into SRI and conventional funds. Consequently, we are able to compare funds, based on the CSR criterion, cross-sectionally and across time. This measure could be used as an additional criterion by mutual fund investors.

In examining the relationship between CSR and fund performance, two hypotheses compete. On the one hand, investing in firms that implement CSR practices is likely to reduce the set of investment opportunities (Geczy et al., 2005; Renneboog et al., 2008b; Cortez et al., 2009) and increase monitoring costs (Bauer et al., 2005). CSR would then negatively impact fund performance. On the other hand, fund managers that target socially responsible firms may in fact be selecting firms with strong financial fundamentals, which in turn would translate into higher fund performance. In this case, investing in socially responsible stocks would be a value-generating strategy.

Empirically, the literature has reported mixed evidence as to the existence of a significant difference in performance between SRI and conventional funds in U.S. markets. For instance, Bauer et al. (2007) find that ethical funds significantly underperform

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[1] See Renneboog et al. (2008a) for a comprehensive literature review.

[2] See the report on "Sustainable and Responsible Investing Trends in the United States, 2012" (SIF, 2012, p. 12).

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conventional funds, while Gil-Bazo et al. (2010) report the opposite finding. Nofsinger and Varma (2014) find that SRI funds outperform their conventional peers during times of crisis, and underperform at other times. However, most of the studies on U.S. mutual funds find no statistical difference in the performance between SRI and conventional funds (e.g., Hamilton et al., 1993; Goldreyer and Diltz, 1999; Statman, 2000; Schröder, 2004; Geczy et al., 2005; and Renneboog et al., 2008b). We contribute to this debate on the impact of CSR on fund performance. However, instead of comparing SRI to conventional funds in a dichotomous way, we introduce a finer fund-level analysis using portfolio holdings, as defended by Borgers et al. (2015). We are thus able to shed light on the potential interaction between CSR and fund performance, without resorting to potentially biased matching procedures and conflicting SRI screening processes.

Using a sample of 2,168 U.S. equity funds over the period of 2003 to 2011, we examine the impact of CSR on the following fund-related characteristics: (i) performance, (ii) performance persistence, (iii) flow-performance relationship, and (iv) flow persistence. First, we provide evidence that an increase in the level of CSR comes at the expense of a reduction in performance. Indeed, our empirical results reveal that the CSR score of the portfolio is negatively related to risk-adjusted performance. This result holds even when we control for fund characteristics (such as volatility, flows, size of the assets under management, number of stocks, expense ratio, and turnover) and employ alternative definitions of the CSR score. Furthermore, we find that the CSR score negatively predicts future fund performance. When considering CSR strengths and concerns separately, we find that performance is more sensitive to strengths than to concerns. These findings complement those of Borgers et al. (2015), who show that funds with higher exposure to sin stocks display higher risk-adjusted performance. Second, we examine the performance persistence of funds. For the entire sample, we find a negative one-year-lagged performance coefficient, attesting to the presence of performance reversal. More importantly, our findings reveal that performance reversal decreases as fund CSR increases.

Third, we examine the flow-performance relationship. Prior work in the mutual fund literature has shown that investor flows respond positively and significantly to past performance (e.g., Chevalier and Ellison, 1997; Sirri and Tufano, 1998). Our empirical tests confirm the positive flow-performance relationship for the entire sample. Moreover, we find that this relationship weakens as fund CSR increases. Therefore, we confirm that investors in more socially responsible funds become less responsive to past performance, and derive their utility from non-financial attributes. These findings hold when we split the sample into retail and institutional investors; when we use the top 10 holdings in computing the CSR score; or when we sort funds into high and low-performing groups. These results are in line with Benson and Humphrey (2008) and Renneboog et al. (2011), who find that SRI fund flows are less sensitive to past performance than those of their conventional counterparts.

Finally, we examine the persistence of fund flows. Anecdotal evidence suggests that socially conscious investors may find fewer suitable investment opportunities relative to performance-chasing investors. Therefore, socially conscious investors may be less likely to switch from one fund to another. However, inconsistent with this conjecture, our results show that flow persistence does not relate to fund CSR.

The remainder of the paper is organized as follows. In Section 2, we review the literature on the performance and flows of SRI and conventional funds. In Section 3, we describe the sample selection and the variables used in the study. In Section 4, we study the relationship between the fund CSR score and fund characteristics. In Section 5, we examine the effects of fund CSR on fund performance and flows. We conclude in Section 6.

2. Related literature

2.1. Performance of SRI funds and conventional funds

Two conflicting arguments have been proposed in the mutual fund literature to explain the relationship between performance and social responsibility. On the one hand, investing in SRI funds might be costly because the set of investment opportunities is smaller for this category of funds. On the other hand, funds using an SRI screening process may in fact target firms with a more sustainable profitability and better long-term prospects. Thus, the first argument aligns with SRI funds underperforming conventional funds, while the second argument advocates the opposite result.

To date, most of the studies on U.S. mutual funds have reported no significant differences in performance between SRI and conventional funds. Hamilton et al. (1993), Goldreyer and Diltz (1999), Statman (2000), Bello (2005), Bauer et al. (2005), and Renneboog et al. (2008b) find no evidence of a performance difference between SRI and conventional funds. However, Geczy et al. (2005) contend that because of the investments costs, SRI funds are likely to underperform their conventional peers. These conflicting results could be due to the use of different types of social screening for funds, and the comparison of fund groups with different characteristics. The use of a fund-level measure of CSR alleviates these two issues.

Another strand of the literature has relied on hypothetical portfolios to compare the performance of high- and low-CSR funds (e.g., Kempf and Osthoff, 2007). While such an approach is appealing because of its flexibility for testing a number of strategies and scenarios, it falls short of using real managers' holdings. The use of actual portfolios, however, perfectly depicts real conditions, as highlighted by Borgers et al. (2015).

2.2. Flow characteristics of socially responsible funds and conventional funds

The mutual fund literature has extensively examined the flow-performance relationship, which has proven to be significant for actively managed funds (e.g., Chevalier and Ellison, 1997; Sirri and Tufano, 1998). Focusing on the magnitude of the flow-performance relationship, extant research has compared SRI funds to conventional funds. On the one hand, as defended by Bollen (2007), SRI funds suffer from having a relatively short history and therefore being perceived as more uncertain by common investors. Hence, common investors may be more worried about and sensitive to SRI funds' performance variations. In addition, SRI investors may display conditional utility, in which case they invest in SRI funds conditional on good performance. This argument is consistent with Statman (2004), who argues that investors respond to both utilitarian characteristics (e.g., return, risk, and liquidity) and expressive characteristics (e.g., patriotism, social cachet, and social responsibility). On the other hand, SRI investors may derive their utility primarily from non-financial attributes and, as such, should be less sensitive to past performance. Bollen (2007) finds that SRI fund flows are more (less) sensitive to lagged positive (negative) returns compared to conventional funds. However, Benson and Humphrey (2008) and Renneboog et al. (2011) find that the fund flows of U.S. SRI funds are less sensitive to performance than those of their conventional counterparts.

A second issue that has attracted the attention of the SRI fund literature is the persistence of flows. Benson and Humphrey (2008) find that SRI funds' flows exhibit stronger persistence than

those of conventional funds and, thus, SRI investors are more reluctant to transfer their investments. This finding is consistent with SRI investors struggling to find investment alternatives and being likely to carry out smoother flow movements.

3. Sample selection and variable construction

3.1. Sample selection

We use the Center for Research in Security Prices (CRSP) Mutual Fund Database and the MSCI ESG KLD STATS (henceforth KLD) database to construct a sample of mutual fund CSR scores. The CRSP provides mutual fund characteristics such as expense ratios, turnover ratios, total net assets, returns, and holdings. These fund characteristics are aggregated at the portfolio level using asset-weighted averages of share classes. We rely on the Lipper-style classifications to select only actively managed equity funds.

KLD provides ratings of individual firms based on their social and environmental performance. Firms are evaluated along seven dimensions: community, corporate governance, diversity, employee relations, environment, human rights, and product quality and safety.

KLD assigns a binary (0/1) rating to a set of strengths and concerns indicators in each dimension. One can obtain a score for each dimension equal to the sum of strengths minus the sum of concerns, and then obtain an overall CSR score equal to the sum of scores across all dimensions. However, this approach is complicated by the fact that KLD has been adding and removing strengths and concerns indicators over time. To make the overall CSR score comparable over time, we follow the procedure in Deng et al. (2013). Specifically, we deflate each strength (concern) score by the number of strengths (concerns) in that year. The overall CSR score, based on the adjusted strength and concern scores, is comparable over time because it does not depend on the changing number of strengths and concerns from year to year.

To construct a CSR score at the fund level, we match the CRSP Mutual Fund holdings with the stock CSR scores from KLD. However, given that mutual funds have invested in 21,275 distinct stocks, and KLD provides information on just 5,296 distinct stocks, a significant portion of stocks is left unrated. The average sum of stock weights of fund portfolios covered by KLD is indeed equal to 80.68%. To alleviate this problem, we follow Cremers and Petajisto (2009), and require that the sum of equity weights with a CSR score accounts for at least 67% of the portfolio.[3] Doing so yields an average sum of stock weights equal to 87.66% for the selected fund portfolios. We then adjust these weights by dividing them by the sum of the weights in order to make the adjusted weights sum to one.[4] Moreover, we require that funds have at least two years of reported holdings. The final sample comprises 2,168 U.S. equity domestic funds and covers the period of 2003 to 2011.[5]

3.2. Variable construction

3.2.1. Fund CSR score

We follow a widely used approach that relies on matching fund holdings with individual stock characteristics. This approach has been used, for example, to construct measures of fund performance (Daniel et al., 1997; Kacperczyk et al., 2008); systematic risk (Chevalier and Ellison, 1997); risk-shifting (Schwarz, 2012); liquidity (Idzorek et al., 2012); and exposure to socially sensitive stocks (Borgers et al., 2015). We follow the same approach to construct a CSR score at the fund level and at a yearly frequency using the following equation:

$$CSR_{j,t} = \sum_{i=1}^{N_{j,t}} \omega_{i,j,t} \times CSR_{i,t}, \tag{1}$$

where $\omega_{i,j,t}$ is the weight of stock i in fund j at the end of year t; $N_{j,t}$ is the number of stocks held by fund j at the end of year t; and $CSR_{i,t}$ is the CSR score of stock i at the end of year t.

3.2.2. Other fund-related variables

Fund performance: In addition to considering fund annual raw return (*Return*), we estimate the risk-adjusted performance using Carhart's (1997) model and daily returns as follows:

$$r_{j,t} - r_t^f = \alpha + \beta_{MKT} \cdot \left(r_t^m - r_t^f\right) + \beta_{SMB} \cdot r_t^{SMB} + \beta_{HML} \cdot r_t^{HML} + \beta_{UMD} \cdot r_t^{UMD} + \varepsilon_{j,t}, \tag{2}$$

where $r_{j,t}$ is fund j's net return on day t and r_t^f is the one-month T-bill rate on day t. $(r_t^m - r_t^f)$ is the excess return of the equity market index over the one-month T-bill rate; r_t^{SMB} is the difference in returns between a small-cap portfolio and a large-cap portfolio; and r_t^{HML} is the difference in returns between a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks. r_t^{UMD} captures the one-year momentum factor. The parameter α (*Alpha*) denotes the annual risk-adjusted performance for fund j.

Fund flows: We measure annual fund flows as:

$$Flows_{j,t} = \frac{TNA_{j,t} - TNA_{j,t-1}\left(1 + R_{j,t}\right)}{TNA_{j,t-1}}, \tag{3}$$

where $TNA_{j,t}$ and $TNA_{j,t-1}$ are the total net assets for fund j at the end of years t and t-1, respectively, and $R_{j,t}$ is the return of fund j in year t.

***R-square*:** Using Eq. (2), we can obtain the *R-square*, which captures the proportion of the fund's return variation explained by variation in Carhart's (1997) model factors. According to Amihud and Goyenko (2013), *R-square* is inversely related to the selectivity and active management of the fund.

***Other variables*:** We employ other variables commonly used in the mutual fund literature. *Volatility* is the annualized fund return volatility. *Number of stocks* is the number of stocks included in the fund portfolio. *Expense ratio* is the ratio of total net assets that shareholders pay for the fund's operating expenses, which include 12b-1 fees. *Turnover* is the minimum of aggregated sales or aggregated purchases of securities, divided by the average 12-month total net assets of the fund. *Fund age* is the age of the fund in years since its inception. *SRI dummy* is a dummy equal to 1 if the fund is an SRI fund, and 0 otherwise. We identify SRI funds using a list of funds collected from the SIF website.[6]

3.3. Descriptive statistics

Table 1 reports descriptive statistics for our set of variables.[7] The average fund CSR score is equal to −0.082, with a standard

[3] Similarly, Borgers et al. (2015) required that at least 75% of the portfolio holdings match the stocks in KLD.

[4] The Pearson correlation coefficient between the adjusted and unadjusted weights is, however, equal to 99.55%.

[5] KLD has registered an important increase in the number of companies covered since 2003 to reach more than 3,000 (per year). In comparison, the coverage was limited to only 650 companies (per year) in the 1990s. This fact has guided the choice of the start year for our sample.

[6] Please refer to www.ussif.org.

[7] We winsorize all continuous variables at the 0.5% and 99.5% levels.

Table 1
Descriptive statistics.

Variable	Mean	Median	Std Dev	Min	Max	Corr.
CSR	−0.082	−0.232	0.434	−0.676	1.527	1
Return	0.074	0.106	0.225	−0.503	0.620	−0.017
Alpha	−0.011	−0.009	0.053	−0.233	0.145	−0.065***
Flows	0.147	−0.054	0.968	−0.753	14.880	−0.012
Volatility	0.230	0.206	0.096	0.089	0.488	−0.088***
R-square	0.951	0.964	0.041	0.706	0.996	0.217***
TNA	881.084	209.600	2,226.420	5.900	28,543.000	0.053***
Number of stocks	104.430	72.000	106.256	18.000	945.000	−0.081***
Expense ratio	0.012	0.012	0.004	0.002	0.026	−0.141***
Turnover	0.792	0.630	0.621	0.020	4.460	−0.128***
Fund Age	13.924	11.000	12.094	1.083	77.750	0.072***
SRI dummy	0.009	0.000	0.096	0.000	1.000	0.050***

This table presents descriptive statistics for our sample of equity mutual funds over the 2003–2011 period. In particular, it reports the mean, median, standard deviation, minimum and maximum of the CSR score, fund raw return, fund risk-adjusted performance (alpha), flows, volatility, R-square, total net assets (TNA) in millions of dollars, number of stocks, expense ratio, turnover ratio, fund age, and the SRI dummy. The last column reports Pearson's correlation coefficient of our main variable (CSR score) with each of the aforementioned variables. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

deviation of 0.434. The average fund raw return (*Return*) is positive and equal to 0.074, while the annualized risk-adjusted return (*Alpha*) is negative and equal to −0.011. Fund flows (*Flows*) are on average positive (0.147), reflecting significant growth for some equity mutual funds over the sample period. R-square ranges between 0.706 and 0.996 with a mean of 0.951, indicating that a significant fraction of the average fund's return variability reflects that of Carhart's (1997) model factors. The mean number of stocks is 104 and the mean fund age is 13.9 years.

The last column of Table 1 reports the correlation coefficients between the CSR score and fund characteristics. The CSR score shows significant correlations with all of the fund characteristics except for flows. The CSR score displays a negative correlation with alpha, supporting the view that an increase in CSR comes at the cost of a reduction in financial performance. Return volatility is negatively correlated with the CSR score, implying that a better CSR rating goes hand in hand with a smaller risk. The CSR score is positively related to R-square and negatively related to the number of stocks. Total net assets are positively related to the CSR score, while the expense ratio and turnover are negatively related to the CSR score.

4. Fund CSR score

4.1. Fund CSR score and fund characteristics: univariate analysis

We sort funds each year into two groups based on whether they have high (i.e., above-median) or low (i.e., below-median) CSR scores. Then, we compute the average fund characteristics for the high and low-CSR funds, and estimate the differences between the two groups. Table 2 reports the univariate results. The difference in performance between the high and low-CSR funds is negative when considering both raw returns and alphas, although it is significant for only the latter. That is, a high CSR score goes hand in hand with poorer risk-adjusted performance. Furthermore, high-CSR funds are older and exhibit lower volatility, a lower R-square, a smaller number of stocks, and a smaller expense ratio. The lower R-square and smaller number of stocks of high-CSR funds are consistent with the idea that these funds are more selective and hold less diversified portfolios. Tests relying on the Mann-Whitney median statistics are generally consistent with those that rely on the mean differences, except in the case of the turnover ratio, for which the difference turns out to be negative and significant. Overall, these results confirm the correlation results on the entire sample, except for the R-square.

Table 2
CSR score and fund characteristics: univariate analysis.

	Low-CSR funds (1)	High-CSR Funds (2)	High−Low (2)-(1)	*t*-statistic	*z*-statistic
Return	0.076	0.073	−0.003	−0.53	−2.77
Alpha	−0.008	−0.015	−0.007***	−5.81	−7.07
Flows	0.142	0.153	0.011	0.51	−0.54
Volatility	0.237	0.224	−0.013***	−6.15	−5.57
R-square	0.953	0.949	−0.004***	−4.18	−3.22
TNA	852.291	904.536	52.245	1.04	−1.23
Number of stocks	113.336	96.187	−17.149***	−7.14	−11.24
Expense ratio	0.012	0.012	−0.000***	−2.65	−3.61
Turnover	0.793	0.794	0.001	0.05	−1.82
Fund age	13.519	14.249	0.729***	2.66	2.07
SRI dummy	0.004	0.014	0.010***	4.92	4.91

This table reports univariate results on fund characteristics. Each year, funds are categorized into high or low-CSR groups, depending on whether they have an above or below-median CSR score. The first two columns report the average fund characteristics for low and high-CSR funds, respectively. The fund characteristics are the fund raw return, fund risk-adjusted performance (alpha), flows, volatility, R-square, total net assets (TNA) in millions of dollars, number of stocks, expense ratio, turnover ratio, fund age, and the SRI dummy. The third column reports the mean difference in characteristics between the high and low-CSR funds. The *t*-statistic for the difference in means and the Mann-Whitney *z*-statistic for the difference in medians are also reported in the fourth and fifth columns, respectively. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

4.2. Fund CSR score and fund characteristics: multivariate analysis

To examine whether fund characteristics are associated with the fund CSR score, we estimate the following regression model:

$$\begin{aligned} CSR_{j,t} = {} & a_0 + a_1 \cdot Return_{j,t} + a_2 \cdot Alpha_{j,t} + a_3 \cdot Flows_{j,t} \\ & + a_4 \cdot Volatility_{j,t} + a_5 \cdot R-square_{j,t} + a_6 \cdot Log\left(TNA_{j,t}\right) \\ & + a_7 \cdot Log\left(Number\ of\ stocks_{j,t}\right) + a_8 \cdot Expense\ ratio_{j,t} \\ & + a_9 \cdot Turnover_{j,t} + a_{10} Fund\ age_{j,t} + a_{11} \cdot SRI\ dummy_{j,t} \\ & + Year\ dummies + Style\ dummies + \varepsilon_{j,t}, \end{aligned} \quad (4)$$

where *j* indexes funds and *t* indexes years. All variables are defined above. We control for time (year) and style dummies. To obtain fund-style dummies, we rank funds according to their self-reported investment objectives into one of the following seven style categories: aggressive growth, mid cap, small cap, growth and income, growth, equity income, and maximum capital gains. Because the CSR score is likely correlated within a fund over time, we adjust standard errors for clustering at the fund level.

Table 3 shows that several fund characteristics are associated with the level of fund CSR. In the first three specifications, we

Table 3
CSR and fund characteristics: multivariate analysis.

Dependent variable	CSR Score					Strengths	Concerns
	(1)	(2)	(3)	(5)	(6)	(7)	(8)
$Return_t$	0.036			−0.026			
	(0.90)			(−0.65)			
$Alpha_t$		−0.578***			−0.726***	−0.834***	−0.107**
		(−8.85)			(−10.36)	(−11.18)	(−2.34)
$Flows_t$			0.000	0.001	0.006*	−0.001	−0.007**
			(0.15)	(0.31)	(1.69)	(−0.27)	(−2.35)
$Volatility_t$				−0.588***	−0.945***	−1.674***	−0.729***
				(−4.59)	(−7.01)	(−9.46)	(−5.92)
$R\text{-}square_t$				−0.669***	−0.734***	1.045***	1.779***
				(−4.47)	(−4.83)	(5.64)	(11.38)
$Log(TNA_t)$				−0.004	−0.004	−0.004	−0.001
				(−1.42)	(−1.27)	(−1.02)	(−0.17)
$Log(Number\ of\ stocks_t)$				−0.019**	−0.017**	−0.040***	−0.023***
				(−2.43)	(−2.18)	(−3.89)	(−2.99)
$Expense\ ratio_t$				−3.710***	−4.038***	−7.160***	−3.122**
				(−3.09)	(−3.42)	(−4.53)	(−2.31)
$Turnover_t$				0.007	0.000	−0.005	−0.005
				(1.16)	(0.07)	(−0.50)	(−0.70)
$Fund\ age_t$				0.000	0.000	0.000	−0.000
				(0.87)	(0.78)	(0.12)	(−0.59)
$SRI\ dummy_t$				0.219***	0.225***	0.032	−0.193***
				(3.76)	(3.66)	(0.57)	(−5.15)
Intercept	−0.161***	−0.273***	−0.252***	0.756***	0.848***	0.511***	−0.337**
	(−5.68)	(−9.09)	(−5.22)	(5.60)	(6.16)	(3.09)	(−2.38)
N	7,726	7,619	7,728	6,645	6,683	6,683	6,683
Adj. R^2	0.514	0.514	0.512	0.489	0.495	0.764	0.746

This table reports results from regressing the CSR score on the following fund characteristics: fund raw return, volatility, fund risk-adjusted performance (alpha), R-square, flows, natural logarithm of the total net assets (TNA), natural logarithm of the number of stocks, expense ratio, turnover ratio, fund age, and the SRI dummy. The regressions include unreported time (year) and style dummies. *t*-statistics based on standard errors clustered at the fund level are reported between parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

focus on fund raw returns, risk-adjusted returns, and fund flows, respectively. Fund raw returns load insignificantly on fund CSR, but risk-adjusted returns load negatively and significantly on fund CSR. The coefficient on *Alpha* is equal to −0.578, suggesting that a one-standard-deviation increase in the fund risk-adjusted return (0.053) is associated with a 0.03 decrease in the fund CSR score, which is economically significant.[8] High fund flows seem to be associated with a high CSR score, though the statistical strength of this relationship is relatively weak. The next two specifications include all fund characteristics. Confirming the univariate analysis, we find that the CSR score is negatively and significantly associated with return volatility, R-square, the number of stocks, and expense ratio. Moreover, the SRI dummy loads positively on CSR, confirming that the CSR score is higher for SRI funds.

The last two specifications replace the CSR score with its strength and concern subcomponent scores, respectively. The comparison between these two specifications shows that *Alpha* is negatively related to both CSR strengths and concerns. However, the coefficient on *Alpha* is about eight times stronger in the strength score regression (−0.834) than in the concern score regression (−0.107). Thus, it appears that the negative relation between risk-adjusted performance and the fund CSR score, which we document above, is driven by CSR strengths rather than CSR concerns.

4.3. Fund CSR score and Carhart's factor loadings

Beyond the CSR-performance relationship, it is worthwhile inspecting how CSR relates to fund style exposures as measured by Carhart's (1997) factor loadings. To do this, we first estimate Carhart's factor loadings for each fund-year using Eq. (2). We then regress the fund CSR score on Carhart's factor loadings. We further include several control variables as in Eq. (4). Table 4 reports the regression results. The CSR score is significantly related to all factor loadings. In particular, a high fund CSR score goes hand in hand with significant exposure to small-beta stocks, large stocks, growth stocks, and contrarian stocks. These results corroborate those of Bollen (2007), who finds that relative to conventional funds, SRI funds are weighted toward larger capitalization and contrarian stocks. Furthermore, the significant relationship between the CSR score and the style factor loadings further justifies the use of risk-adjusted returns instead of raw returns as a measure of performance in our study.

5. Fund performance, flows, and CSR score

5.1. Does CSR predict fund performance?

Renneboog et al. (2008b) posit that socially responsible funds invest within a smaller universe of stocks, and this is likely to harm the performance of this category of funds. However, the multiple screening steps taken by socially responsible funds' managers may well eliminate poorly managed companies with underperforming stocks. The latter argument aligns with higher performance of socially responsible funds. Here, we test these arguments in our sample of funds to verify whether a high CSR score improves or depresses future fund performance. Specifically, we estimate the following regression model:

$$\begin{aligned} Alpha_{j,t+1} = {} & b_0 + b_1 \cdot CSR_{j,t} + b_2 \cdot CSR_{j,t-1} + b_3 \cdot Alpha_{j,t} \\ & + b_4 \cdot Flows_{j,t} + b_5 \cdot Volatility_{j,t} + b_6 \cdot R-square_{j,t} \\ & + b_7 \cdot Log\left(TNA_{j,t}\right) + b_8 \cdot Log\left(Number\ of\ stocks_{j,t}\right) \\ & + b_9 \cdot Expense\ ratio_{j,t} + b_{10} \cdot Turnover_{j,t} \\ & + b_{11} \cdot Fund\ age_{j,t} + b_{12} \cdot SRI\ dummy_{j,t} \\ & + Year\ dummies + Style\ dummies + \varepsilon_{j,t} \end{aligned} \quad (5)$$

[8] The mean CSR score is -0.082.

Table 4
CSR and style factors.

	(1)	(2)
$Alpha_t$	−0.667***	−0.665***
	(−10.21)	(−9.61)
$\beta_{MKT,t}$	−0.260***	−0.100**
	(−5.19)	(−2.07)
$\beta_{SMB,t}$	−0.120***	−0.054*
	(−4.33)	(−1.91)
$\beta_{HML,t}$	−0.147***	−0.143***
	(−8.24)	(−8.27)
$\beta_{UMD,t}$	−0.167***	−0.158***
	(−6.12)	(−5.54)
$Volatility_t$		−0.699***
		(−5.69)
$R\text{-}square_t$		−0.684***
		(−4.74)
$Log(TNA_t)$		−0.005*
		(−1.67)
$Log(Number\ of\ stocks_t)$		−0.007
		(−0.84)
$Expense\ ratio_t$		−4.004***
		(−3.47)
$Turnover_t$		0.009
		(1.38)
$Fund\ age_t$		0.000
		(0.16)
$SRI\ dummy_t$		0.130**
		(2.19)
Intercept	0.021	0.697***
	(0.37)	(5.26)
N	7,619	6,721
Adj. R^2	0.526	0.501

This table reports results from regressing the CSR score on Carhart's (1997) factor loadings: *Alpha*, β_{MKT}, β_{SMB}, β_{HML}, and β_{UMD}. The regression includes the following control variables: volatility, R-square, natural logarithm of the total net assets (TNA), natural logarithm of the number of stocks, expense ratio, turnover ratio, fund age, and the SRI dummy. The regressions includes time (year) and style dummies. *t*-statistics based on standard errors clustered at the fund level are reported between parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Our regressions include one and two-year lags of the CSR variable in the first and second specifications of Table 5. The results in the first specification show that only the one-year-lagged CSR is significant. This variable remains significant even when we control for other fund characteristics as displayed in the second specification of Table 5. These results are consistent with Renneboog et al. (2008b), who suggest that socially responsible funds underperform other funds. In the last two specifications, we decompose the CSR score into its strength and concern subcomponents. We find that the coefficient on the CSR strengths score is negative and statistically significant, while the coefficient on the CSR concerns score is insignificant. Thus, it appears that the negative relationship between the fund CSR score and next year's *Alpha* is driven mainly by CSR strengths rather than CSR concerns.

Among the control variables, Table 5 shows that volatility, the log of the number of stocks, the expense ratio, and the turnover ratio all relate negatively to the next year's performance, while R-square is positively associated with next year's performance.

A natural extension of the performance predictability question is to examine how fund CSR affects performance persistence. To do so, we regress risk-adjusted returns on lagged risk-adjusted returns, lagged risk-adjusted returns interacted with lagged fund CSR, and lagged control variables. Specifically, we estimate the following regression model:

$$\begin{aligned} Alpha_{j,t+1} = {} & c_0 + c_1 \cdot Alpha_{j,t} + c_2 \cdot Alpha_{j,t} \times CSR_{j,t} + c_3.CSR_{j,t} \\ & + c_4 \cdot Flows_{j,t} + c_5 \cdot Volatility_{j,t} + c_6 \cdot R - square_{j,t} \\ & + c_7 \cdot Log\left(TNA_{j,t}\right) + c_8 \cdot Log\left(Number\ of\ stocks_{j,t}\right) \\ & + c_9 \cdot Expense\ ratio_{j,t} + c_{10} \cdot Turnover_{j,t} \\ & + c_{11} \cdot Fund\ age_{j,t} + c_{12} \cdot SRI\ dummy_{j,t} \\ & + Year\ dummies + Style\ dummies + \varepsilon_{j,t} \end{aligned} \quad (6)$$

Table 5
Future risk-adjusted performance and CSR.

Independent variable:	CSR Score		Strengths	Concerns
	(1)	(2)	(4)	(5)
CSR_t	−0.012**	−0.017***	−0.010**	−0.003
	(−2.13)	(−2.95)	(−2.09)	(−0.27)
CSR_{t-1}	0.007	0.008	−0.010	−0.010
	(0.85)	(0.94)	(−1.32)	(−1.06)
$Alpha_t$		−0.114***	−0.117***	−0.112***
		(−5.16)	(−5.28)	(−5.06)
$Flows_t$		−0.001	−0.001	−0.001
		(−0.73)	(−0.83)	(−0.72)
$Volatility_t$		−0.092**	−0.114***	−0.111***
		(−2.44)	(−3.00)	(−2.91)
$R\text{-}square_t$		0.112**	0.141***	0.130***
		(2.30)	(2.82)	(2.58)
$Log(TNA_t)$		0.000	0.000	0.000
		(0.38)	(0.29)	(0.44)
$Log(Number\ of\ stocks_t)$		−0.005***	−0.005***	−0.005**
		(−2.69)	(−3.00)	(−2.56)
$Expense\ ratio_t$		−0.905***	−0.984***	−0.877***
		(−2.93)	(−3.19)	(−2.85)
$Turnover_t$		−0.008***	−0.008***	−0.008***
		(−4.36)	(−4.36)	(−4.25)
$Fund\ age_t$		0.000	0.000	0.000
		(0.21)	(0.21)	(0.16)
$SRI\ dummy_t$		−0.008	−0.005	−0.008
		(−0.99)	(−0.60)	(−0.87)
Intercept	−0.045***	−0.092*	−0.074	−0.095**
	(−2.69)	(−1.95)	(−1.50)	(−2.01)
N	2,608	2,460	2,460	2,460
Adj. R^2	0.057	0.087	0.088	0.084

This table reports results from regressing risk-adjusted performance (*Alpha*) on the following lagged fund characteristics: the fund CSR score, fund risk-adjusted performance (alpha), flows, volatility, R-square, natural logarithm of the total net assets (TNA), natural logarithm of the number of stocks, expense ratio, turnover ratio, fund age, and the SRI dummy. Columns 1 and 2 use the CSR score as a independent variable. Columns 3 and 4 use CSR strengths and CSR concerns scores as independent variables, respectively. The regressions include time (year) and style dummies. *t*-statistics based on standard errors clustered at the fund level are reported between parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6 reports the regression results. In the first two specifications, we find no evidence of performance persistence over a horizon of one year, as the coefficient on lagged alpha is negative. As it is statistically significant, the coefficient on lagged alpha hints rather at the presence of performance reversal. In the third specification, the interaction term between risk-adjusted performance and the fund CSR score is positive and significant, implying that an increase in the CSR score strengthens the performance persistence. Thus, funds with a high CSR score exhibit stronger persistence or lower reversal in their performance. Combined with the evidence of a relatively poor performance that was found previously, this result suggests that socially responsible funds are less desirable to performance-chasing investors.

5.2. Fund performance-flow relationship and CSR

The performance-flow relationship is a well-studied relationship in the mutual fund literature. Several papers have reported evidence that investor flows respond positively to performance, and are more sensitive to good performance than they are to poor performance. Here, we examine the performance-flow relationship, and investigate how it is affected by our holdings-based measure of CSR.

As funds invest in more socially responsible stocks, they should attract investors that are less focused on performance. Consistent

Table 6
Risk-adjusted performance persistence and CSR.

	(1)	(2)	(3)
$Alpha_t$	−0.054***	−0.111***	−0.072***
	(−3.58)	(−6.14)	(−2.90)
$Alpha_t \times CSR_t$			0.180**
			(2.22)
CSR_t		−0.011***	−0.008*
		(−2.81)	(−1.83)
$Flows_t$		0.002**	0.002*
		(2.07)	(1.89)
$Volatility_t$		−0.083***	−0.085***
		(−2.69)	(−2.75)
$R\text{-}square_t$		0.124***	0.127***
		(3.38)	(3.46)
$Log(TNA_t)$		−0.001*	−0.001*
		(−1.75)	(−1.84)
$Log(Number\ of\ stocks_t)$		−0.003**	−0.003**
		(−2.02)	(−2.04)
$Expense\ ratio_t$		−1.157***	−1.172***
		(−5.01)	(−5.07)
$Turnover_t$		−0.009***	−0.009***
		(−6.64)	(−6.61)
$Fund\ age_t$		0.000	0.000
		(0.63)	(0.63)
$SRI\ dummy_t$		0.006	0.005
		(0.73)	(0.56)
Intercept	−0.040***	−0.095***	−0.096***
	(−3.70)	(−2.69)	(−2.69)
N	4,816	4,287	4,287
Adj. R^2	0.056	0.087	0.088

This table reports results from regressing risk-adjusted performance (*Alpha*) on the following lagged fund characteristics: fund risk-adjusted performance (*Alpha*), fund risk-adjusted performance (*Alpha*) interacted with the fund CSR score, the fund CSR score, flows, volatility, R-square, natural logarithm of the total net assets (TNA), natural logarithm of the number of stocks, expense ratio, turnover ratio, fund age, and the SRI dummy. The regressions include time (year) and style dummies. *t*-statistics based on standard errors clustered at the fund level are reported between parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

with this idea, Benson and Humphrey (2008) and Renneboog et al. (2011) find that SRI fund flows are less sensitive to performance than their conventional counterparts. However, Bollen (2007) finds that compared to conventional funds, SRI fund flows are more sensitive to lagged positive returns and less sensitive to lagged negative returns. Bollen (2007) argues that investors face more uncertainty in SRI funds due to their short history, and that investors are therefore more sensitive to performance variations.

We argue that funds that invest in more socially responsible stocks will repel performance-chasing investors and attract socially conscious investors. Thus, as a fund invests more in socially responsible stocks, the investor's sensitivity to the fund's performance should weaken. As we find that the CSR score is negatively related to fund performance, funds with a high CSR level should attract investors that are less sensitive to the performance criterion. To test this argument, we estimate the following regression model:

$$\begin{aligned} Flows_{j,t+1} = {} & d_0 + d_1 \cdot Alpha_{j,t} + d_2 \cdot Alpha_{j,t-1} + d_3 \cdot Alpha_{j,t} \\ & \times CSR_{j,t} + \sum_{k=1}^{4} d_{3+k} \cdot Alpha_{j,t} \times Q_{k,j,t} + d_8 \cdot CSR_{j,t} \\ & + d_9 \cdot Flows_{j,t} + d_{10} \cdot Volatility_{j,t} + d_{11} \cdot R-square_{j,t} \\ & + d_{12} \cdot Log\left(TNA_{j,t}\right) + d_{13} \cdot Log\left(Number\ of\ stocks_{j,t}\right) \\ & + d_{14} \cdot Expense\ ratio_{j,t} + d_{15} \cdot Turnover_{j,t} \\ & + d_{16} \cdot Fund\ age_{j,t} + d_{17} \cdot SRI\ dummy_{j,t} \\ & + Year\ dummies + Style\ dummies + \varepsilon_{j,t}, \end{aligned} \quad (7)$$

where $Q_{k,j,t}$ ($k = 1$, 2, 3, and 4) are dummy variables for each of the four quartiles of funds sorted on the CSR score. The remaining variables are defined in Section 3.2.

Panel A of Table 7 reports the estimation results of Eq. (7). The first two specifications show that fund flows respond positively and significantly to the one-year and two-year lagged risk-adjusted performances. In the third specification, the interaction term between risk-adjusted performance and the CSR score is negative and significant, implying that an increase in the CSR score weakens the flow-performance relationship. These results suggest that investors are less sensitive to the performance attribute in more socially responsible funds. As the level of CSR increases, it may become more difficult for investors to find similar investment alternatives and, therefore, they may be more reluctant to switch to other funds, even when the original funds perform poorly.[9]

Looking at the other control variables, we find that funds exhibit persistence in their annual flows, as evidenced by the positive and significant coefficient on lagged flows. Moreover, we find that fund flows are negatively related to total net assets, which is consistent with the diseconomies of scale in the mutual fund industry: as funds become larger, they find it more difficult to maintain a sustained growth rate.

In examining how CSR affects the sensitivity of fund flows to performance, we contribute to a growing literature that shows that investors are sensitive to fund holdings-based measures (e.g., Chen et al., 2000; Kacperczyk and Seru, 2007; Huang and Kale, 2013; and Agarwal et al., 2014). Nonetheless, since fund holdings are not publicly available, investors might not have precise knowledge of funds' overall CSR scores, and thus may not be responsive to small changes in fund CSR levels. We adapt our analysis to take into account this issue. First, instead of directly estimating the impact of fund CSR on the sensitivity of flows to performance, we assign funds to CSR-sorted quartiles on the premise that investors are more likely to have relative rather than absolute perceptions of fund CSR. These perceptions may be easily formed after discussions with fund managers or from reading prospectuses. In the fourth specification of Panel A, we interact risk-adjusted performance with the CSR quartile dummies. Consistent with the previous result, we find that the coefficients on the interaction terms are decreasing in the level of fund CSR, with the difference between the four coefficients being statistically significant. Second, we distinguish between retail and institutional funds, as institutional investors may have better access to holdings information. In the third and sixth specifications of Panel B, we find that the magnitude of the flow-performance relation is decreasing across the CSR quartiles for both retail and institutional funds. Moreover, the difference between the quartile coefficients is statistically significant for the two fund categories. Third, we conduct our analyses using only the top 10 holdings—which are readily available to investors—in computing the CSR score. In the eighth specification of Panel B, we find that the interaction term between the risk-adjusted performance and the top-10-holdings CSR score is negative and significant, thereby confirming that the sensitivity of flows to performance decreases with the fund CSR.

In Panel C of Table 7, we examine the asymmetry of the flow-performance relationship. Each year, we sort funds into high (i.e., above-median) and low (i.e., below-median) alpha groups, and re-estimate Eq. (7) while further interacting CSR with the high and low alpha dummies. Our results confirm the positive relationship between performance and flows. We also find this relationship to be asymmetric, as it is stronger for the higher-performance group in all of the CSR-sorted quartiles. This finding corroborates Chevalier and Ellison (1997).

[9] In unreported results, we also estimated the flow-performance relationship using raw returns. We confirm the positive relationship between flows and past returns, and observe the same trend across CSR quartiles: as the level of CSR increases, the flow-return relationship weakens. For brevity, we do not report these results.

5.3. Flow persistence and CSR

We repeat the previous analysis by regressing fund flows on lagged values of the explanatory variable, but we focus on lagged flows in order to study flow persistence. Patel et al. (1994), Fant and O' Neal (2000), and Del Guercio and Tkac (2002) find that annual fund flows are persistent. We contribute to this strand of the literature by examining whether flow persistence varies with the level of fund CSR.

Persistence in fund flows reflects the ability of funds to maintain sustainable flows over time. A strong persistence in fund flows indicates that a fund has a stable pool of loyal investors, whereas a

Table 7
Flow-performance relationship and CSR.

Panel A: Baseline specification

	(1)	(2)	(3)	(4)
$Alpha_t$	1.605***	1.558***	0.583	
	(7.15)	(6.63)	(1.38)	
$Alpha_{t-1}$	1.786***	1.433***	1.406***	
	(8.32)	(6.21)	(6.14)	
$Alpha_t \times CSR_t$			−4.541***	
			(−3.25)	
$Alpha_t \times Q_{1,t}$				2.313***
				(5.13)
$Alpha_t \times Q_{2,t}$				1.683***
				(4.35)
$Alpha_t \times Q_{3,t}$				2.135***
				(5.79)
$Alpha_t \times Q_{4,t}$				1.339***
				(3.59)
CSR_t		−0.031	−0.108*	0.050
		(−0.65)	(−1.84)	(1.03)
$Flows_t$		0.168***	0.171***	0.163***
		(5.63)	(6.00)	(15.03)
$Volatility_t$		0.258	0.313	0.664*
		(0.80)	(0.99)	(1.76)
$R\text{-}square_t$		0.059	−0.090	−0.407
		(0.12)	(−0.19)	(−1.04)
$Log(TNA_t)$		−0.034***	−0.033***	−0.050***
		(−4.69)	(−4.61)	(−6.99)
$Log(Number\ of\ stocks_t)$		−0.015	−0.015	−0.013
		(−0.83)	(−0.79)	(−0.66)
$Expense\ ratio_t$		−5.788*	−5.527*	−8.372***
		(−1.72)	(−1.66)	(−2.71)
$Turnover_t$		0.046*	0.047*	0.024
		(1.68)	(1.73)	(1.33)
$Fund\ age_t$		−0.000	−0.000	−0.001
		(−0.37)	(−0.37)	(−1.30)
$SRI\ dummy_t$		0.009	0.042	0.180*
		(0.10)	(0.49)	(1.79)
Intercept	0.280**	0.452	0.585	1.126***
	(2.09)	(1.11)	(1.41)	(3.19)
N	2,589	2,464	2,464	4,319
Adj. R^2	0.058	0.118	0.124	0.101

Panel B: Alternative specifications for retail and institutional funds, and for using top 10 holdings

	Retail funds			Institutional funds			Top 10 holdings		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Alpha_t$	1.537***	0.977***		1.070***	0.622		1.690***	1.189***	
	(6.17)	(3.16)		(2.73)	(0.96)		(8.01)	(3.65)	
$Alpha_{t-1}$	0.973**	0.674***		1.026*	1.019*		1.377***	1.355***	
	(2.20)	(2.81)		(1.91)	(1.91)		(6.98)	(6.90)	
$Alpha_t \times CSR_t$		−1.673*			−2.038			−2.280**	
		(−1.73)			(−1.09)			(−2.44)	
$Alpha_t \times Q_{1,t}$			2.302***			3.139***			1.837***
			(4.28)			(4.83)			(4.75)
$Alpha_t \times Q_{2,t}$			1.744***			1.713***			1.756***
			(3.48)			(2.95)			(5.38)
$Alpha_t \times Q_{3,t}$			2.533***			1.008*			2.089***
			(5.60)			(1.78)			(6.57)
$Alpha_t \times Q_{4,t}$			0.877*			1.533***			1.427***
			(1.74)			(2.63)			(4.19)
CSR_t	−0.566	−0.055	0.082	−0.007	−0.049	−0.010	0.022	−0.008	0.032
	(−1.39)	(−1.08)	(1.30)	(−0.09)	(−0.54)	(−0.14)	(0.87)	(−0.29)	(1.15)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	913	913	1,643	712	712	1,258	3,107	3,107	5,040
Adj. R^2	0.123	0.113	0.155	0.135	0.135	0.166	0.124	0.128	0.106

(continued on next page)

Table 7
(continued)

Panel C: The flow-performance asymmetry			
	(1)	(2)	(3)
$Alpha_t$	1.558***	0.557	
	(6.63)	(1.33)	
$Alpha_{t-1}$	1.433***	1.400***	
	(6.21)	(6.11)	
$Alpha^L{}_t \times CSR_t$		−6.899***	
		(−3.13)	
$Alpha^H{}_t \times CSR_t$		−3.257**	
		(−2.10)	
$Alpha^L{}_t \times Q_{1,t}$			1.753***
			(3.47)
$Alpha^L{}_t \times Q_{2,t}$			1.293***
			(3.09)
$Alpha^L{}_t \times Q_{3,t}$			1.774***
			(5.22)
$Alpha^L{}_t \times Q_{4,t}$			0.769
			(1.21)
$Alpha^H{}_t \times Q_{1,t}$			3.111***
			(3.09)
$Alpha^H{}_t \times Q_{2,t}$			2.233**
			(2.05)
$Alpha^H{}_t \times Q_{3,t}$			2.674***
			(3.99)
$Alpha^H{}_t \times Q_{4,t}$			2.350*
			(1.96)
CSR_t	−0.031	−0.062	0.044
	(−0.65)	(−0.99)	(0.60)
Other controls	Yes	Yes	Yes
N	2,464	2,464	4,319
Adj. R^2	0.118	0.125	0.101

This table reports results from regressing fund flows on the following lagged fund characteristics: fund risk-adjusted performance (*Alpha*), fund risk-adjusted performance (*Alpha*) interacted with the fund CSR score, fund risk-adjusted performance (*Alpha*) interacted with CSR quartile dummies, the fund CSR score, flows, volatility, R-square, natural logarithm of the total net assets (TNA), natural logarithm of the number of stocks, expense ratio, turnover ratio, fund age, and the SRI dummy.
Panel A reports the results of the base specifications. Panel B reports additional specifications by splitting the sample between retail and institutional funds, and considering only the top 10 holdings in computing the CSR score. Panel C reports results from estimating Eq. (7) after replacing *Alpha* with high and low-Alpha dummies. All of the specifications in panels B and C include all other control variables (coefficients unreported for brevity). The regressions include time (year) and style dummies. *t*-statistics based on standard errors clustered at the fund level are reported between parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

weaker persistence may signal a difficulty in preventing investors from walking away. We argue that if a fund is more compliant with CSR principles, investors should be less concerned with other factors such as performance or risk, and therefore be more loyal to the fund. As such, we expect a positive relationship between flow persistence and the CSR score.

To test this argument, we regress fund flows on lagged flows, the interaction between lagged fund flows and CSR, and lagged control variables. The results of these estimations are reported in Table 8. The first and second columns of Table 8 show that fund flows exhibit persistence that is significant even when we control for common fund characteristics. The third column shows that the interaction term between flows and CSR is negative but insignificant, indicating that fund CSR has no effect on fund flow persistence.

5.4. Robustness checks: alternative assumptions and model specifications

In this section, we examine the determinants of the fund CSR score (Eq. 4) by using alternative assumptions and model specifications.

Borgers et al. (2015) note that firm size and industry are strongly related to CSR scores. For instance, larger firms have more resources to invest in CSR activities. Since our CSR score may be picking up size and industry effects, we use risk-adjusted performance and control for style dummies in our main analyses. Here, we further address this issue by adjusting CSR scores for size and industry. Each year, we rank firms into market capitalization deciles. Then, for each firm, we compute the size-adjusted CSR score as the difference between the CSR score and the average CSR score of its market capitalization decile. Similarly, we compute the industry-adjusted CSR score as a firm's CSR score minus the average CSR score of its industry peers (defined according to the Fama-French 48 industry classification). Using these firm-level-adjusted CSR scores, we compute fund-level CSR scores as in Eq. (1). The first and second columns of Table 9 employ the size and industry-adjusted CSR fund scores, respectively. Taking into account these adjustments does not alter the CSR-performance relationship, which remains significantly negative.[10]

In column 3, we compute the fund CSR score using the top 10 holdings instead of all fund holdings. We continue to find a negative and significant coefficient on alpha, suggesting that the top 10 holdings are representative of the entire holdings. In column 4, we compute the CSR score using principal component analysis (PCA) applied to the seven qualitative areas' scores. Using this alternative weighting scheme, rather than equally averaging the seven qualitative dimensions, shows very similar results: the performance coefficient remains negative and significant.

Eq. (4) has CSR on the left-hand side and performance on the right-hand side, while Eq. (5) has performance on the left-hand side and CSR on the right-hand side. In column 5, we estimate Eq. (4) jointly with Eq. (5) using a system of equations. The results

[10] These results are not surprising given that the correlation between the unadjusted CSR score and the size-adjusted (industry-adjusted) CSR score is 0.92 (0.96).

Table 8
Fund flow persistence and CSR.

	(1)	(2)	(3)
$Flows_t$	0.164***	0.162***	0.145***
	(6.55)	(5.21)	(4.12)
$Flows_t \times CSR_t$			−0.141
			(−1.40)
CSR_t		0.060	0.082
		(0.98)	(1.24)
$Alpha_t$		1.838***	1.838***
		(6.99)	(6.87)
$Volatility_t$		0.673**	0.660**
		(2.07)	(2.00)
$R\text{-}square_t$		−0.390	−0.415
		(−0.91)	(−0.96)
$Log(TNA_t)$		−0.050***	−0.050***
		(−6.11)	(−6.12)
$Log(Number\ of\ stocks_t)$		−0.013	−0.013
		(−0.78)	(−0.75)
$Expense\ ratio_t$		−8.334**	−8.332**
		(−2.41)	(−2.42)
$Turnover_t$		0.025	0.026
		(1.11)	(1.17)
$Fund\ age_t$		−0.001	−0.001
		(−1.46)	(−1.39)
$SRI\ dummy_t$		0.175	0.192
		(0.96)	(0.96)
Intercept	0.065**	1.111***	1.157***
	(1.98)	(2.80)	(2.88)
N	4,932	4,319	4,319
Adj. R^2	0.056	0.101	0.103

This table reports results from regressing fund flows on the following lagged fund characteristics: flows, flows interacted with the fund CSR score, the fund CSR score, fund risk-adjusted performance (*Alpha*), volatility, R-square, natural logarithm of the total net assets (TNA), natural logarithm of the number of stocks, expense ratio, turnover ratio, fund age, and the SRI dummy. The regressions include time (year) and style dummies. *t*-statistics based on standard errors clustered at the fund level are reported between parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

reveal no noticeable differences compared to those found in the previous columns.

In columns 6 and 7, we split the sample between retail and institutional funds, respectively. The performance coefficient shows no stark differences between the two types of funds. Overall, the results on the determinants of the CSR remain qualitatively similar when we use alternative assumptions and model specifications.

6. Concluding comments

This paper examines the effects of CSR on fund performance and flows. To gauge such effects, extant research has thus far relied on a comparison between SRI and conventional funds. While this approach has the advantage of comparing two distinct fund categories, it comes at the cost of ignoring the amount of heterogeneity within each one. Moreover, the fund categorization itself is still subject to debate, as various screening processes exist and may sometimes provide conflicting fund classifications. Suggesting a continuum approach across all funds, this paper offers a simple holdings-based measure to assess the level of the fund's CSR. The measure is a value-weighted score using firm-level CSR scores of portfolio holdings.

Looking at the determinants of the fund CSR score, we find that CSR is negatively related to risk-adjusted performance, return volatility, R-square, the number of stocks, and the expense ratio. Funds that invest in more socially responsible firms also display smaller market betas; invest in firms with large capitalizations or low book-to-market ratios; and are contrarian.

We then test how CSR impacts fund performance. Our empirical estimations show that the CSR score negatively predicts next year's fund performance. Moreover, we find that this negative relationship is driven mainly by CSR strengths rather than CSR concerns. We next examine performance persistence and find evidence of performance reversal for the entire sample. However, we

Table 9
CSR and fund characteristics: alternative assumptions and model specifications.

	Size-adjusted (1)	Industry-adjusted (2)	Top 10 holdings (3)	PCA (4)	System of equations (5)	Retail (6)	Institutional (7)
$Alpha_t$	−0.186***	−0.799***	−0.697***	−1.633***	−0.284***	−0.608***	−0.592***
	(−4.35)	(−11.36)	(−8.05)	(−10.95)	(−3.20)	(−5.41)	(−4.27)
$Flows_t$	0.002	0.007**	0.008	0.015*	−0.006	0.010	0.001
	(0.67)	(2.00)	(1.39)	(1.85)	(−1.06)	(1.41)	(0.07)
$Volatility_t$	−0.619***	−0.954***	−1.174***	−1.566***	0.352**	−1.273***	−1.217***
	(−6.91)	(−7.04)	(−6.41)	(−5.72)	(2.35)	(−5.73)	(−5.39)
$R\text{-}square_t$	−0.456***	−0.689***	−0.858***	−2.397***	0.070	−0.487*	−0.570**
	(−4.14)	(−4.55)	(−4.68)	(−7.60)	(0.41)	(−1.88)	(−2.07)
$Log(TNA_t)$	−0.004**	−0.004	−0.005	−0.006	−0.005*	−0.003	−0.001
	(−2.15)	(−1.29)	(−1.18)	(−1.07)	(−1.69)	(−0.70)	(−0.12)
$Log(Number\ of\ stocks_t)$	−0.018***	−0.015**	−0.007	−0.011	−0.041***	−0.028**	−0.051***
	(−3.61)	(−1.99)	(−0.73)	(−0.68)	(−5.07)	(−2.04)	(−3.23)
$Expense\ ratio_t$	−2.594***	−4.185***	−4.093**	−5.321**	−5.729***	−1.640	−2.587
	(−2.98)	(−3.55)	(−2.46)	(−2.09)	(−4.39)	(−0.75)	(−1.28)
$Turnover_t$	−0.005	−0.002	0.025***	−0.004	−0.012	−0.009	−0.002
	(−1.20)	(−0.33)	(2.77)	(−0.32)	(−1.55)	(−0.83)	(−0.17)
Fund age	0.000	0.000	0.000	0.001	0.000	−0.000	0.000
	(1.23)	(0.86)	(0.70)	(0.78)	(0.99)	(−0.60)	(0.69)
SRI dummy	0.193***	0.224***	0.224***	0.492***	0.180***	0.197**	0.185*
	(5.37)	(3.72)	(3.75)	(3.83)	(4.51)	(2.40)	(1.71)
Intercept	0.549***	0.737***	0.647***	2.221***	−0.112	0.500**	0.540**
	(5.50)	(5.39)	(3.87)	(7.60)	(−0.70)	(2.16)	(2.23)
N	6,687	6,686	7,395	6,681	2,460	2,517	1,915
Adj. R^2	0.285	0.579	0.369	0.594	0.4690	0.469	0.499

This table reports results from regressing the fund CSR score on fund characteristics. In column 1, the dependent variable is the size-adjusted CSR score. In column 2, the dependent variable is the industry-adjusted CSR score. In column 3, the dependent variable is the CSR score of the top 10 holdings. In column 4, the dependent variable is the first principal component of the seven qualitative areas' scores. In column 5, the CSR regression (Eq. (4)) is estimated jointly with the performance regression (Eq. (5)). In columns 6 and 7, the sample is split into retail and institutional, respectively. The regressions include time (year) and style dummies. *t*-statistics based on standard errors are clustered at the fund level and are reported between parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

find that funds with a high CSR score exhibit performance persistence relative to funds with a low CSR score. With relatively poor and persistent performance, high-CSR funds may struggle to attract performance-chasing investors.

Additionally, consistent with the idea that an increase in fund CSR attracts social investors and repels performance-chasing investors, we find that the flow-performance relationship becomes weaker as the level of fund CSR increases. Therefore, high-CSR funds are likely to attract investors that are less sensitive to performance. Finally, we find that the effect of fund CSR on flows' persistence is statistically insignificant. Therefore, the level of fund CSR does not seem to affect the loyalty of fund investors.

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Appendix. Variable definitions

Variable	*Definition*
CSR	CSR score of the fund computed as $CSR_{j,t} = \sum_{i=1}^{N_{j,t}} \omega_{i,j,t} \times CSR_{i,t}$, where $\omega_{i,j,t}$ is the weight of stock i in fund j at the end of year t; $N_{j,t}$ is the number of stocks held by fund j at the end of year t; and $CSR_{i,t}$ is the CSR score of stock i at the end of year t.
Return	Fund annual raw return.
Alpha	Fund annual risk-adjusted fund return is the estimate of the parameter α in Carhart's (1997) model (Eq. (2)).
Flows	Annual fund flows computed as $\frac{TNA_{j,t} - TNA_{j,t-1}(1+R_{j,t})}{TNA_{j,t-1}}$, where $TNA_{j,t}$ and $TNA_{j,t-1}$ are the total net assets for fund j at the end of years t and t-1, respectively, and $R_{j,t}$ is the return of fund j in year t.
R-square	$R-square_{j,t}$ is the R^2 estimated from Carhart's (1997) model (Eq. (2)).
TNA	Total net assets in millions of dollars.
Volatility	Annualized fund return volatility.
Number of stocks	Number of stocks included in the fund portfolio.
Expense ratio	Ratio of total net assets that shareholders pay for the fund's operating expenses, which include 12b-1 fees.
Turnover	Minimum of aggregated sales or aggregated purchases of securities, divided by the average 12-month total net assets of the fund.
Fund age	Age of the fund in years since its inception.
SRI dummy	Dummy equal to 1 if the fund is an SRI fund, and 0 otherwise.
β_{MKT}, β_{SMB}, β_{HML}, β_{UMD}	Carhart's (1997) model factor loadings on the market, small minus big, high minus low, and momentum, respectively.
Q_1, Q_2, Q_3, Q_4	Dummy variables for each of the four quartiles of funds sorted on CSR score.

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