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Socially Responsible Fixed-Income Funds

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Abstract: The growing importance of SRI in the investment arena has resulted in considerable academic interest in the performance of socially responsible equity mutual funds. Remarkably, no attempts have been made to evaluate the performance of mutual funds that invest in socially responsible fixed-income securities. This study fills that gap by measuring the performance of socially responsible bond and balanced funds relative to matched samples of conventional funds, over the period 1987–2003. Using multi-index performance evaluation models, we show that the average SRI bond fund performed similar to conventional funds, while the average SRI balanced fund outperformed its conventional peers by more than 1.3% per year. The expenses charged by SRI funds, match those charged by conventional funds and, evidently, do not cause SRI funds to underperform.

Keywords: socially responsible investing, bonds, mutual funds, performance measurement

1. INTRODUCTION

Socially responsible investing (SRI) is gaining momentum. According to estimates by the US social investment forum (SIF, 2003), the rapidly growing market for assets that are deemed socially, morally or environmentally responsible covers about 10% of the financial market as a whole. The largest institutional investors around the world are demonstrating their interest in investing based on SRI principles.[1] These developments have been joined by regulatory changes designed to promote corporate social responsibility (CSR).[2]

Nevertheless, SRI has not yet been embraced by the mainstream investment community. There exists uncertainty as to whether adding an ethical dimension to

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1 Pension funds showing commitment to 'socially responsible investments' include, for example, CalPERS in the US, Universities Supperannuaiton Scheme in the UK, ABP and PGGM in the Netherlands, and AP7 in Sweden.

2 For instance, an amendment to the 1995 Pension Act in the UK, which was enforced in 2000, requires pension funds to disclose how they consider social and environmental issues.

the stock selection process adds or hurts value to investors. Standard investment theory predicts that imposing constraints on the investment opportunity set translate into sub-optimal investment decisions. This line of reasoning has led many businesspeople and scholars to believe that socially responsible investments should underperform their mainstream counterparts (e.g., Rudd, 1981). An alternative theory about SRI, however, is that the social and environmental awareness expressed by a firm are sources of financial benefits that are overlooked by mainstream investment criteria, implying that social investors might enjoy an informational advantage (Kurtz, 1997). For example, strong corporate social responsibility policies have been associated with strong corporate management, reputational benefits, and a forward-looking business style, all of which could be (intangible) sources of superior firm performance.

The conflicting theories about SRI performance have fuelled empirical research in the area of socially responsible mutual fund performance. Most empirical studies, such as Mallin et al. (1995), Hamilton et al. (1993), Gregory et al. (1997), Statman (2000), Bauer et al. (2005), Bello (2005) and Gregory and Whittaker (2007) have investigated social and conventional equity mutual fund returns using a wide array of performance evaluation models. These studies, as a whole, provide evidence that the difference in risk-adjusted performance between SRI equity mutual funds and their conventional peers is not statistically significant.[3]

Remarkably, the majority of empirical research in this field has involved SRI common stock mutual funds and little is known about the performance of retail products that invest in socially responsible fixed-income securities.[4] Our objective is to fill that gap. In this paper, we evaluate the performance of socially responsible fixed-income (henceforth SRI fixed-income) mutual funds in the United States relative to the returns of their mainstream counterparts. SRI fixed-income mutual funds provide an excellent laboratory for testing the financial impact of social screens on fixed-income portfolio returns under practical conditions.[5] We focus on two sets of samples: SRI funds that invest in bonds (SRI bond funds), and balanced funds which hold both socially responsible debt and equity (SRI balanced funds).

Our study is important for several reasons. First, now that SRI has attracted the attention of the world's largest investors, it is important to understand whether SRI can be aligned with mainstream asset allocation problems. More specifically, although institutional investors are increasingly viewing SRI as a viable approach to meeting not only their financial objectives but also their social duties, they need a better understanding of SRI for different asset classes in order to make optimal strategic and tactical asset allocation decisions. Focusing solely on SRI equity return has only limited value to strategic asset managers who seek to optimize their asset mix. Yet, there is barely any information on the track record of SRI in the fixed-income area. By concentrating on SRI fixed-income portfolio performance, we add new insights that are relevant for making such allocation decisions. Second, studying socially responsible bond funds is relevant because these vehicles allow investors to purchase a stake in companies that are not publicly traded on financial markets (i.e. owned through private equity).

3 There are also studies that concentrate on SRI indexes instead of mutual funds, see, e.g., Schroeder (2007) and Statman (2006).

4 D'antonio et al. (1997) raised the possibility that the concept of socially responsible investing is applicable to bonds, but these authors did not study SRI fixed-income fund performance.

5 An alterative approach would be portfolio construction based on social rating data on individual fixed-income securities, however, these data are underdeveloped.

Through fixed-income funds, investors are thus indirectly able to participate in socially responsible companies they cannot access directly. Finally, the massive size of the market for corporate and government debt illustrates there is enormous potential for SRI in fixed-income markets. Moreover, estimates by the Investment Company Institute (2004) emphasize the overwhelming demand for bond mutual funds. Of the $7.4 trillion invested in all mutual funds at the end of 2003, more than $1.2 trillion were invested in bond funds and $2.1 trillion were invested in money-market funds. Assessments of SRI fixed-income fund performance relative to conventional funds can add new and significant insights concerning the prospects of SRI within this tremendous industry.

Prior to the empirical section, we develop theories on the performance of socially responsible investments in fixed-income markets. Subsequently, we discuss the data and explain the importance of multi-index models for evaluating fixed-income mutual fund performance. Using these models, we demonstrate that socially responsible fixed-income funds have performed no worse, if not better, than their conventional peers.

2. THEORETICAL DISCUSSION

This section provides a theoretical discussion about socially responsible investment in two ways. First, it explains the ways by which SRI mutual funds commonly derive an investment universe that satisfies a number of social responsibility criteria. Second, we summarize ongoing debates about the implications of social screening for investment returns.

(i) Socially Responsible Mutual Funds

Socially responsible mutual funds differ from mainstream retail investment products by applying not only financial but also moral, social, and environmental performance criteria when making investment decisions.[6] SRI funds typically believe one can comply with social issues while generating superior return to risk ratios by investing in stocks of leaders in corporate social responsibility. Socially responsible funds may establish their investment universe in several ways. The oldest generation of SRI funds conducts *negative* screens, which involve the exclusion of companies operating in socially controversial sectors from the investment opportunity set. Negative screeners typically seek to avoid 'sin' companies, such as those significantly involved in the tobacco, gambling, alcohol, and weapons/military industries. A second approach is 'positive' screening which concentrates on firms with positive social performance records. Positive screeners tend to look for companies with good labor relations, community involvement, and superior environmental performance records. Recent socially responsible funds screen according to a 'best-in-class' approach. Rather than excluding sectors, best-in-class funds usually rely on the conjecture that firms within a sector face the same social and environmental challenges and that positive screening within every sector is the most effective approach to identifying firms with a competitive edge. Most US and UK SRI funds employ a combination of negative and positive screens (SIF, 2003).[7]

6 For evidence that SRI funds select companies with relatively higher 'ethical' ratings, see Kempf and Osthoff (2008).

7 Another approach to operationalizing SRI is known as shareholder engagement. This approach differs from screens in that the investor engages in an active dialogue with company management on corporate

(ii) Theory About SRI Performance in the Fixed-Income Area

There are a number of alternative theories about whether incorporating ethics into investment decisions affects performance. An oft-cited claim is that socially responsible investors face a financial penalty for imposing ethical constraints on the investment universe: by avoiding assets for ethical reasons, socially responsible investors constrain portfolio risk-return optimization. However, empirical evidence from the equity area suggests that social screens do not come at the expense of a significant reduction in diversification opportunities.

How important is the problem of inefficient diversification and how well do conventional theories about SRI fare in the fixed-income area? Anecdotal evidence suggests that approximately 30% of all companies are screened out by SRI bond funds on social, moral or environmental grounds.[8] Do these screens influence fixed-income portfolio optimization? A prevalent belief among scholars is that bonds constitute a homogenous asset class, that is, their returns are largely a function of variation in a few non-diversifiable risk factors. For investors in government bonds and most high-quality corporate bonds, timing the market by changing the duration structure of a portfolio to exploit future changes in market-wide interest rates plays an important role in enhancing portfolio return. The relative benefits of managing idiosyncratic bond risk through selection or diversification could be limited when idiosyncratic factors have little impact on performance, especially considering the involved transaction costs.

However, several studies support the belief that a sizable portion of the risk of non-government bonds is firm-specific and can either be exploited by active management or be eliminated by means of diversification, which also suggests that social investment constraints might have a non-trivial impact on investment performance. Indeed, active managers perform credit analysis with the objective to identify non-government bonds that are likely to witness a change in credit quality in the future and to invest in those securities that yield a larger premium than is suggested by their risk or credit rating.[9] Hottinga et al. (2001), suggest that corporate bond selection strategies based on security-specific and firm-specific attributes yield superior information ratios.[10] Particularly high-yield corporate bonds might constitute a credit-risk sensitive investment vehicle, displaying heterogeneity (Barnhill et al., 1991) and unique risk-return characteristics (Blume and Keim, 1987; and Cornell and Green, 1991).

Moreover, a number of studies on bond fund performance support the view that fixed-income managers have no consistent timing/selectivity ability, in aggregate, and that bond mutual fund managers underperform their benchmarks by the expenses they charge (e.g., Blake et al., 1993; and Elton et al., 1995). This evidence highlights the importance of expenses in the discussion about SRI bond fund performance. One could expect that ethical screens come at a cost, because SRI asset management companies purchase corporate social performance data from rating vendors and spend time on translating the data into investment decisions. These costs raise the question

social responsibility issues. This form of SRI implementation has attracted the attention of many institutional investors.

8 See, for example, Stephen Taub (2004), 'Socially Responsible Bonds', *BondsOnline Advisor*.

9 Another element of active management is exploiting differences in liquidity across bonds. Furthermore, bond managers may adopt a sector-rotation approach.

10 There are more examples of studies that find management of non-systematic factors to be an important source of improving return-to-risk ratios; see, for example, Dynkin et al. (1999) and Dynkin et al. (2002).

as to whether SRI fixed-income funds have higher expense ratios compared to their conventional peers (and whether differences in expense ratio fully account for a difference in performance). Bauer et al. (2005) suggest that SRI equity funds have higher expense ratios than the equity retail market as a whole.

Since several theoretical perspectives seem to plague SRI in fixed-income investment context, how could SRI investors reap the benefits from social screening? One theory predicts that SRI investors enjoy an information advantage, because the economic benefits (liabilities) that corporations reap (avoid) by adopting strong CSP policies tend to materialize slowly, which may be overlooked by an investment community that is obsessed with short-term judgment periods (e.g., Kurtz, 1997; and Moskowitz, 1972). Graham et al. (2000) indeed find evidence to confirm the value-relevance on environmental information for assessing firms' creditworthiness. Their empirical evidence suggest that firms' environmental liabilities, as measured by either monetary or non-monetary indicators based on public data from the Environmental Protection Agency (EPA), are negatively associated with their credit rating. Their study suggests that the inclusion of environmental information to rating models results in increased rating classification accuracy. Hence, a small body of evidence lends support to the view that social criteria carry value-relevant information beyond that conveyed by mainstream fundamental indicators.

Moreover, SRI has attracted the attention of investors in sovereign bond markets. Sovereign states represent an overwhelming portion of debt issuers, perhaps because the case for SRI in this segment is most straightforward (see, for instance, EPN, 2004). Bond rating agencies seem to agree that sovereign credit risk is significantly driven by quantifiable and non-quantifiable instruments related to social, political and economic factors (Cantor and Packer, 1996). Here, socially responsible investors make a case for integrating environmental and social factors into investment decisions, because these factors influence countries' long-term economic development and political stability. The case of Argentina, for example, makes it clear that social inequality can hinder long-term economic growth with potentially severe consequences for default rates. However, beyond such anecdotal examples, empirical evidence on whether social investment criteria systematically enhance fixed-income portfolio management is scarce.

In essence, because of underdeveloped attention for SRI research in the fixed-income domain, there is a lack of consensus concerning the performance of socially responsible fixed-income investments. The growing need for insights into this asset class motivates our focus on SRI fixed-income mutual funds.

3. DATA

This section describes the data used throughout this study. We first discuss the sample of socially responsible and conventional mutual funds. We then present information on the benchmark indexes and economic variables that are used to measure the performance of fixed-income mutual funds.

(i) Mutual Fund Samples

Our data set includes bond and balanced mutual funds that are labeled by the US Social Investment Forum[11] as socially responsible in investing, and matched

11 See SIF (2003)

samples consisting of conventional fixed-income funds. We manually inspected fund prospectuses and websites to verify the presence of a social investment policy. All bond mutual funds in our sample are US-oriented and primarily invest in intermediate- and long-term fixed-income securities. All balanced funds hold a mixture of domestic bonds and domestic equity. We evaluate SRI fund performance relative to matched samples of conventional fixed-income funds. Each socially responsible mutual fund is matched against an equally weighted portfolio of five conventional funds using fund age, end-of-period fund size, and investment objective as matching criteria. In using these criteria, we control for the potentially interfering influence of, respectively, fund age, fund size, and investment scope on fixed-income fund returns.[12] We select five funds to compose a matched sample, instead of one fund, in order to mitigate the problem that mutual funds are not entirely equal in terms of the size criterion. This discrepancy averages out. The fund data are primarily from the CRSP US Mutual Fund database and cover the period 1987:09–2003:03. Supplementary data were obtained from Datastream and Morningstar.

Table 1 gives summary statistics on the bond mutual funds (Panel A) and on the balanced funds (Panel B). Panel A shows that the majority of pure bond funds in the sample invest in high-quality bonds (BQ). Approximately one-eighth of all funds invest in high-yield debt instruments (BY). Panel B shows that the number of SRI balanced funds in our sample is smaller than the number of pure SRI bond funds. However, both retail markets can be traced back several decades. While some SRI bond funds and SRI balanced funds have existed for almost twenty years, most socially responsible funds commenced operations in the nineties.

Table 1 also reports the statistics of the funds as a group. Group statistics on the bond fund samples indicate that the average SRI bond fund has a lower expense ratio compared to its conventional counterpart. SRI balanced funds, on average, have a higher expense ratio.[13] Taken as a whole, the difference in expense ratio between socially responsible fixed-income funds and conventional funds is trivial. This observation adds new insights on the costs of social screening, because evidence on equity funds suggests that socially responsible investments are associated with relatively higher expense ratios (see Bauer et al., 2005). Apparently, the costs associated with screening fixed-income securities do not translate into higher expense ratios.

A glance at some simple return statistics in Table 1 suggests that SRI bond funds provided a higher average return and a higher Sharpe ratio compared to conventional funds. The socially responsible balanced fund group has a higher return, a lower standard deviation, and a higher Sharpe ratio compared to its conventional peer. Note, however, that these statistics are merely descriptive in nature. Throughout this paper, we shed more light on these performance differentials using rigorous performance attribution approaches and formal tests for significance of the results.

(ii) Benchmark Data

We evaluate SRI and conventional fixed-income fund performance using benchmark models that include US bond and equity indexes as performance attribution variables.

12 For example, Philpot et al. (1998) document a positive relationship between bond fund performance and total fund assets, suggesting that bond mutual funds are able to enjoy economies of scale.
13 The calculation of the average expenses ratio does not include the New Covenant Balanced Fund, because this is a fund of funds with a very low expense ratio.

Table 1
Summary Statistics on the Mutual Funds

Fund Samples	*Mean Return%*	*St Dev%*	*Sharpe*	*Inception*	*Size (mln)*	*Expense%*	*ICDI Objective*
Panel A: SRI Bond Funds							
Aquinas Fixed Income	5.78	3.75	0.38	1994	46	1.00	BQ
Calvert Social Investments Bond	7.78	4.51	0.65	1987	136	1.18	BQ
Citizens Income	5.86	3.79	0.46	1992	67	1.38	BQ
CRA Qualified Investments	7.72	4.43	0.92	1999	470	1.00	BQ
Domini Social Bond	8.91	2.89	2.08	2000	38	0.95	BQ
MMA Praxis Intermediate Income	5.87	4.07	0.37	1994	43	1.20	BQ
Parnassus Fixed Income	6.80	4.97	0.53	1992	24	0.81	BQ
Pax World High Yield	2.24	8.27	−0.16	1999	44	1.48	BY
New Covenant Income	4.68	4.25	0.35	1999	507	0.86	BQ
Ariel Premier Bond	6.34	3.13	0.71	1997	26.85	0.85	BQ
Capstone SERV Bond Fund	5.57	3.98	0.44	1999	43.37	0.67	BQ
Timothy Plan Fixed Income*	−11.34	5.05	−3.22	1999	24	1.35	BQ
Aha Full Maturity Fixed Income	7.78	3.88	0.78	1988	36.72	0.76	BQ
Lutheran Brotherhood Income	7.25	4.45	0.54	1972	634	0.84	BQ
Lutheran Brotherhood High Yield A**	0.18	9.99	−0.39	1997	521.13	1.03	BY
Group SRI Bonds	7.05	4.13	0.53	1987	177	1.02	BQ/BY
Group Conventional Bonds	6.66	3.71	0.48	1987	136	1.17	BQ/BY

Table 1 (Continued)

Fund Samples	*Mean Return%*	*St Dev%*	*Sharpe*	*Inception*	*Size (mln)*	*Expense%*	*ICDI Objective*
Panel B: SRI Balanced Funds							
New Covenant Balanced Income	−6.00	6.95	−1.32	1999	124	0.18	BAL
Calvert Social Balanced	6.77	9.75	0.20	1982	447	1.25	BAL
Green Century Balanced	12.74	15.87	0.54	1992	33	2.39	BAL
Pax World Balanced	9.56	9.10	0.52	1970	1012	0.95	BAL
Walden Social Balanced	−0.80	9.00	−0.50	1999	19	1.00	BAL
Aquinas Balanced	9.59	9.55	0.49	1994	15	1.50	BAL
Aha Balanced	9.57	10.24	0.47	1998	26	1.13	BAL
Working Assets Citizens***	6.14	5.46	0.34	1992	45	1.75	BAL
Smith Barney Social****	5.18	12.98	0.08	1992	234	1.17	BAL
Group SRI Balanced	9.08	9.45	0.45	1987	217	1.42	BAL
Group Conventional Balanced	8.17	9.92	0.33	1987	300	1.30	BAL

Notes:
Panel A: Mean returns, standard deviations, and Sharpe ratios are annualized. End-of-sample-period fund size is measured by total net assets. BQ and BY identify high-quality and high-yield bond funds.
Source: The Investment Company Data (ICDI).

Panel B: Mean returns, standard deviations, and Sharpe ratios are annualized. End-of-sample-period fund size is measured by total net assets. BAL identifies balanced funds.
Source: The Investment Company Data (ICDI).

* Coverage stopped in 2000.
** Started as Class A fund in 1997.
*** Merged into Citizens Growth in 1995. No returns included after merger.
**** Became socially responsible in 1997. No returns included before 1997.

Several studies on bond funds have suggested that only a few indexes explain most of the variation in bond portfolio returns. See, for example, Blake et al. (1993), Elton et al. (1995) and Detzler (1999). We employ different sets of indexes to capture the entire spectrum of investment exposures a fund might have. Specifically, these indexes possess several unique risk and return characteristics to account for the fact that fixed-income funds can differ in scope and 'style'.

Our primary set of benchmark indexes is maintained by Citigroup. We utilize total returns on their CGBI US Broad Investment-Grade Bond Index (USBIG) as well as the returns on some of its subsets. Generally, the indexes are aimed at providing stable and easily replicable benchmarks by including all investment opportunities that are available to market participants under regular conditions. USBIG is a value-weighted index that includes fixed-rate Treasury, government-sponsored, mortgage, asset-backed, and investment-grade issues that have a remaining maturity of at least one year. The issues are eligible for inclusion when they pass a size criterion that is designed to ensure the bonds are reasonably available. Further details on the Citigroup Bond Index construction methodology can be found in Citigroup (2003). Because the CGBI High-Yield index does not span the entire sample period, we use the Merrill Lynch High Yield Index to account for a fund's exposure to high yield instruments.

Our study also allows for the possibility that fixed-income fund performance can be explained partially by equity return variation. Although bond indexes are the primary instruments for evaluating pure bond funds, adding an equity index to bond performance models is important for evaluating the returns of balanced funds and bond funds that hold convertible debt. The stock market variable we employ is defined as the value-weighted return on all stocks in the NYSE-AMEX-Nasdaq universe over the risk-free rate proxy from Ibbotson Associates, and is from Fama and French (1993).[14]

Apart from including benchmark asset returns, we also consider models that include variables related to the macroeconomy. Previous research has suggested that risk premiums associated with fundamental economic variables are potentially relevant in explaining bond mutual fund returns (e.g, Elton et al., 1995). For this purpose, we collected survey data on the US inflation rate from the University of Michigan and data on economic development (industrial production) from the Federal Reserve Bank of Philadelphia.

4. EMPIRICAL ANALYSIS

The empirical analyses concentrate on SRI and conventional mutual fund performance along several lines. The first sections focus on the risk and return characteristics of SRI bond funds and SRI balanced funds as a whole, using a battery of performance attribution models and risk-adjusted performance measures. Finally, year-by-year cross-sectional regressions are performed to examine the relation between fixed-income mutual fund performance and the SRI attribute, controlling for other common determinants of mutual fund performance.

(i) Performance Evaluation of Fund Portfolios

In this section, we compare portfolios of SRI fixed-income funds with their conventional peers using multifactor benchmark models. Our decision to adopt multi-index models

14 See the website of Kenneth French: mba.tuck.dartmouth.edu/pages/faculty/ken.french/

follows from evidence that single-index specifications cannot explain the returns of all bond classes. Blake et al. (1993) illustrate that the returns of high-yield bond funds are poorly captured by a broad market index. (Equivalently, the returns of bond funds with broad market exposure are poorly explained by a high-yield index.) Hence, under single-index benchmark specifications, even passive bond investment strategies can easily deliver significant abnormal return estimates if there is a mismatch between the funds manager's strategy and the benchmark used for evaluation of the fund. Consider, for example, a mutual fund that mainly invests in investment-grade bonds and does so in a socially responsible manner. If the manager of this fund chooses to be tilted slightly towards high-yield debt, provided this is allowed within some prespecified range, then a single-index regression of the fund's return on a broad investment-grade bond index will deliver an inaccurate estimate of mutual fund performance. Performance evaluation models that suffer from this form of misspecification bias can severely skew a judgment on the effects of SRI screens on fund performance.

If we have a set of investment indexes in vector F and economic variables in G, the multifactor models we employ can be written as:

$$R_{it} - R_{ft} = \alpha_i + \sum_{j=1}^{J} \beta_{ij} F_{jt} + \sum_{k=1}^{K} \gamma_{ik} G_{kt} + \varepsilon_{it} \tag{1}$$

where R_{it} is the return on bond mutual fund i in month t, R_{ft} denotes the one-month T-Bill rate, F_{jt} is the excess return on determinant j at t, and J denotes the number of determinants (passive indexes) F used in the model. Equivalently, G_{kt} is the value for the risk premium associated with fundamental economic variable k at t and K indicates the number of fundamental variables. The coefficients in this model can be interpreted along various lines, depending on the nature of the determinants. One can interpret a model that includes F's and G's to determine expected return simply as a linear factor model. Further, models with index returns F's, as proxies for wealth, could theoretically be justified by Merton's (1973) ICAPM. Models that include a set of indexes in conjunction with G's that are in spirit similar to Chen et al. (1986) are consistent with the APT of Ross (1976). Alternatively, Blake et al. (1993) use excess returns on passive investments to describe time variation in bond fund return without referring to a general equilibrium model. The βij's can simply be thought of as the weights assigned to a set of passive portfolios that most closely explain the time-series variation in the fund's return, and the intercept term could then be seen as the contribution of active money management.

Typically, analogous to the intercept term in equity fund performance models, α (i.e., Jensen's (1968) alpha) is viewed as the contribution of active money management to fixed-income portfolio return. Our interpretation of Jensen's alpha is slightly different because this research involves a comparison between SRI mutual funds and conventional funds. While conventional fund alpha measures the added value of active management net of expenses and after correction for factor-sensitivities, the alpha for SRI mutual funds additionally reflects the potential influence of social screens on average portfolio return. By comparing the alphas we thus formally test a joint hypothesis that the average abnormal return of SRI funds resulting from active portfolio management, expenses, *and* social screens is equal to the abnormal returns on conventional funds resulting from active management and expenses. If we assume that management timing skills and expenses are similar for both mutual fund categories,

then our tests point more explicitly to the influence of SRI screens. The previous section showed that the latter assumption is acceptable. There is also no reason to expect that the market timing skill of the average SRI fixed-income portfolio manager differs from the skills of conventional managers.

Since there is no consensus about which combination of bond indexes is most suitable for explaining the returns on bond funds, we consider several models. The principal model we use is a four-factor model developed by Elton et al. (1995). The model's first variable, which captures broad market sensitivity, is computed as the return on the USBIG Index in excess of a risk-free rate proxy. The second variable, DEFAULT, is defined as the return spread between the High Yield Index and the USBIG Treasury Index and is intended to capture default risk compensation in fixed-income portfolio returns. The third variable, OPTION, is computed as the difference in return between the USBIG GNMA Mortgage Index and the USBIG Treasury Index. Blake et al. (1993) introduced the mortgage index to capture option features in specific bonds. Finally, we include an EQUITY variable, which is defined as the value-weighted return on a portfolio of all stocks listed on the NYSE-AMEX-Nasdaq markets in excess of the risk-free rate. Including an equity variable is relevant because balanced funds have a significant exposure to the stock market and because bond funds may hold convertible debt. Thus, the main model is written as:

$$R_{pt} - R_{ft} = \alpha_i + \beta_{0i}(\text{USBIG}_{mt} - R_{ft}) + \beta_{1i}Default + \beta_{2i}Option_t + \beta_{3i}Equity_t + \varepsilon_{it}, \quad (2)$$

where $\text{USBIG}_{mt} - R_{ft}$ represents the return on the broad investment grade bond index above the Ibbotson risk-free rate, DEFAULT_t is the return spread between the Merrill Lynch High Yield Index and the USBIG Treasury index, OPTION_t denotes the return difference between the USBIG GNMA index and the Treasury Index, and EMKT_t is the excess return on the CRSP value-weighted US stock portfolio.

The alternative multifactor specifications we construct in robustness tests are as follows. We develop a five-factor model that additionally includes a term structure variable, which is defined as the return difference between the CGBI 20-year+ Treasury Index and the 1–3-year Treasury Index. Second, we consider a model that additionally utilizes two fundamental expectational variables concerning inflation and economic conditions, which is advocated by Elton et al. (1995). The first fundamental expectational variable that we employ is a measure of unanticipated changes in inflation, based on the US consumer opinion survey from the University of Michigan.[15] The coincident change in the 12-month inflation forecast is used as fundamental expectational variable. The second expectational variable we use is based on the changes in yearly industrial production growth based on data from the Federal Reserve Bank of Philadelphia. Following Elton et al. (1995), we use a joint-estimation approach to estimate the prices of risk associated with the economic variables.[16]

15 See Elton et al. (1995) for the benefits of using survey data on economic variables compared to changes in realizations of those variables.

16 For example, extending equation (2) with the two fundamental economic variables requires that we estimate: $R_{pt} - R_{ft} = \alpha_i + \beta_{0i}(\text{USBIG}_{mt} - R_{ft}) + \beta_{1i}Default + \beta_{2i}Option_t + \beta_{3i}Equity_t + \beta_{4i}(Inf_{t-1} + \tau Inf) + \beta_{5i}(Prod_{t-1} + \tau Prod) + \varepsilon_{it}$, where Inf_t and $Prod_t$ are unexpected changes in the fundamental variables. We obtain the prices of risk $\tau\, inf$ and $\tau\, Prod$ by simultaneously estimating the following equation for a set of passive benchmark indexes using nonlinear least squares: $R_{pt} - R_{ft} = \delta_i + \beta_{0i}(\text{USBIG}_{mt} - R_{ft}) + \beta_{1i}Default + \beta_{2i}Option_t + \beta_{3i}\, Equity_t + \beta_{4i}(Inf_{t-1}) + \beta_{5i}(Prod_{t-1}) + \varepsilon_{it}$, subject to the restriction $\delta_i = \beta_{4i}\tau inf + \beta_{5i}\tau Prod$.

The last specification we employ offers a slight methodological innovation. This model improves upon the seven-factor model by removing pricing errors that are neither attributable to the contribution of active money management nor to the influence of a social investment policy. The model is designed such that it accounts for errors in explaining the returns of alternative passive indexes by means of statistically derived factors. For a whole host of alternative passive indexes, we run individual regression of passive index returns on the seven-factor model.[17] The unexplained returns (i.e. the model's intercept and the residual series) are decomposed by means of a principal components analysis on the covariance matrix of non-centered variables. The first two principal components, capturing 85 percent of the residuals, are added to the seven-factor model.[18] The resulting model is a nine-factor model.

In Table 2, we report the results of regressing excess mutual fund returns on the sets of indexes. Panel A reports performance evaluation results for pure bond funds, while Panel B displays results for balanced funds. In Panel A, we also report separate results for high-yield bond funds because low-grade bond returns are relatively less market interest-rate sensitive and more dependent on selectivity skill and risk diversification. High-yield fixed-income fund returns may therefore display a higher than average sensitivity to the diversification constraints inherent in social screens. All SRI bond funds are grouped into an equal-weighted SRI bond fund portfolio prior to the estimation of the models. The same method is applied to the conventional fund samples. This section, thus, concentrates on evaluating SRI fund *group* performance relative to that of conventional funds. We formally compare the SRI fund portfolios with their respective matched samples using the returns on a 'difference' portfolio, which are obtained by subtracting conventional fund returns from the returns of SRI funds. Differences in risk-adjusted performance, as indicated by differential alpha, are implicitly attributed to differences in social responsibility between the matched samples.[19]

Regression R^2s indicate that the four-index model does a good job in explaining the returns of fixed-income mutual funds. From the broad market index sensitivities, it can be observed that market risk estimates for the aggregated fund groups are large and comparable to equity market betas that tend to vary around unity. Corresponding *t*-statistics point out that the coefficients on the broad market factor are highly significant at the standard cut-off levels. Moreover, the results point to the relevance of the DEFAULT, OPTION and EQUITY variables. Not only are the coefficients on these regressors mostly significant from a statistical perspective, they also have economically plausible signs. For example, the group of high-yield funds loads heavily on the default variable, which confirms their exposure to default risk associated with investing in

The passive indexes are the CGBI USBIG short-term Treasury Index (which includes 1–3 year maturity vehicles), the intermediate Treasury Indexes (3–7 years and 7–10 years), long-term Treasury Indexes (10+ and 20+ years), CGBI USBIG Corporate Bond Indexes (1–3, 7–10 and 10+ years), the GNMA Index, and the Merrill Lynch High-Yield Index. See Elton et al. (1995) for further details on the estimation methodology.

17 The passive bond indexes that were used as the dependent variable to determine residual return series are several CGBI corporate bond indexes (with different maturities), CGBI government bond indexes (with different remaining maturity), and the high-yield market index.

18 This method resembles the factor analysis of Knez et al. (1994), except for the fact that our focus is on modeling residual returns rather than absolute returns.

19 Before running these regressions we examined some distributional features of the data. To begin with, we found no significant discrepancies between mean returns on the difference portfolios and the respective median returns. Furthermore, (unreported) Durwin-Watson statistics for the difference portfolios suggested that serial correlation is not a real concern to this study. To obtain somewhat conservative *t*-statistics, we use Newey-West (1987) standard errors in our tests.

Table 2
Four-Factor Model for Fixed-Income Funds

	Alpha	*USBIG*	*Default*	*Option*	*Equity*	*Adj. R^2*
Panel A: Performance of Pure Bond Funds						
Using All Funds in Sample						
SRI Bond Funds	−1.08%***	0.98***	0.10***	−0.17***	0.02***	0.95
	(−3.91)	(46.19)	(5.11)	(−3.74)	(2.64)	
Matched Sample	−1.28%***	0.91***	0.13***	−0.05***	0.01*	0.95
	(−5.10)	(30.53)	(9.36)	(−0.90)	(1.91)	
Difference	0.20%	0.07**	−0.03**	−0.12***	0.00	0.38
	(0.84)	(2.48)	(−2.49)	(−2.85)	(1.11)	
Using High Yield Funds						
SRI Bond Funds	−1.99%	0.80***	0.79***	−0.23	0.04	0.86
	(−1.28)	(4.66)	(13.36)	(−0.93)	(1.56)	
Matched Sample	−1.85%	0.66***	0.80***	−0.35	0.02	0.86
	(−1.26)	(4.67)	(14.18)	(−1.51)	(0.71)	
Difference	−0.13%	0.15	−0.01	0.12	0.02	0.00
	(−0.15)	(1.04)	(−0.26)	(0.73)	(0.97)	
Panel B: Performance of Balanced Funds						
SRI Balanced Funds	0.11%	0.20***	0.06*	−0.13	0.54***	0.94
	(0.16)	(3.60)	(1.80)	(−1.56)	(35.16)	
Matched Sample	−1.25%***	0.26***	0.03	−0.09**	0.59***	0.98
	(−2.97)	(8.97)	(1.32)	(−2.13)	(74.45)	
Difference	1.36%**	−0.06	0.03	−0.04	−0.04***	0.06
	(2.04)	(−1.03)	(0.97)	(−0.45)	(−3.01)	

Notes:
Fixed-income fund performance is estimated with a four-factor model (see Elton, Gruber and Blake, 1995). Alphas are annualized, and *t*-statistics based on Newest-West (1987) standard errors are reported in parentheses. The SRI bond fund samples and matched samples are equally weighted portfolios of all funds. Sample period for bond funds: 1987:01–2003:03. Sample period for high-yield funds: 1997:01–2003:03. Sample period for balanced funds: 1987:01–2003:03.
*** significant at 1% level, ** significant at 5% level, * significant at 10% level.

low-grade bonds. Balanced funds load less USBIG and more on EQUITY, compared to pure bond funds, resulting from significant investment in both bonds and stocks.

After controlling for benchmark sensitivities, we make two important observations. First, full-sample results show that both SRI bond funds and conventional bond funds, as a whole, underperformed the set of benchmark indexes by more than 1% per annum. The *t*-statistics corresponding to the intercepts indicate that the underperformance is significant below the 1% cut-off level. For high-yield funds, the average underperformance is in the order of 2%, but is not significant. The negative excess returns we generally observe are consistent with the results of previous research on bond mutual funds. More importantly, the difference portfolio results suggest that difference in average excess return between the SRI bond fund portfolio and conventional fund portfolio is 0.20% per annum when all funds are included in the evaluation and −0.13% when the analysis is restricted to high-yield funds. While these performance differentials may be economically important, statistical tests do not reject the null hypothesis of a zero return difference at the standard significance levels.

Second, the results for balanced funds are more optimistic about SRI fund performance. While SRI balanced fund returns do not exceed significantly the returns predicted by the performance evaluation model, conventional funds underperformed the set of benchmark indexes significantly, by 1.25%. Consequently, the differential return between SRI balanced funds and their conventional peers is economically large (1.36%) and statistically significant. Hence, SRI balanced funds have produced competitive risk-adjusted returns.

Table 3 reports alpha estimates under alternative specifications. In the first column of results, we report single-index alphas because single-factor measures are widely monitored in practice and have strong theoretical roots.[20] The indexes used in this model are tailored to the scope of the funds: USBIG is used to measure pure bond fund alphas, the high-yield index is employed for evaluating high-yield bond funds, and an equally weighted portfolio of USBIG and EQUITY is used to estimate balanced fund alphas. The other columns report the results of estimating, respectively, the five-factor model that augments the four-factor model by the term spread, the seven-factor model that additionally includes two fundamental economic variables, and the nine-factor model that further includes statistical factors. All scenarios corroborate the evidence from our initial four-factor model and confirm that our findings are robust to the choice of performance evaluation model. On average, SRI bond funds and conventional bond funds earned similar benchmark-adjusted returns while SRI balanced funds outperformed their conventional peers.

As a robustness check, we also explored measures of total risk, residual risk and some alternative performance measures. For example, Rudd (1981) argues that SRI portfolios underperform the 'normal' portfolio because SRI portfolio returns do not compensate for additional residual risk. Unreported *F*-tests for differences in residual variance between SRI and conventional funds were performed, based on the aforementioned performance evaluation models. Pure SRI bond funds and SRI balanced funds have a relatively higher residual risk according to most test statistics, but the residual variance of high-yield SRI funds is not significantly different from that of the matched sample. Whether differences in residual risk materially influence the comparison between SRI and conventional fixed-income funds is questionable, as is also suggested by the high regression *R*-squared values in Tables 2 and 3. Table 4 presents the funds' Sharpe ratio and multifactor variants of the appraisal ratio of Treynor and Black (1973) and the information ratio described in Goodwin (1998). In addition, Table 4 reports on a statistical test for comparing Sharpe ratios and appraisal ratios, based on the method originally developed by Jobson and Korkie (1981). That is, we formally compare the difference in Sharpe (appraisal) ratio between SRI and conventional funds via a Z_{JK} (Z_{AR}) score. When there are a sufficient number of time-series observations, the Jobson-Korkie Z statistic has a standard normal distribution with a zero mean and unit standard deviation.

The Z-scores do not significantly change the conclusions we derived from the previous section. The Sharpe and appraisal ratios of SRI bond funds and high-yield SRI funds are somewhat higher than those of conventional funds but not significantly so. The results for balanced funds are, not surprisingly, stronger, since SRI funds earned positive multifactor alphas and conventional funds negative ones. Z_{AR} scores suggest a significant difference in appraisal ratio.

20 See Sharpe (1964).

Table 3

Alternative Specifications for Robustness Tests

	1-factor Model α	*Adj. R2*	*5-factor Model α*	*Adj. R2*	*7-factor Model α*	*Adj. R2*	*9-factor Model α*	*Adj. R2*
Panel A: Bond Funds								
Using All Funds in Sample								
SRI Bond Funds	−0.85%**	0.90	−1.06%***	0.95	−1.05%***	0.95	−1.07%***	0.95
	(−2.55)		(−3.62)		(−3.65)		(−4.08)	
Matched Sample	−0.87%**	0.86	−1.15%***	0.95	−1.15%***	0.95	−1.13%***	0.95
	(−2.25)		(−5.43)		(−5.41)		(−5.56)	
Difference	0.01%	0.25	0.09%	0.46	0.10%	0.46	0.06%	0.46
	(0.06)		(0.45)		(0.49)		(0.31)	
Using High Yield Funds								
SRI Bond Funds	−2.41%	0.85	−1.87%	0.85	−1.75%	0.85	−2.22%	0.85
	(−1.43)		(−1.23)		(−1.16)		(−1.53)	
Matched Sample	−2.75%	0.85	−1.66%	0.86	−1.32%	0.87	−1.32%	0.87
	(−1.54)		(−1.17)		(−1.03)		(−1.03)	
Difference	0.34%	0.00	−0.21%	0.00	−0.44%	0.02	−0.43%	0.01
	(0.38)		(−0.24)		(−0.48)		(−0.48)	
Panel B: Balanced Funds								
SRI Balanced Funds	−0.77%	0.91	0.28%	0.93	0.28%	0.93	0.23%	0.93
	(−0.93)		(0.38)		(0.38)		(0.32)	
Matched Sample	−2.06%***	0.96	−1.08%**	0.98	−1.08%**	0.98	−0.90%*	0.98
	(−4.06)		(−2.31)		(−2.33)		(−1.92)	
Difference	1.29%*	0.06	1.36%*	0.06	1.36%*	0.06	1.13%*	0.13
	(1.95)		(1.89)		(1.89)		(1.79)	

Notes:

The single-factor model includes the excess return on a broad market index (i.e. USBIG for bond funds in the full sample, the high-yield index for high-yield funds, and an equal-weighted portfolio of USBIG and the EQUITY factor portfolio for balanced funds). The five-factor model augments the four-factor model by the term spread variable. The seven-factor model additionally includes monthly spreads associated with changes in the annual inflation rate and in industrial production. The nine-factor model, further, contains two statistical factors derived from a principal components analysis. Alpha estimates are annualized, corresponding *t*-statistics (in parentheses). Sample period for bond funds (full sample). Sample period for high-yield funds: 1997:01–2003:03. Sample period for balanced funds.

* Significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table 4
Sharpe and Appraisal Ratios

		Appraisal Ratio			
	Sharpe Ratio	*4-factor Model*	*5-factor Model*	*7-factor Model*	*9-factor Model*
Panel A: Bond Funds					
Using All Funds in Sample					
SRI Bond Funds	0.53	−1.22	−1.20	−1.21	−1.21
Matched Sample	0.48	−1.56	−1.53	−1.53	−1.59
Abs.(Z_{JK})	0.66				
	(0.51)				
Abs. (Z_{AR})		1.56	1.53	1.52	1.58
		(0.11)	(0.12)	(0.12)	(0.11)
Using High Yield Funds					
SRI Bond Funds	0.21	−0.63	−0.60	−0.56	−0.56
Matched Sample	0.20	−0.58	−0.53	−0.48	−0.55
Abs.(Z_{JK})	0.12				
	(0.90)				
Abs. (Z_{AR})		0.17	0.23	0.44	0.04
		(0.87)	(0.82)	(0.66)	(0.97)
Panel B: Balanced Funds					
SRI Balanced Funds	0.45	0.05	0.12	0.12	0.12
Matched Sample	0.33	−0.86	−0.74	−0.74	−0.65
Abs.(Z_{JK})	1.56				
	(0.11)				
Abs. (Z_{AR})		2.84***	2.65***	2.67***	2.46***
		(0.00)	(0.01)	(0.01)	(0.01)

Notes:
Panel A: The Sharpe ratio is the return above the risk−free rate divided by the standard deviation of excess return. The appraisal ratio is the intercept from the employed model divided by the regression's standard error. All ratios are annualized. The Jobson and Korkie (1981) test compares the difference in Sharpe (Appraisal) ratio between SRI and conventional funds via a Z_{JK} (Z_{AR}) score. Sample period: 1987:01–2003:03 for (all) bond funds and 1997:01–2003:03 for high-yield funds.

Panel B: The Sharpe ratio is the return above the risk-free rate divided by the standard deviation of excess return. The appraisal ratio is the intercept from the employed model divided by the regression's standard error. All ratios are annualized. The Jobson and Korkie (1981) test compares the differential Sharpe (Appraisal) ratio between SRI and conventional funds via a Z_{JK} (Z_{AR}) score. Sample period: 1987:01–2003:03 for balanced funds.
*** Significant at 1% level.

(ii) Fama-MacBeth Setup

An attractive feature of grouping funds into portfolios is that long-run mutual fund performance can be assessed at the aggregate level without requiring all funds in the data to have a long-term history. The aggregation process that inherently comes with the portfolio evaluation approach may sacrifice some information for simplicity. This section presents a final robustness check by relating fund alphas to fund-specific attributes in a panel analysis.

Inspired by Fama and MacBeth (1973), our approach involves a two-step regression methodology. Every calendar year, we use the four-factor model described earlier to estimate 12-month non-overlapping alphas for each fund in our sample. Subsequently, each calendar year, we use fund-specific attributes to explain the cross-section of fund

alphas. To evaluate SRI fixed-income fund performance, our model includes well-documented fund characteristics augmented by a variable that identifies a socially responsible fund. If SRI screens influence benchmark-adjusted fund returns, then the SRI fund identifier should explain the cross-sectional variation in fund alphas. Our set of fund-specific attributes contains the following variables: fund size (Log TNA) as measured by the natural log of total net assets, a fund's expense ratio (EXPENSES), a fund's turnover rate over year t (TURNOVER), and a dummy variable for SRI funds. The resulting specification can be thought of as a model that estimates the average benchmark-adjusted return of fixed-income funds after controlling for fund size, expenses, turnover, and the presence of SRI screens. The model can be described as follows:

$$\alpha_{it} = a_{ot} + \gamma_{1it}\,\mathrm{LogTNA}_{it-1} + \gamma_{2it}\,\mathrm{EXPENSES}_{it} + \gamma_{3it}\,\mathrm{TURNOVER}_{it} + \gamma_{4it}\,\mathrm{SRI} + \varepsilon_{it}. \tag{3}$$

The parameters in model (5) are estimated each calendar year. Since the cross-section of funds in our sample is too small in early years in order to produce informative regression results, we restrict the regressions to the period 1994–2002. Since we obtain multiple cross-sectional regressions with this procedure, we take the time-series average of yearly obtained coefficients (in the tradition of Fama and MacBeth, 1973). We then compute corresponding t-statistics by using standard errors from the time-series parameters.

Table 5 reports Fama-Macbeth regression results for bond funds and balanced funds, respectively. Both the intercept term and the coefficients on the SRI dummy variables are annualized and expressed as percentages. The reported sensitivities with respect

Table 5
Fama-MacBeth Regressions

	Fama-MacBeth Time-Series Average Coefficients	
	Pure Bond Funds	*Balanced Funds*
Intercept	0.25%	0.80%
	(1.32)	(0.39)
Log TNA	$-1.07\mathrm{E}^{-03}$	$2.60\mathrm{E}^{-04}$
	(−1.74)	(0.13)
EXPENSES	−0.98***	−1.57***
	(−4.23)	(−4.40)
TURNOVER	−0.02	−1.05*
	(−0.26)	(−2.22)
SRI	0.02%	1.34%
	(0.14)	(0.89)

Notes:
This table reports the results of annual regressions of a fund's 12−month four-factor alpha on a constant, the log of total net assets (Log TNA), the fund's expense ratio (EXPENSES), the turnover rate (TURNOVER), and a SRI Fund Dummy indicating that a fund is a socially responsible fixed-income fund. In the tradition of Fama and MacBeth (1973), we calculate time-series average of the cross-sectional coefficient estimates. We then compute corresponding t-statistics by using standard errors from the time-series parameters. Sample period: 1994–2002. The intercept terms and the coefficients on the SRI fund dummy variables are presented as an annual percentage. The t-statistics are shown in parentheses.
*** Significant at 1% level, * significant at 10% level.

to the control variables are supported by existing literature (e.g., Blake et al., 1993; and Carhart, 1997), but not all coefficients are statistically significant. Consistent with a large body of fund performance studies, the expense ratio is significantly and negatively related to excess fixed-income fund returns. The other controls have coefficients that are consistent in terms of sign but not highly significant. Central to this section are the SRI fund identifiers. Notwithstanding the fact that previous sections enjoyed a larger sample window, the loadings on the SRI dummy variables in this cross-sectional framework support our portfolio evaluation results. The coefficient on the SRI bond fund dummy variable is virtually zero. The coefficient on the SRI balanced fund dummy is in magnitude similar to the differential alphas reported in the previous section (1.3%) but not statistically significant. Thus, the cross-sectional regressions suggest that the excess returns of SRI bond funds and SRI balanced funds match those of their conventional peers.

5. CONCLUDING REMARKS

Sizeable academic interest has been shown in the performance of socially responsible equity mutual funds. To the best of our knowledge, little evidence exists in the investment literature regarding the performance of SRI funds that focus on fixed-income securities.

Using several performance attribution techniques, we showed that socially responsible fixed-income funds have been steady performers over the period 1987–2003. We found that a portfolio of SRI bond funds earned a benchmark-adjusted return similar to that of its conventional counterpart. A portfolio of SRI balanced funds outperformed conventional balanced funds by 1.3% per year. Cross-sectional models that include fund size, expenses, turnover, and an SRI dummy as determinants of fund alpha offer supportive evidence: coefficients on the SRI dummies indicate that socially responsible fixed-income funds have performed no worse than their conventional peers. Note that the returns investigated in this study are post-expense fund returns. The expenses charged by SRI funds, on average, match those charged by our matched sample of conventional funds and evidently do not cause SRI funds to underperform. As we do not find any indication that socially motivated constraints are binding on fund performance, our evidence supports the idea that SRI in the fixed-income industry is a financially viable investment approach.

This study uses a basic distinction between SRI and conventional funds, but SRI funds might have heterogeneous beliefs about which social criteria are necessary to establish SRI portfolios. For example, some funds may apply social screens that are grounded in religious investment, whereas others put more emphasis on environmental responsibility. The contribution of each individual social investment criterion to fixed-income portfolio return is an interesting empirical question that awaits further research.

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