Factors influencing SRI fund performance

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Abstract

Purpose – The purpose of this paper is to examine socially responsible investment (SRI) fund performance and investigate the factors influencing fund performance.

Design/methodology/approach – The study uses return data from the Morningstar database for 152 SRI funds from January 1995 to May 2015. The initial analysis includes the use of various risk-adjusted performance measures, including Sharpe ratio, Treynor ratio, Information ratio, Sortino ratio and M^2. The study also uses four factor models, including Jensen single-factor model, Fama–French three-factor model, Carhart four-factor model and Fama–French five-factor model to explain SRI fund returns. Finally, a cross-sectional regression analysis is applied to investigate the determinants of SRI fund returns.

Findings – The results show that, on average, the SRI funds provide comparable risk-adjusted returns relative to various benchmark market indices. Market factor is significant in explaining SRI fund returns. Examining each factor model, the results do not support Fama–French's three-factor model as neither size nor value factor is significant. The author finds weak support for Carhart's momentum factor along with the market factor. Finally, the Fama–French five-factor model shows market, size and operating profit factors explain SRI fund returns. The study also finds the fund performance is stronger for funds with the higher turnover ratio, the larger fund size and more managerial experience and lower for funds with higher expense ratio. Also, funds formed with negative screening perform better than positive or mixed screened funds.

Originality/value – SRI funds have received considerable attention from investors. This study contributes to the literature by examining SRI fund performance and investigating factors influencing their performance using multiple factor models and cross-sectional regression analysis. The findings are relevant for investors who demand responsible investment opportunities without sacrificing returns for nonfinancial screenings. Findings also suggest that investors should consider fund characteristics when selecting SRI funds.

Keywords Factor models, SRI funds, Responsible investment

Paper type Research paper

1. Introduction

The socially responsible investment (SRI) fund performance has received the attention of both academicians and practitioners. The awareness for the social issues influencing living conditions has increased the popularity of social and ethical investments during the last few decades. The total net assets of SRI funds reached $12 trillion in 2018 (www.ussif.org).

Social investing reflects investor concerns on human rights abuses, environmental deprivation and mistreatment of workers, among others. We define socially responsible investing as applying nonfinancial screening to a universe of investment alternatives to detect investment opportunities. For example, Kinder and Domini (1997) define social screen as expressing an investor's social, ethical or religious concern in a form that allows an investment manager to apply it in the investment decision making with other screens. Schueth (2003) describes socially responsible investing as the method of integrating personal values and communal concerns into investment decision making.

JEL Classification — G10, G11, G12, G19

SRI selection process may involve both negative and positive or mixed investment screens; most fund managers use negative screening that involves excluding certain sets of stocks or industries from SRI portfolios based on social, environmental and ethical criteria. For example, gambling, alcohol and tobacco are the most common restrictions used by SRI investors. Positive screening emphasizes the constructive characteristics of investments. For example, it often uses a firm's sensitivity to the environment, community participation, diversity and employee relations. So, fund managers contemplate several criteria in creating their portfolios as the demands for SRI funds have amplified.

The question of the compatibility of the shareholder wealth maximization with the socially responsible behavior that society requires from the firm has been questioned. Based on finance theory, the primary goal of the firm is to maximize the shareholders' wealth, measured by stock prices. Perhaps firms using their scarce resources to develop a desirable environment without adversely affecting shareholder value may not be possible. Any funds used for this purpose are likely to increase costs and thus reduce firm profits. Some (i.e. Schueth, 2003) note that investments in social and environmental issues help first to improve firm efficiency and provide opportunities to expand to new markets. In the same vein of the argument, several researchers question whether SRI funds perform at the levels comparable to traditional investment funds. Some researchers question whether investors give up returns for the sake of ideology when they invest in SRI funds. Because an SRI does not guarantee good returns to investors. A related issue is whether active portfolio managers investing in socially responsible firms can produce superior performance. For example, Jarrow (2010) contends that persistent and regular arbitrage opportunities are sporadic and achieving positive αs or excess returns are difficult while Lin *et al.* (2009) note that skilled managers can achieve higher αs without additional risk.

This study examines both the SRI fund performance and factors influencing their performance using fund specific, market and style factors. The study adds to the existing body of SRI literature in the following ways: first, the sample size in this study is larger than those of previous studies with an extended period. Second, it provides additional evidence on SRI fund performance using four risk-adjusted return measures and compares SRI fund performance with multiple benchmark indices. Third, besides Jensen's single-factor model, it uses the Fama–French three-factor, Carhart four-factor and Fama–French five-factor models to bring additional insights to SRI fund performance through factor analysis. Finally, it provides a cross-sectional regression analysis of fund performance using various fund characteristics, screening criteria and fund types to explore the determinants of SRI fund performance.

The findings show that while the overall unadjusted annual geometric returns for SRI funds are lower than many of the benchmarks used, SRI funds provide comparable risk-adjusted returns using various measures including Sharpe and Sortino ratios. The results of the factor analysis of SRI funds show that market factor explains funds returns across all factor models. We find support for momentum proposed by Carhart's four-factor model and for size and profitability factors proposed by the Fama–French five-factor model. Finally, the cross-sectional regression results using fund characteristics show older funds, funds with more frequent trading, funds with longer-tenured managers, and larger funds perform better on average. We find that fund performance is inversely related to expense ratios. Concerning the screening procedure, we find that negative screened funds provide a higher return than other screenings and global-oriented funds perform worse than Domestic Equity funds.

The study is organized as follows. Section 2 provides the literature review. Section 3 describes the sample selection and method used. Section 4 reports the empirical findings. The final section provides a summary and concludes the study.

2. Literature review

Empirical studies on SRI fund performance focus on the returns of SRI indices and SRI funds. Earlier studies (Sauer, 1997; Guerard, 1997; Konar and Cohen, 2001; Statman, 2006; Adler and Kritzman, 2008, Mallett and Michelson, 2010, among others) cannot provide convincing evidence about the advantage of socially responsible investing. Among the studies investigating SRI index performance, Grossman and Sharpe (1986), Hutton *et al.* (1998), Luck and Pilotte (1993), Diltz (1995) and Heyes (2005) report that SRI indices perform better than conventional indices. Lyn and Zychowicz (2010), using the Sharpe and Treynor measures, report that faith-based funds perform better than other socially responsible funds. Schröder (2004) also supports these studies showing that most of the German, Swiss and US SRI funds provide at least comparable returns relative to their benchmarks. Among international studies, Luther *et al.* (1992) and Mallin *et al.* (1995) also support the view that on a risk-adjusted basis ethical trusts outperform the other trusts.

Several other studies report no substantial variations in SRI and conventional portfolio returns. Among them, Corson and Van Dyck (1992), Guerard (1997) and Kurtz (1997) report no significant differences between returns of socially screened and unscreened portfolios. Blanchett (2010) reaches a mixed conclusion on SRI fund performance relative to non-SRI counterparts. The findings show that while SRI funds provide lower unadjusted returns relative to non-SRI funds, their risk-adjusted performance is higher than non-SRI funds. There are also several studies in non-US settings, reporting no significant differences between SRI and conventional funds. Among them, Luther and Matatko (1994) and Gregory *et al.* (1997) for UK and Tippet (2001) for Australia and Kreander *et al.* (2005) for Europe find no difference between ethical and other funds on their performance. Mallett and Michelson (2010) report that risk-adjusted returns between green and conventional funds are not significant.

The performance studies are not limited to analyzing the performances of SRI indices. There are also several studies examining individual SRI fund performance. Among earlier studies, Hamilton *et al.* (1993) using 32 socially responsible mutual funds report that relative to a conventional benchmark, social responsibility factors do not affect returns or cost of capital. Statman (2000) also reports no significant differences between socially responsible funds and conventional funds, although the difference appears to be significant for the funds with similar asset size. Sauer (1997) notes that using social responsibility screens does not influence investment performance negatively.

Conversely, Fowler and Hope (2007) find that the returns of SRI vehicles have either underperformed or failed to outperform, compared with market indices. Like the previous study, Fowler and Hope (2007) also report that SRI screens for equities do not lead to a significant performance difference compared to traditional investments. While it may seem, the screening should lead to a decline in the risk-adjusted return; the empirical results do not support the underperformance of screened investment for SRI funds.

Another group of researchers focuses on how fund characteristics influence fund performance. For example, Gil-bazo *et al.* (2010) examine the impact of fees on fund performance. Their findings show that SRI funds earn superior risk-adjusted performance relative to similar conventional funds both before and after fees basis, suggesting that fund characteristic should be considered when selecting SRI funds. Similarly, Bauer *et al.* (2005) apply Carhart (1997) model to control for investment style and find little evidence of significant differences in risk-adjusted returns between ethical and conventional funds. They further provide evidence on learning the effect of these funds. While older ethical funds seem to catch up with conventional funds, younger ethical funds continue to underperform both the index and peers.

More recently, Belghitar *et al.* (2017) and Nakai *et al.* (2016) study the SRI fund performance during the global financial crises. Belghitar *et al.* (2017) report that the SRI

funds perform better in pre- and post-financial crisis while Nakai *et al.* (2016) find that SRI funds coped better with the pressure created by the failure of financial institutions than conventional funds did. Finally, Kiymaz (2019) also provides mixed evidence on SRI fund performance relative to various benchmarks and reports significant differences among the performance of various fund types, including fixed income SRI funds offering the best risk-adjusted returns while global SRI funds performing the worst in the sample.

Overall, the existing studies on the performance of the SRI funds provide mixed evidence. While many studies report weak evidence of a difference in risk-adjusted returns between SRI and conventional funds, other studies provide supporting evidence favoring the inclusion of social investing a portfolio as these funds can be a valuable source of risk reduction, even for investors who are not driven by social values. On the flip side, there is a significant cost associated with SRI. This research aims to provide more evidence on the performance of SRI funds and investigate the factors that influence SRI fund performance.

3. Data and methodology

3.1 Data

The initial sample of SRI funds comprised 202 funds that we identified from the Social Investment Forum and SocialFunds.com. Table I reports the sample selection process. We removed the funds with fewer than 12 months of observation, leading the final sample of 152 SRI funds. About half of these funds were classified as Domestic Equity funds (67 funds), followed by Institutional funds (34 funds) and Global funds (20 funds) in the sample. The sample also included Balanced funds (17 funds) and Fixed Income (14 funds). We identify the reported benchmark index for each fund. These indices include the S&P 500 Index, Russell 2000 Index, Russell 1000 Index, Barclays US Aggregate Bond Index and MSCI World Index. We get the monthly return data for SRI funds and indices from the Morningstar database from January 1995 to May 2015.

Table II reports various fund characteristics and portfolio holdings for SRI funds. These characteristics include turnover ratio, expense ratio, loads, net assets, redemption fee, manager tenure age and Morningstar overall rating. For example, the mean expense ratio is 1.19 percent that is comparable with the industry trend of lower cost funds. The net assets under management have an average value of $302.72m while average manager tenure is about eight years. Portfolio holdings are equity (78.19 percent) and followed by bond holdings (16.97 percent). The average price to book value is 2.27, and the average price to earnings ratio is 16.46.

Table III provides summary statistics (annualized geometric mean return, annualized standard deviation, average monthly return, highest and lowest return, skewness and

	Initial sample	Funds with missing data or less than 12 months of data	Net sample	% of the total
Domestic				
Equity	96	29	67	44
Global	30	10	20	13
Balanced	18	1	17	11
Fixed Income	17	3	14	9
Institutional	41	7	34	22
Total	202	50	152	100

Notes: This table reports how filters used to get the final sample 152 SRI funds and sub-classification of SRI funds. The sample includes funds with data available in Morningstar as of May 2015. Study period spans from January 1995 to May 2015
Sources: Social Investment Forum, SocialFunds.com and Morningstar

Table I.
Sample selection

	Mean	Median	SD
Fund characteristics			
Turnover (%)	60.22	40.00	58.01
Expense ratio (%)	1.19	1.13	0.54
Front load (%)	1.04	0.00	2.03
Load (%)	0.25	0.25	0.32
Net assets (millions)	302.72	99.25	786.37
Redemption fee	0.36	0.00	0.76
Manager tenure	7.91	7.00	5.53
Age (days)	4,951.42	3,756.00	2,736.18
Morningstar overall star rating	2.82	3.00	0.92
Portfolio holdings			
Equity holdings (%)	78.19	95.67	34.42
Bond holdings (%)	16.97	0.00	32.79
Cash holdings (%)	3.66	2.38	6.03
Other holdings (%)	1.13	0.27	2.82
Other characteristics			
Price/book ratio	2.27	2.40	1.08
Price/earnings ratio	16.46	17.80	6.33
Market capitalization ($ millions)	28,868.32	28,410.50	25,767.71

Table II.
Summary fund
characteristics

Notes: This table reports the summary statistics for various fund characteristics, portfolio holdings and other characteristics of SRI funds. We compute these statistics as of May 2015

	Annual geometric mean return (%)	Annualized SD (%)	Average monthly return (%)	Highest monthly return (%)	Lowest monthly return (%)	Skewness	Kurtosis
Mean	6.62	14.78	0.64	11.91	−16.31	−0.69	2.65
Minimum	−11.15	2.17	−0.51	1.47	−38.58	−3.21	0.22
Maximum	24.48	32.49	1.97	31.31	−1.51	0.54	24.30
First quartile	4.34	11.28	0.41	9.11	−20.01	−0.88	1.13
Median	6.13	15.78	0.60	12.37	−17.54	−0.67	2.09
Third quartile	8.21	18.12	0.77	14.09	−12.78	−0.40	3.11

Table III.
Descriptive statistics
of SRI funds

Notes: This table reports the descriptive statistics of SRI funds. The sample includes 152 SRI funds during the sample period of January 1995 to May 2015

kurtosis) for SRI funds. The average annualized geometric returns for 152 funds during the study period is 6.62 percent. The best performing fund has an average annual return of 24.48 percent while the worst performing fund experiences an average annual return of −11.15 percent. These funds have an annualized standard deviation of 14.78 percent. The data are negatively skewed, showing that the mean is less than the median and earn extreme negative returns. Finally, most funds are also leptokurtic showing values lying around the mean and thicker tails, meaning a high probability for extreme values for SRI funds.

Besides the data on the SRI funds, we get the monthly returns on various benchmarks, including S&P 500 Index, Russell 2000 Index, Russell 1000 Index, Barclay's US Aggregate Bond Index and MSCI World Index. We downloaded factors for Fama and French (1993, 2015) and Carhart (1997) factor models from the data library of Kenneth R. French.

3.2 Methodology

To evaluate the SRI performance, we compute several risk-adjusted measures against the benchmark used. First, we estimated the Sharpe reward to risk measure which estimates the ratio of the average return to the standard deviation of the fund return using the following equation. So, given comparable portfolios, the larger the Sharpe ratio, the better off the investor is:

$$\text{Sharpe} = \frac{Ri - Rf}{\sigma i} \tag{1}$$

where R_i is the annualized average return on the fund; R_f the annualized risk-free rate proxies for 30-days US treasury bill rate; and σ the annualized standard deviation of fund returns.

Second, we compute the Treynor ratio that considers the β of the fund concerning its benchmark as the risk measure (Treynor and Black, 1973):

$$\text{Treynor} = \frac{R_i - R_f}{\beta_i}, \tag{2}$$

where β_i is the β of the fund. As the Treynor ratio uses β as its measure of risk, it considers the systematic risk of the series, not the total risk. We also refer this ratio to as the reward-to-volatility ratio.

The third measure for assessing fund performance is the Information ratio that is defined as:

$$\text{Information ratio} = \frac{R_i - R_b}{\sigma_{er}}, \tag{3}$$

where R_i is the average return of a fund for the specific period; R_b the average return for the benchmark portfolio during the period; and σ_{er} the standard deviation of the excess return of the fund. We use this ratio for evaluating managerial skill.

Additional risk measures used include Sortino ratio and M^2. Sortino ratio focuses on the downside risk concerning a minimum acceptable rate of return that is assumed to be the risk-free rate in this study. M^2 is obtained by multiplying the Sharpe ratio with the annualized benchmark return and adding the risk-free rate to get a unit free version of a Sharpe ratio.

Finally, we estimate SRI fund performance using four different factor models. First, we measure Jensen (1968) single-market model that is based on the capital asset pricing model (CAPM). Jensen's α is the difference between a fund's average rate of return and its expected position on the security market line given his risk level. If a fund has positive Jensen's α, it is above the security market line and is, therefore, outperforming what the CAPM would predict. We run the following regression:

$$R_{it} - R_{ft} = \alpha_i + \beta_i (R_{mt} - R_{ft}) + \varepsilon_{it}, \tag{4}$$

where R_{it} is the return on fund i in month t; α_i the Jensen's α; β_i the fund's systematic risk; R_{ft} the risk-free rate in month t; R_{mt} a return on benchmark portfolio in month t; and ε_{it} the random error term.

Second, we estimate Fama and French's (1993) model using the following equation:

$$R_{it} - R_{ft} = \alpha_i + \beta_{mkt} (R_{mt} - R_{ft}) + \beta_{\text{HML}} \text{HML}_t + \beta_{\text{SMB}} \text{SMB}_t + \varepsilon_{it}. \tag{5}$$

We refer the intercept in this model to as the three-factor α. HML_t and SMB_t are the size and value (book-to-market) factors in month t.

Third, we use Carhart's (1997) four-factor model:

$$R_{it}-R_{ft} = \alpha_i + \beta_{mkt}\left(R_{mt}-R_{ft}\right) + \beta_{\text{HML}}\text{HML}_t + \beta_{\text{SMB}}\text{SMB}_t + \beta_{\text{UMD}}\text{UMD}_t + \varepsilon_{it}. \quad (6)$$

We refer the intercept in this model to as the four-factor α. UMD is a zero-cost portfolio that is long in previous 12-month winner stocks and short (momentum) in previous 12-month loser stocks.

Finally, Fama and French's (2015) five-factor model is estimated using the following equation. This model adds investment and profitability in the Fama–French three-factor model:

$$R_{it}-R_{ft} = \alpha_i + \beta_{mkt}\left(R_{mt}-R_{ft}\right) + \beta_{\text{HML}}\text{HML}_t + \beta_{\text{SMB}}\text{SMB}_t$$

$$+ \beta_{\text{RMV}}\text{RMV}_t + \beta_{\text{CMA}}\text{CMA}_t + \varepsilon_{it}. \quad (7)$$

The intercept in this model is the five-factor α. Robust minus weak (RMW-operating profits) is the average return on the two robust operating portfolios minus the average return on the two weak-operating portfolios. Conservative minus aggressive (CMA-investments) is the average return on the two conservative investment portfolios minus the average return on the two aggressive investment portfolios.

We also run a cross-sectional regression model using the following equation to explain the fund performance:

$$\text{FundPerformance}_i = \alpha + \beta_1\text{Age} + \beta_2\text{N.Asset} + \beta_3\text{Turnover} + \beta_4\text{Tenure}$$

$$+ \beta_5\text{Load} + \beta_6\text{Redemp} + \beta_7\text{ExpenseRatio} + \beta_8\text{PBratio}$$

$$+ \beta_9\text{PEratio} + \beta_{10}\text{SreenDummy} + \beta_{11}\text{TypeDummy} + \varepsilon. \quad (8)$$

The Sharpe ratio is selected as a proxy for fund performance and got from computing Equation (1) for each fund. Among independent variables, Age represents the age of fund in days in logarithmic form. Net Asset is in millions of dollars and represents the fund's total asset base, net of fees and expenses, in logarithmic form. Turnover denotes turnover ratio, a measure of trading activity computed by purchases or sales divided by average monthly net assets. It shows how often a fund manager sells all the stocks in the mutual fund in a year. A high turnover ratio represents a frequent trading strategy while a low turnover ratio reflects a buy-and-hold strategy. Tenure represents managers' tenure with the fund in logarithmic form. Load is fund's back-end deferred sales charge an investor pays when withdrawing money from an investment, which is common in mutual funds and annuities designed to discourage withdrawals. Redemp is an amount charged when money is withdrawn from a fund. This fee goes back into the fund itself and does not represent a net cost to shareholders. Redemption fees are imposed to discourage market-timers, whose quick movements into and out of funds can be disruptive. Expense Ratio is the annual fee that funds charge their shareholders. This is the percentage of fund assets paid for operating expenses and management fees. NegScreen is a dummy variable taking a value of 1 if they screen a fund for negative characteristics (i.e. tobacco, weapons, firearms) and 0 otherwise. MixScreen is a dummy variable taking a value of 1 if a fund is screened for a combination of environment-, social- or governance-related characteristics and 0 otherwise. Equity, Balanced, Fixed Income, Global and Institutional are dummy variables representing various fund types. This variable takes the value of 1 if a fund is classified within its group and 0 otherwise. To avoid the dummy variable trap, Equity group is designated as a control group, and we interpret the results relative to the control group.

4. Empirical results

4.1 Performance of SRI funds

This section reports the empirical findings. Table IV provides the risk-adjusted performance measures of SRI fund. While Panel A reports four risk-adjusted performance measures for the entire sample, Panel B contains the same measures for benchmark market indices. In sample performance, the mean Sharpe ratio, Treynor ratio and Jensen's α of 152 SRI funds are 0.145, 0.607 and −0.007, respectively. While the Sharpe ratio ranges from a high value of 0.492 and a low value of −0.066, Jensen's α has a maximum value of 0.660 and a minimum value of −1.230. Panel B reports performance of benchmark market indices, including annual geometric mean returns, annualized standard deviation, Sharpe ratio and Sortino ratio. When we compare the risk-adjusted performance of SRI fund with those of various market indices, we find mixed performance. For example, the SRI funds appear to provide comparable risk-adjusted returns relative to the S&P 500 index as both have similar Sharpe ratios of 0.145 and 0.153, respectively. The mean Sharpe ratio for SRI funds is higher than those of Russell 2000 and MSCI World indices, with values of 0.127 and 0.061, respectively, while it is lower than Barclays US Aggregate Bond and Russell 1000 indices that have Sharpe ratios of 0.280 and 0.155, respectively.

Panel C of Table IV reports the performance of SRI funds using various fund categories. Among them, Domestic Equity category provides the highest annual geometric mean return of 8.37 percent, while Global category has the lowest annual geometric mean return of 3.51 percent. The panel also reports the annualized standard deviation for each category. Global category has the highest standard deviation while the fixed income category experiences the lowest standard deviation. The panel further delivers various risk-adjusted-risk measures, including the Sharpe

Panel A: SRI funds (n = 152)

	Sharpe ratio	Treynor ratio (%)	Jensen's α (%)	Information ratio	Sortino ratio	M^2 (%)
Mean	0.145	0.607	−0.007	−0.059	0.295	0.606
Minimum	−0.066	−0.554	−1.230	−0.392	−0.074	−0.370
Maximum	0.492	1.824	0.660	0.210	1.009	1.660
First quartile	0.094	0.359	−0.120	−0.143	0.159	0.403
Median	0.121	0.581	−0.020	−0.065	0.227	0.625
Third quartile	0.176	0.745	0.090	0.015	0.328	0.800

Panel B: performance of benchmark indices

	Annual geometric mean return (%)	Annualized SD (%)	Sharpe ratio	Sortino ratio
S&P 500	9.81	16.67	0.153	0.300
Russell 2000	9.64	21.98	0.127	0.243
Russell 1000	10.02	16.90	0.155	0.301
Barclays US AggBond	6.13	3.76	0.279	0.985
MSCI World	2.44	22.36	0.061	0.088

Panel C: performance by fund categories

	Annual geometric return (%)	Annualized SD (%)	Sharpe ratio	Treynor ratio (%)	Jensen's α (%)	Information ratio
Domestic Equity	8.37	18.24	0.151	0.755	0.024	−0.047
Global	3.51	20.56	0.084	0.488	−0.061	−0.025
Balanced	5.69	11.40	0.121	0.486	−0.081	−0.184
Fixed Income	4.84	4.37	0.224	0.327	0.003	−0.086
Institutional	6.34	15.92	0.152	0.570	0.000	−0.030

Note: This table reports risk-adjusted performance measures computed for 152 SRI funds and benchmark indices during the sample period of January 1995–May 2015

Table IV.
Risk-adjusted performance measures of SRI funds and their benchmarks

ratio, Treynor ratio, Jensen's α and Information ratio. For example, the Fixed Income category has the highest risk-adjusted return with a Sharpe ratio of 0.224, followed by distance second place Sharpe ratios of 0.152 and 0.151 for Institutional and Domestic Equity category, respectively. Using the Treynor ratio, Domestic Equity and Institutional categories provide the highest risk-adjusted returns. Finally, based on Jensen's α, Domestic Equity category has the highest excess returns of 0.024 percent, while the Balanced category has the lowest excess return of −0.081 percent.

Overall, our findings show mixed performance results for SRI funds that provide comparable risk-adjusted fund returns relative to the benchmark market indices. While SRI funds outperformed both Russell 2000 and MSCI World index, they underperformed S&P 500, Barclays US Aggregate Bond and Russell 1000 indices during the study period.

4.2 Factor models and performance of SRI funds

Table V reports empirical results corresponding to the multifactor regressions formulated by using Jensen's single-factor, Fama–French's three-factor, Carhart's four-factor and Fama–French five-factor models. Dependent variable includes 66 equity SRI funds. The adjusted R^2 ranges from 0.9715 to 0.9761 as we move from a single-factor to the five-factor model. For all models, we find market factor significant at 1 percent level. Examining each model, we note that for Jensen's single-factor and Fama–French's three-factor models, only the market factor is significant at 1 percent level. Other two factors (HML-value and SMB-size) are positive but insignificant. In applying Carhart's four-factor model, we find that momentum factor (a zero-cost portfolio that is long previous 12-month return winners and short previous 12-month loser stocks) is also significant in explaining SRI returns. Finally, the Fama–French five-factor model show that besides market factor, SMB-size factor (the average return on the nine small stock portfolios minus the average return on the nine large stock portfolios) and RMV-operating profit factor (RMW – the average return on the two robust operating portfolios minus the average return on the two weak-operating portfolios) are significant at 1 percent level explaining SRI fund returns. Using the Fama–French five-factor model, we find that the coefficient of HML-value (the average return on the two value portfolios minus the average return on the two growth portfolios) and CMA-investment (CMA – the average return on the two conservative investment portfolios minus the average return on the two aggressive investment portfolios) are not related to SRI fund returns for our sample.

	Jensen single-factor model	Fama–French three-factor model	Carhart four-factor model	Fama–French five-factor model
α	−0.0009 (−1.39)	−0.0011 (−1.99**)	−0.0009 (1.49)	−0.0013 (−2.57**)
β_{MKT}	0.9722 (54.5***)	0.9712 (84.0***)	0.9589 (62.2***)	0.9812 (64.2***)
β_{HML} (Value)	–	0.0612 (1.51)	0.0514 (1.48)	0.0417 (1.01)
β_{SMB} (Size)	–	0.0578 (1.44)	0.0627 (1.63)	0.0949 (2.48***)
β_{UMD} (Momentum)	–	–	−0.0296 (−1.74*)	–
β_{RMV} (Profitability)	–	–	–	0.0803 (3.07***)
β_{CMA} (Investment)	–	–	–	−0.0353 (−1.03)
R^2	0.9715	0.9741	0.9752	0.9761
Adj R^2	0.9713	0.9738	0.9748	0.9756
F-stat	8,272***	3,024***	2,359***	1,950***

Notes: This table reports empirical results corresponding to the multifactor regressions formulated by Equations (4) through (7), representing Jensen single-factor, Fama–French three-factor, Carhart four-factor and Fama–French five-factor models. The dependent variable is the equally weighted average of 66 equity SRI fund returns. *,*****Show statistical significant at 10, 5 and 1 percent levels, respectively

Table V.
Multifactor regression results

4.3 Cross-sectional regression of SRI funds

We report the cross-sectional regression analysis results in Tables VI and VII. Table VI summarizes correlation coefficients of independent variables used in our analysis. The findings show that all correlation coefficients are below an acceptable range of 0.7, suggesting that multicollinearity is not a problem to influence interpretations of our results. Table VII reports the regression analysis results using four different models. We use the Sharpe ratio as the dependent variable representing fund performance. Each model adds a new group of independent variables into the analysis. First, we investigate the impact of fund characteristics, including age, net asset, turnover, management tenure, load, redemption and expense on the fund performance. Then we add a set of market-related variables and two screening variables into our analysis. The third model includes our

	N. asset	Turnover	Tenure	Load	Redemp	Expense ratio	PB ratio	PE ratio
Age	−0.23	0.00	−0.08	0.03	−0.01	−0.03	−0.20	−0.09
N. asset	1	−0.20	0.15	−0.37	−0.10	−0.45	0.13	−0.04
Turnover		1	−0.06	0.03	0.08	0.31	−0.34	−0.10
Tenure			1	0.05	−0.02	0.15	0.22	0.26
Load				1	−0.12	0.68	−0.02	−0.09
Redemp					1	0.03	0.09	0.10
Expense ratio						1	−0.21	0.03
PB ratio							1	0.44
PE ratio								1

Note: This table provides correlation coefficients of independent variables used to analyze the performance of SRI funds

Table VI.
Correlation coefficient
of regression variables

	Model 1	Model 2	Model 3	Model 4
Constant	0.0091 (0.21)	−0.0660 (−1.11)	0.0927 (3.88)***	−0.0251 (−0.39)
Age	4.8035 (2.00**)	5.9523 (2.41**)	−	6.7824 (2.43**)
Net Asset	0.0166 (3.31***)	0.0148 (3.59***)	−	0.0161 (3.38***)
Turnover	0.0311 (1.72*)	0.0653 (3.98***)	−	0.0572 (3.52***)
Tenure	0.0235 (2.78**)	0.0235 (2.82**)	−	0.0203 (2.34**)
Load	0.1054 (3.12***)	0.0624 (2.07**)	−	0.0467 (1.44)
Redemp	0.0174 (2.32**)	0.0084 (1.03)	−	0.0072 (0.88)
Expense ratio	−0.0785 (−2.99***)	−0.0503 (−2.18**)	−	−0.0337 (−1.26)
PE ratio	−	−0.0057 (−2.04**)	−	−0.0067 (2.36**)
PB ratio	−	0.0571 (4.52***)	−	0.0466 (4.00***)
PosScreen	−		−	−
NegScreen		0.0194 (0.97)	0.0655 (1.86*)	0.0156 (0.84)
MixScreen		−0.0194 (−1.46)	0.0182 (0.89)	−0.0144 (1.03)
Equity	−	−	−	−
Balanced	−	−	−	−0.0097 (−0.74)
Fixed Income	−	−	−	−0.0540 (−1.45)
Global	−	−	−	−0.0496 (−1.88*)
Institutional	−	−	−	−0.0193 (−1.02)
R^2	0.3543	0.3451	0.0733	0.4971
Adj R^2	0.3187	0.2998	0.592	0.4337
F-statistic	9.95***	7.61***	5.22***	7.84***

Notes: This table reports the cross-sectional regression results. We use the Sharpe ratio as the dependent variable. Independent variables include fund related variables, market variables, screening types and fund sub-group dummy variables. *,**,***Show statistical significant at 10, 5 and 1 percent levels, respectively

Table VII.
Cross-sectional
regression results

screening variables only, and the final models include all independent variables and controls for the fund types, including Equity, Balanced, Global, Fixed Income and Institutional funds. We use equity fund as a control group to avoid the dummy variable trap in our analysis. The adjusted R^2 ranges from 0.31 to 0.59. F-statistics for all models is significant at 1 percent level. The first model, the first-column, uses fund-specific variables as independent variables. Among them, NetAsset, Load and ExpRatio variables have coefficients of 0.0166, 0.1054 and −0.0785, respectively. They are all statistically significant at 1 percent level. SRI fund performance is directly related to the size of the fund and the deferred load that is back-end sales charges imposed when investors redeem shares. Similarly, the expense ratio, the percentage of fund assets paid for operating expenses and management fees, is inversely related to the fund performance.

Funds with lower expense ratios perform better than funds with higher expense ratios. For example, the coefficient of this variable in the first regression is −0.0785, suggesting that a 10 percent increase in a fund's expense ratio is associated with a 0.785 percent decline in fund performance. Age, Tenure and Redemp variables are statistically significant at the 10 percent level and are positively related to fund performance. These findings show that older funds and funds with experienced managers provide higher returns to investors. We also find Turnover weakly significant and directly related to fund performance. Funds with a higher percentage of the portfolio's holdings that have changed over the past year (a frequent trading strategy) perform better than those of lower ratios (buy-hold strategy).

Model 2 adds a set of market-related variables and two screening variables into our analysis. With the exemption of the Redemp variable, all variables in the previous model continue to be statistically significant in Model 2. While PE ratio variable has a statistically significant coefficient of −0.0057, PB variable is positive with a weakly significant coefficient of 0.0571. Both negative and mixed screening dummy variables are insignificant. The third model includes our screening variables only. By excluding positive screening, we can test the impact of negative and mixed screening on fund performance relative to positive screening. The NegScreen variable has a statistically positive coefficient of 0.0655, showing that negatively screened SRI funds perform better than positively screened ones. The MixScreen variable also has a positive coefficient but it not statistically significant.

The last model adds the fund type dummy variables into the analysis, including Equity, Balanced, Global, Fixed Income and Institutional funds. We use Equity fund group as the control group to avoid the dummy variable trap. We find that Global funds underperform Equity funds significantly while we find no significant differences for other subgroups.

Overall, the regression analysis shows that fund-specific variables are important in determining SRI fund performance. We find that older fund with longer-tenured managers performs better than others. Larger funds, measured with the net asset size, perform better than smaller ones. Funds with a higher turnover ratio, showing a more frequent trading strategy, provide higher returns than funds with lower turnover ratios, a buy-and-hold strategy. We associate a higher expense ratio with lower fund performance. We also find that funds using negative screening strategy appear to provide a higher fund return.

5. Conclusions
This study analyzes SRI funds during January 1995 and May 2015 period using a sample of 152 SRI funds. On average, SRI funds appear to be providing comparable returns relative to benchmark market returns, leading us to conclude mixed evidence regarding their performance.

The study further provides evidence on the use of various factor models to explain the fund performance. We apply the multifactor regressions formulated by using Jensen single-factor, Fama–French three-factor, Carhart four-factor and Fama–French five-factor models. Across these models, the market factor significant in explaining SRI fund returns. When we examine each model, we note that the results do not support Fama–French's three-factor models as either HML-value or SMB-size factors impact SRI fund returns. We find weak support for Carhart UMD (momentum) factor. Finally, the Fama–French five-factor model results show that besides the market, size and operating profit variables can explain SRI fund returns for the sample.

Finally, the cross-sectional regression results show a positive relation between the fund performance and age of fund, turnover ratio, net asset size and manager tenure. Also, funds with lower expense ratio perform better than funds with higher expense ratio. Funds with negative screening perform better than positive or mixed screened funds. Overall, our findings are relevant for investors who demand SRI funds with a desire to have higher returns without sacrificing returns for nonfinancial screenings. Findings also suggest that investors should consider fund characteristics when selecting SRI funds.

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