DOES BEING NICE HAVE A PRICE? AN INVESTIGATION ON SOCIALLY RESPONSIBLE FUNDS' PERFORMANCE

by

Inna Vasylivna Omelyukh

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Inna Vasylivna Omelyukh

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Dr. James R. Brown

Approved for the Department of Agricultural Economics and Economics

Dr. Wendy A. Stock

Approved for the Division of Graduate Education

Dr. Carl A. Fox

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Inna Vasylivna Omelyukh

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ABSTRACT

Are lower returns a cost of socially responsible investing? Financial theory presents opposing views on that account and empirical studies have yielded mixed results. This study evaluates the relative performance of socially responsible investment (SRI) mutual funds and tests whether the difference in financial performance of SRI funds and their benchmarks is related to the intensity of the screens and to the different types of screens employed by SRI funds. The results show that there is a curvilinear relationship between the number of exclusionary screens and fund performance, the use of environmental and alcohol screens is negatively related to fund performance, and the use of gambling and employment screens is positively related to fund performance.

CHAPTER 1

INTRODUCTION

Definition and History

Unlike managers of other funds, socially responsible fund managers explicitly consider social and ethical factors, as well as economic factors, when deciding which shares to buy, sell, or hold. Socially responsible funds construct their portfolios by screening potential investments in one of three ways: restrictive, exclusionary, and positive screening. Fund managers that employ restrictive screening only invest in companies that pass minimum criteria related to a given issue. Managers that use exclusionary screening avoid investing in companies whose products or policies are in any way inconsistent with the fund's social, religious, or environmental criteria, while managers that use positive screening actively search for companies that have notable achievements in the funds' areas of interest. For example, a fund may seek out companies that demonstrate leadership in areas such as community development, environmental practices, and human rights.

The idea of incorporating ethical or social criteria into the investment process has religious origins and dates as far back as the 18th century, when churches, universities and pension funds began using so called "sin" screens to shun tobacco, liquor or gambling investments (Renneboog et al. 2007). Later a demand for socially responsible investing emerged during the Vietnam War when an increasing number of investors became uncomfortable with investing in war supply companies. In response to this growing

demand, the Pax World Fund was created in 1971 for investors opposed to the Vietnam War (and militarism in general). This fund avoided investments in weapons contractors. The Pax World Fund is considered the first modern socially responsible mutual fund. SRI gained further popularity in the 1980s when investors started pulling their money away from companies with operations or subsidiaries in South Africa, seen as supporting the Apartheid regime (Renneboog et al. 2007). In the 1990s, the number and variety of funds have increased to incorporate other social issues such as environmental protection, human rights, and labor relations. Furthermore, a series of corporate scandals in the 2000s has turned corporate governance and responsibility into a focal point of SRI investors.

While all socially responsible funds use social, environmental, or religious criteria to help guide their investment practices, different funds may have varying social priorities. Some adhere to religious principles; others seek to promote certain social or environmental goals. Since opinions differ on what makes a company responsible or an investment acceptable, socially responsible funds are diverse in terms of investment philosophies. In fact, there are funds that take opposing positions on certain controversial issues. For example, some funds refuse to invest in companies that provide healthcare and other benefits to unmarried domestic partners, while other funds seek out firms that offer such benefits. Similarly, some funds refuse to invest in companies that test products on animals, while other funds do not consider animal testing an issue (Albertson 2006). Therefore, it is possible for one fund to use a positive screen in a given category while for another fund to use an exclusionary screen in the same category.

An increasing number of individuals who care about where their money is invested are turning to SRI funds, including high-net-worth clients, individuals seeking socially responsible options for their retirement plans, and mission-driven institutional investors such as foundations, endowments, labor unions, and faith-based investors. Additionally, a growing concern about climate change is driving an increase in demand for investments in green technology, alternative and renewable energy, green building, and other types of environmentally friendly businesses. At the same time the crisis in Sudan is drawing more attention from investors, similarly to the Vietnam War and the Apartheid in the 1970s and 1980s.

Due to the increasing demand, SRI funds have experienced significant growth in most developed economies around the world. The latest study conducted by the Social Investment Forum (a national non-profit organization that encourages and promotes the growth of socially responsible investing) in 2007 found that SRI investment in the U.S. is growing at a faster pace than the broader universe of all investment assets under management. SRI assets rose 324 percent from $639 billion in 1995 to $2.71 trillion in 2007, while during the same time period the broader universe of assets under professional management increased by about 260 percent from $7 trillion to $25.1 trillion. At the end of 2007, SRI investment accounted for roughly 11 percent of assets under professional management in the U.S. Mutual funds with $171.7 billion in total net assets make up the largest share of socially screened funds. Currently investors can choose from 173 different funds available in 358 different share classes through more than 60 different fund families.

Financial Theory Background

Financial theory presents two opposing views on how SRI funds' financial returns differ from those of non-SRI funds. The first theory (also known as the Markowitz view) is that SRI funds should have a lower risk-adjusted return because of a lack of diversification and higher transaction costs (Van Liedekerke et al 2007). Since SRI funds employ screens that restrict investment in large parts of industries or even entire sectors, SRI funds cannot match the diversification of mainstream funds. Standard portfolio analysis yields the well known tradeoff between risk and return described by the Markowitz frontier. All else equal, because SRI funds deal with a restricted opportunity set, they are less diversified and yield lesser returns to investors for the same level of risk compared to mainstream funds. As a result of stock (or even industry) exclusion, SRI fund managers can try to mitigate the decreased market exposure by changing their asset allocation strategies. However, the only way such strategy would completely compensate for decreased diversification is if managers could find stocks that are perfectly (positively or negatively) correlated to all the stocks subject to restriction.

Contrary to the Markowitz view, Moskowitz developed a theoretical view which comes to the conclusion that SRI portfolios may have a better risk-return profile than non-SRI portfolios. His argument is that strong social performance indicates that a firm possesses superior management talent and understands how to improve internal and external relationships through socially responsible activities (Moskowitz 1972). In accordance with the Moskowitz view, SRI proponents argue that there is a link between social considerations and financial performance that is reportedly ignored in the market,

and by taking advantage of information about social performance, SRI fund managers can outperform the market (Boatright 2008). By using screens, SRI fund managers claim to be able to generate value-relevant non-public information that helps them make better investment decisions. SRI fund proponents claim that screens help identify companies with superior management and governance practices, or avoid investing in companies that are likely to be involved in corporate or social crises and environmental disasters (Renneboog et al. 2007). Therefore, it is possible that while SRI portfolio managers are constrained from choosing amongst the entire universe of stocks, the pool of stocks from which they do choose is superior to that of the overall market, and thus more likely to provide favorable financial returns over time.

CHAPTER 2

PREVIOUS LITERATURE

As the interest in socially responsible investment funds increased, academics have started to investigate the performance of the SRI funds more closely. The published studies primarily focus on funds traded in the UK and the U.S. Recently, several scholars investigate performance of SRI funds in other markets such as Canada, Australia, and European countries (see for example Kreander et al. 2005; Bauer et al. 2005; Renneboog et al. 2007). The empirical investigations employ several conventional measures of performance to assess financial performance of SRI funds. In particular, most studies base their analysis on the Capital Asset Pricing Model (CAPM) which is used to determine a theoretically appropriate required rate of return of an asset. CAPM takes into account the asset's sensitivity to non-diversifiable (market) risk, as well as the expected return of the market and the expected return of a theoretical risk-free asset (Jensen 1968). Other studies use the Fama-French model which, in addition to the expected return of the market and the risk free asset, takes into consideration the difference in return between a small cap portfolio and a large cap portfolio as well as the difference in return between a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks (Fama and French 1992). Another model used in the analysis of SRI funds' performance is the four-factor Carhart model which extends the Fama-French model by adding the fourth factor which captures momentum; this factor is the difference in return between a portfolio of past winners and a portfolio of past losers (Carhart 1997). The existing

studies often use the following performance measures to compare SRI funds against non-SRI funds: i) the Jensen's alpha, which is the return in excess of a risk-adjusted return of a benchmark portfolio and is used as a common measure of assessing an active manager's performance, ii) the Sharpe ratio, which measures reward to total risk and is used to characterize how well the return of an asset compensates the investor for the risk taken; and iii) the Treynor measure, which measures reward to systemic (market) risk (Kreander 2005).

Over time researchers have improved their models by using more appropriate benchmarks against which to judge SRI funds' performance. Early studies compare SRI fund performance to market-wide indices such as the Standard and Poor (S&P) 500 index for the U.S. funds and the Financial Times Stock Exchange (FTSE) all-share index for the UK funds. For example, in the first published article about the UK SRI funds, Luther, Matatko and Corner (1992) compare the returns of 15 ethical unit trusts traded in the UK to the returns of the FT all-share index. They conclude that the ethical funds slightly outperform the market index. They also find evidence that the UK ethical trusts' investment portfolios are more skewed towards companies with low market capitalization than the market as a whole. In a subsequent study, Luther and Matatko (1994) confirm this small cap bias and show that comparing ethical funds to a small cap benchmark substantially improves their relative performance. Hamilton, Jo and Statman (1993) and Statman (2000) compare the returns of ethical and non-ethical U.S. funds to each other, and to both the S&P 500 and the Domini Social Index (DSI). Using the Jensen's alpha, they conclude that there are no significant differences between ethical and non-ethical

mutual funds and that the Domini Social Index outperforms the S&P 500 over the 1990-98 period.

Attempting to solve the benchmark problem identified by Luther and Matatko (1994), Mallin, Saadouni and Briston (1995) use matched pair analysis. They compared the performance of a group of 29 UK ethical funds with a 29 non-ethical UK funds between 1986-1993, matched on the basis of fund age and size. They provide evidence of ethical mutual fund out-performance, based on Jensen's alpha. M'Zali and Turcotte (1998) attempt to overcome the benchmark problem by comparing the performance of 18 American and Canadian ethical funds with 10 non-ethical funds which were managed by the same companies during the period from 1994 to 1997. Using the Sharpe and Treynor measures to assess fund performance, they show that the majority of all funds (ethical and non-ethical) underperform S&P 500 and the Toronto Stock Exchange (TSE) 300 market indices. Gregory, Matatko and Luther (1997) argue that matching based on fund size is not enough to control for a small cap bias in the ethical portfolios. They employ a matched pairs approach similar to that used by Mallin, Saadouni and Briston (1995) and examine a sample of 18 UK ethical funds and 18 non-ethical UK funds between 1986 and 1994. Using a 2-factor Jensen's alpha (including a small cap benchmark), they confirm their prior observation of the small cap bias. They find no significant difference between the financial performance of ethical and non-ethical unit trusts.

Subsequently, several U.S. studies show that in addition to the small cap bias, sector and style biases are overlooked in the prior research. Specifically, Dibartolomeo (1996), Guerard (1997), and Kurtz (1997) report that the large-cap growth exposure of

the Domini Social Index (DSI), not the social screening, is driving DSI's outperformance over S&P 500. In addition, Goldreyer and Diltz (1999) extend previous studies by including equity, bond and balanced funds in their sample. They find that that social screening does not affect managers' selectivity in any systemic way. More recent studies control for sector and style biases by using appropriate benchmarks. For example, Bauer, et al. (2005), use a sample of 103 German, UK and U.S. ethical mutual funds and apply the four-factor Carhart model to assess financial performance. After controlling for investment style, they find no evidence of significant differences in risk-adjusted returns between ethical and conventional funds for the 1990-2001 time period. Geczy, Stambaugh and Levin (2003) investigate the cost of being constrained to invest only in SRI funds by constructing optimal portfolios of SRI mutual funds and comparing them to those constructed from the broader fund universe. The authors find that the cost of investing only in SRI funds depends on the investor's views about asset pricing models and stock-picking skill by fund managers. For instance, to an investor who adheres rather strongly to a belief in the CAPM and maintains complete disbelief in manager skill, the SRI constraint can cost as little as 1 or 2 basis points per month. However, when the investor's beliefs shift toward multifactor models like the Fama-French three-factor model or the Carhart four-factor extension, or when the investor admits the possibility that fund managers have skill, then the costs associated with socially responsible investing can be as much 30 basis points per month.

More recently, Gregory and Whittaker (2007) investigate both the performance and the consistency of performance of UK ethical funds also on a risk/style adjusted

basis, concluding that neither ethical nor conventional funds exhibit significant underperformance. Girard, Stone and Rahman (2007) examine SRI funds managers' performance in terms of selectivity, net selectivity, diversification and market timing. They compare 117 U.S. SRI mutual funds to Lipper's active benchmark indices of the same investment style in the period between 1984 and 2003 and find that socially responsible mutual fund managers show poor selectivity, net selectivity and market timing ability as compared to benchmark indices. They also find that diversification is significantly different from zero for the SRI funds, indicating that investors bear a cost for their lack of diversification.

Therefore, there exists an extensive body of research regarding the financial performance of SRI funds. The empirical results of SRI and non-SRI fund performance comparisons have been mixed. Many studies have shown that the social screens have no effects on performance and SRI funds can perform as well as (see for example Guerard 1997; Diltz 1995), and even better than unscreened funds (Statman 2000). But other, more recent studies have shown that SRI funds perform worse than unscreened funds (see for example Geczy et al. 2003; Girard et al. 2007).

Despite SRI becoming an important player in the investment market, little is known about how different screens employed by the socially responsible funds affect their financial performance. SRI fund managers have a range of screening criteria from which to choose. SRI funds differ in terms of social screens as well as intensity of screening (some fund managers might employ only positive screens while others are precluded from investing in several industries). This heterogeneity within the socially

responsible funds may help explain the nature of relationship between ethical investment policies and financial returns. Barnett and Salomon (2006) and Renneboog et al. (2007) appear to be the only existing studies that examine the effects of different screening practices on SRI funds' performance. Barnett and Salomon (2006) use a panel of 61 SRI funds from 1972 to 2000 to measure financial performance differences within SRI funds. They find evidence of a curvilinear relationship between screen intensity and financial performance (as the number of screens used by an SRI fund increases, financial returns decline at first, but then rebound as the number of screens reaches a maximum). The authors also conclude that financial performance varies with the types of social screens used. Specifically, their analysis shows that environmental and labor relations screening decrease financial performance. Renneboog et al. (2007) use an extensive sample of 463 SRI mutual funds from 23 countries and compare SRI fund performance to conventional mutual funds from the same countries. Using the four-factor Carhart model, they conclude that SRI funds in many European and Asia-Pacific countries strongly underperform domestic benchmark portfolios by about 5% per annum, but UK and U.S. SRI funds do not significantly underperform their benchmarks. Contrary to Barnett and Salomon (2006), the authors find that fund returns increase with screening intensity. All else equal, funds with eight more SRI screens (i.e. a two standard deviation difference) are associated with a 1.3% higher 4-factor-adjusted return per annum. They also find that screening activities of SRI funds have a significant impact on funds' risk-adjusted returns; specifically, corporate governance and social screens generate better risk-adjusted returns whereas other screens (e.g. environmental ones) yield significantly lower

returns. In addition, employing an in-house research team on SRI issues is associated with increase in returns by 1.2% per annum. Therefore, while there is evidence that SRI fund performance may be better explained by examining screening intensity, the results have been contradictory (Barnett and Salomon 2006; Renneboog et al. 2007). Incorporating screen intensity in a model of SRI returns may explain the tradeoff between lower returns from poor diversification and higher returns from selecting companies with better governance and stakeholder relationships.

CHAPTER 3

SCOPE OF THE STUDY

The main question raised by the existing studies is whether the incorporation of ethical criteria into an investment strategy results in lower risk adjusted returns. This study also addresses this issue by examining the risk-return characteristics of U.S. SRI funds relative to appropriate style benchmarks. Additionally, it investigates the cost of social constrains as well as how much of this cost is due to lower diversification and how much is due to poor portfolio management skills. The total cost of investing in a socially responsible fund (measured by selectivity) is broken into two components: diversification and net selectivity. This study also investigates the impact of screening intensity (measured by total number of screens) on fund's selectivity, net selectivity, and diversification, as well as the difference in impacts of specific screens on aforementioned measures of performance. The possibility of a curvilinear relationship between performance and screen intensity is also tested. Furthermore, the study examines how different screens (e.g. environmental, labor relations) affect fund performance and risk exposure and investigates the possibility of compound effects by using interaction variables.

This study adds to the current body of research in several ways. Previous studies have determined that using a benchmark that is more closely related to the style of the fund improves the validity of the comparison between the risk-adjusted returns of SRI funds and non-SRI benchmarks. This study uses style-appropriate Russell indices, which

solves the style bias problem many early studies suffered from. The time period examined in this study includes the bear market of 2008-2009, which may yield useful results, since many socially responsible funds are young, and their return history examined in previous studies captured only the recent bull market period 2003-2007. In addition, the impact of different types of ethical constraints on risk-return characteristic and the possibility of compound effects are examined, issues that have not yet been explored by most of the existing literature. Moreover, the three existing studies (Girard et. al. 2005; Barnett and Salomon 2006; and Renneboog et. al. 2007) that examine the impact of screen intensity on funds' risk-adjusted returns produced conflicting results. This study attempts to improve on the methods used previously by differentiating between the three types of screen intensity and investigating the impact of each type as well as the impact of the total number of screens on the risk-adjusted returns. Finally, this study also tests a hypothesis of a curvilinear relationship between screen intensity and risk-return characteristics (suggested by Barnett and Salomon 2006), but not replicated in any other study.

CHAPTER 4

METHODOLOGY

Data

The names of existing U.S. socially responsible equity funds are taken from the Social Investment Forum (SIF). SIF has been used in previous literature as a source of SRI fund names (Barnett and Salomon 2006) and statistics on growth of socially responsible investment industry (by most studies related to SRI funds). Data from this source provides information about the social screening strategies (number and type of social screens used) of 109 socially responsible funds as of the end of October 2009. Some of the listed funds are duplicates - different classes of the same fund. For example, Calvert Large Cap Growth appears in four fund classes. I include only the first-established class of the fund (or the class with the most assets if two or more classes of the same fund were established simultaneously). My final sample consists of 68 U.S. equity SRI funds. I examine monthly and annual performance of these funds over the period from January 1994 through August 2009. I use Yahoo Finance to track each fund's financial performance, assets under management, and inception date. Fund monthly and annual returns are calculated by taking the change in a fund's Net Asset Value (NAV) during the period, and then dividing by the initial NAV. According to Morningstar, returns calculated in such way account for management, administrative, and 12b-1 fees and other costs that are automatically deducted from fund assets, but not for sales charges or redemption fees (Morningstar 2009). Thus, the fund return represents

the actual return an investor would receive after owning shares of a mutual fund for one month/year after the mutual fund fees have been deducted. It was not possible to obtain historical data on management, and 12b-1 fees to separate them from the returns. I use Morningstar to determine each fund's investment style and Russell.com to track monthly and annual returns of the benchmark indices. Each SRI fund is matched with a Russell index based on investment style. The sample includes eight dead funds. These are the funds that disappeared during the period of this study. Although there are more funds that disappeared during 1994 – 2009 period, it was not possible to obtain their performance data from the sources used for this study. The cross-sectional characteristics of the sample are described in Table 1.

Table 1. Descriptive Statistics across Funds.

	Mean	Median	Min	Max	Standard Deviation
Assets ($ mil.)	133.06	23.78	0.73	1250	239.65
Age (yr.)	10.32	9	1	37	7.23
Total number of screens	6.91	8	1	11	3.39
Number of positive screens	2.59	3	0	6	2.19
Number of restrictive screens	1.06	0	0	7	1.6
Number of exclusionary screens	3.26	3	0	8	1.88
Front load	1.56	0	0	5.5	2.32

N = 68

Notes: This table shows the average, median, minimum, maximum, and standard deviation measures for SRI fund assets (as of August 2009), age (as of August 2009), and the number of positive, restrictive, and exclusionary screens for the 86 funds in the sample. It also reports the average, median, minimum, maximum, and standard deviation measures for fund front-end load (as of November 2009) for 60 'live' funds within the sample. None of the funds in the sample have a deferred load.

An average SRI fund has $133 million assets under management. Within the sample, total assets under management vary from $0.73 million to $1.25 billion. On

average, SRI funds employ seven screens and the number of screens varies from one to eleven. An average SRI fund employs two positive screens, one restrictive screen, and three exclusionary screens. The average load is 1.56; out of 60 existing funds (no data is available on eight dead funds), 41 funds have no load, while 19 funds have loads ranging from 4.75 to 5.5.

An overview of performance statistics of the sampled existing funds relative to their style-appropriate Russell index benchmarks is presented in Table 2. More than fifty percent of the existing SRI funds outperformed their benchmarks over 1-, 3-, and 10-year periods. In each time period, the mean difference in return cannot be considered negligible to an investor. However, if the survivorship bias is taken into account, on average SRI funds outperform their benchmarks only over the 1- and 3-year periods.

Table 2. Performance Statistics.

Period	1 yr.	3 yr.	5 yr.	10 yr.
Number of funds (n)	60	50	40	29
Percent funds outperformed benchmark	88	62	43	62
Mean difference (% return)	7.12	1.19	-0.13	1.62
Mean difference adj. (% return)	6.81	0.26	-1.69	-1.52

Notes: This table shows the number of funds within the sample whose returns history spans 1-, 3-, 5-, and 10- year periods. The 1-year period is the calendar year 2008; the 3-year period is the period from the beginning of 2005 to the end of 2008 and so on. The table also reports the fraction of funds that had higher total returns than their style-appropriate Russell index benchmarks, and the average difference in total return between SRI funds and their benchmarks over each period. It also reports the difference in total return adjusted for survivorship bias. Adjustment for survivorship bias is calculated by subtracting an estimated overstatement of mean returns (0.31% according to Bauer, et al. 2005) from SRI mean returns over one year, and a compounded measure of 0.31% per year from SRI 3-. 5-, and 10-year returns.

Table 3 reports how often each screening category is used by the funds. The most commonly used screens are weapons and tobacco and the least commonly used screen is community investment.

Table 3. Screening Activities.

Screen Type	% Funds
Weapons	79.7
Tobacco	79.7
Environment	75.4
Alcohol	72.5
Gambling	66.7
Employment	65.2
Human Rights	59.4
Product Safety	59.4
Nuclear Power	52.2
Animal Rights	43.5
Community Investment	37.7

N = 68

Notes: No differentiation is made between positive, restrictive, and exclusionary screens in this table: a fund that has a positive environmental screen and a fund that has a negative environmental screen are counted the same way.

Analysis

I examine the performance of the SRI funds by using the time-series data and estimating Jensen's Alpha for each fund. As in Jensen (1968), I assume that the CAPM holds. First I estimate the CAPM model:

$$R_{j,t} - R_{f,t} = \alpha_j + \beta_j (R_{m,t} - R_{f,t}) + \varepsilon_{j,t} \quad (1)$$

where $R_{j,t}$ is the return of fund j over period, $R_{f,t}$ is the return on the risk-free security for period t (i.e., the 1-month treasury bill rate), $R_{m,t}$ is the return on the benchmark for period t, β_j is the beta of fund j, α_j is the alpha of fund j, and $\varepsilon_{j,t}$ is the random error for

fund j over period t with an expected value of zero. The fund manager's predictive ability in terms of forecasting or security selection (known as selectivity) is measured by the intercept (α_j). If alpha is positive, then a fund manager has the ability to accurately predict stock prices. If it is negative, then the manager cannot beat a buy and hold strategy.

Fama (1972) shows that, by actively selecting securities that are undervalued, portfolio managers give up part of the diversification potential of their portfolios. Compared to conventional fund managers, SRI fund managers face an additional set of restrictions of their investment universes – the SRI screens. Following Fama (1972), I measured the return due to improper diversification (Div):

$$Div_{j,t} = [\,(\sigma_j / \sigma_m) - \beta_j]\; * (R_{m,t} - R_{f,t}) \qquad (2)$$

where σ_j is the standard deviation of fund j's returns, σ_m is the standard deviation of the benchmark returns. Diversification represents the added return necessary to justify any loss of diversification in a portfolio.

If SRI investors bear an additional cost of investing in SRI funds (i.e. selectivity is negative) compared to conventional funds, it is possible to determine how much of that cost comes from the manager's lack of ability to select stocks (net selectivity) by subtracting diversification from selectivity. Thus, I calculate net selectivity (NS) as follows:

$$NSj,t = (R_{j,t} - R_{f,t}) - (\sigma_j / \sigma_m) * (R_{m,t} - R_{f,t}) \qquad (3)$$

Net selectivity is the additional return coming from selecting undervalued securities net of the additional return due to improper diversification. Positive net

selectivity implies that the SRI manager is able to pick undervalued securities. Negative net selectivity implies that SRI investors bear a cost of the SRI manager's poor selection skills. Thus, the true cost of investing in SRI funds is the selectivity, which is comprised of the manager's stock picking ability (net selectivity) and the cost of foregoing the benefits of full diversification (diversification). Theoretically, since the cost of inadequate diversification results from using ethical screens, it can be viewed as a conscious contribution to the ethical cause. However, a negative net selectivity results from poor portfolio management skills, not from the social responsibility constraint. Therefore, if SRI funds exhibit negative net selectivity, SRI investors bear an additional cost of investing in these funds beyond the ethical premium paid.

Formally, I estimate the following hypothesis:

Hypothesis 1: Socially responsible funds perform differently than non-SRI funds.

Hypothesis 1: H_o: Selectivity (α) = 0 H_a: Selectivity (α) $\neq$ 0

I estimate selectivity for each fund using time series regression shown in equation (1). Because of the nature of the time series data, autocorrelation is likely to be a problem. The data may also have heteroskedasticity since 'assets under management' is included as an explanatory variable and its variance is likely to be correlated with the error. The standard in the SRI literature for correcting for heteroskedasticity and autocorrelation is using Newey-West errors with four lags for monthly data. After correcting for heteroskedasticity and autocorrelation, I test Hypothesis 1 separately for each fund.

Due to the nature of my sample, the estimates of selectivity are likely to be overstated because of survivorship bias. As pointed out by Brown et al. (1992), leaving out dead funds leads to an overestimation of average performance because funds that cease to exist usually have low returns. The approximate overestimation of returns of SRI funds in the U.S. due to survivorship bias is up to 0.31% per annum (0.025% per month) (Bauer et al. 2005). Including eight dead funds in the sample mitigates the survivorship bias, but does not eliminate it completely, since not all dead funds are represented. I estimate monthly and annual measures of diversification and net selectivity for each fund using equations (2) and (3). I take the median measures of the two variables to use in the hypothesis testing. I use the median instead of the average to minimize the effect of outliers.

After investigating the performance of socially responsible funds relative to their non-SRI benchmarks, I now explore cross-sectional differences within the SRI funds. In order to pursue social objectives, SRI managers employ ethical screens in their investment decisions. SRI funds are heterogeneous in terms of the screening intensity: some funds use more screens than others and some funds use stricter screens than others. Previous studies examined the effect of screening intensity on financial performance by regressing risk-return characteristics on either the total number of screens employed by a fund (see Barnett and Salomon 2006; and Renneboog et. al. 2007) or the weighted sum of the number of screens with positive screens corresponding to smaller weights relative to restrictive or exclusionary screens (see Girard et. al. 2005). The precise effects of

positive, restrictive, and exclusionary screens have not been explored in the literature. I estimate these effects by including the three types of screens separately in the regression.

Following Barnett and Salomon (2006); and Renneboog et. al. (2007), I use the total number of screens each fund applies to its investment as a proxy for the fund's screen intensity. According to the Social Investment Forum, there are eleven screens SRI funds currently use relating to alcohol, tobacco, gambling, defense/weapons, nuclear power, animal testing, product safety, environment, human rights, employment equality, and community investment. Thus screening intensity varies from one to eleven. If a fund's screening intensity is given a value of eleven, this indicates that the fund employs all of the above-listed screens, whereas a value of one indicates that the fund uses only one of the available screens. To control for potential size and age biases, I include a measure of overall fund assets and a measure of fund age into my regression. To also test for a possible curvilinear relationship between selectivity and screen intensity suggested by Barnett and Salomon (2006), I add a quadratic term $(\#\text{ of screens})^2$ to the regressions.

Not all screens restrict the investment universe the same way: positive screens force managers to overinvest in certain industries while restrictive screens leave only parts of industries in the investment universe, causing bigger cost to investors in terms of foregone diversification than positive screens do, and exclusionary screens preclude managers from investing in certain industries altogether, causing the biggest cost in terms of diversification. To account for the differences in screen intensity levels, I create three count variables, one for each type of screens. I then run a different regression including

these count variables, but excluding the total number of screens to avoid multicollinearity.

Socially responsible funds vary not only in the intensity of their social screening, but also in the types of screens they use. SRI fund investors can choose from a variety of funds that pursue different social objectives, and thus use screens targeting different industries. The different screens may affect fund risk-return characteristic in different ways. To test this possibility, I create 11 indicator variables – one for each type of screen. Due to the nature of indicator variables, I exclude the variable corresponding to weapons screen from the regressions (I choose weapons because 79% of the funds in my sample have a restrictive or an exclusionary screen on businesses related to the weapons industry); thus the coefficients on all the other types of screens show the effects of these types of screens on fund risk-return characteristics relative to a fund that only has a screen on weapons.

Since some of the screens target related industries (e.g. alcohol, tobacco and gambling screens target so called 'sin' investments), it is possible that simultaneously using more than one restrictive or exclusionary screen targeting related industries has different effects on risk-return characteristics than using just one screen that targets those industries. For instance, if a fund only uses a tobacco screen, (but does not screen for alcohol and gambling), it loses a certain degree of achievable diversification; similarly a fund that only uses an alcohol screen, (but does not screen for tobacco or gambling) loses a different degree of achievable diversification. The costs of these funds' investment strategies to their respective investors are estimated previously by coefficients of

indicator variables for tobacco and alcohol screens. However, it could be the case that if a fund employs screens for tobacco, *and* alcohol, *and* gambling, the cost of these screens may be greater than the sum of the costs of individual screens. One possible reason for such difference is that if only one screen that targets related industries is used, the manager can try to mitigate the diversification costs imposed by that screen by investing more in the other industry related to the excluded one. However, if at the same time the manager faces another screen precluding him/her from investing in that related industry, s/he will not be able to mitigate the cost of inadequate diversification, thus leaving his/her investors with a greater diversification cost than they would have incurred by investing in two funds – one that screens out only one industry, and another that screens out the other industry. Specifically, studies have shown that 'sin' stocks have historically outperformed the market (see Hong and Kacperczyk 2005) so it is possible that using tobacco, alcohol, and gambling screens at the same time would result is a greater cost than already predicted by the separate indicator variables. To examine this assertion, I create interaction variables 'sin2' and 'sin3' which take on a value of one if a fund employs either restrictive or exclusionary screen in two or three 'sin' industries (alcohol, tobacco, and gambling), and take on a value of 0 otherwise. The resulting models are as follows:

$$Selectivity_j = \beta_{0s} + \beta_{1s}(\text{log total assets}) + \beta_{2s}(age) + \beta_{3s}(\text{total \# screens}) + \qquad (4\text{-a})$$

$$+ \beta_{4s}(\text{\# screens})^{\wedge 2} + \beta_{5s}(\text{screen type 1}) + \ldots + \beta_{14s}(\text{screen type10}) + \beta_{15s}(sin2) + + \beta_{16s}(sin3) + \varepsilon_{js}$$

$$Selectivity_j = \mu_{0s} + \mu_{1s}(\log \text{total assets}) + \mu_{2s}(age) + \mu_{3s}(\#\text{ exclusionary screens}) + \quad (4\text{-b})$$

$$+ \mu_{4s}(\#\text{ exclusionary screens})^{\wedge 2} + \mu_{5s}(\#\text{ restrictive screens}) + \mu_{6s}(\#\text{ restrictive screens})^{\wedge 2} +$$

$$+ \mu_{7s}(\#\text{ positive screens}) + \mu_{8s}(\#\text{ positive screens})^{\wedge 2} + \mu_{9s}(\text{screen type 1}) +$$

$$+ \mu_{18s}(\text{screen type10}) + \mu_{19s}(sin2) + \mu_{20s}(sin3) + \varepsilon_{js}$$

Equations (4-a) and (4-b) are also used with Diversification and Net Selectivity as dependent variables. Coefficients from these regressions are represented by β_{id} and μ_{id} for Diversification and β_{in} and μ_{in} for Net Selectivity. Both equations are estimated with robust standard errors to avoid heteroskedastricity. With these models, I test the following hypotheses:

Hypothesis 2: Selectivity is inversely related to the total number of screens used.

Hypothesis 3: Cost of inadequate diversification is positively related to the total number of screens used (due to restricted investment universe).

Hypothesis 4: Net Selectivity is positively related to the total number of screens used (due to manager's better knowledge of securities in the smaller investment universe).

Hypothesis 2:	$H_o: \beta_{3s} = 0$	$H_a: \beta_{3s} < 0$
Hypothesis 3:	$H_o: \beta_{3d} = 0$	$H_a: \beta_{3d} > 0$
Hypothesis 4:	$H_o: \beta_{3n} = 0$	$H_a: \beta_{3n} > 0$

The true cost of investing in SRI funds (selectivity) incorporates both the stock picking ability of the manager (net selectivity) and the cost of foregoing the benefits of full diversification (diversification). Since positive net selectivity and the cost of incomplete diversification affect risk-adjusted return in opposite directions, it is possible that the true relationship between the cost of investment in SRI funds (selectivity) and the total number of screens is in fact curvilinear. This means that SRI funds that have a small

number of screens are able to choose from a larger universe of potential investments, thus increasing their odds of achieving sufficient diversification. As the number of screens used by the fund increases, so does the cost of inadequate diversification. However, this negative effect is offset by potential benefit from improved manager's security selection ability due to either better knowledge of the securities within a smaller investment universe or because the screens remove underperforming securities from the investment universe (as SRI proponents claim). To test the possibility of a curvilinear relationship between selectivity and the total number of screens, I investigate the following hypothesis:

Hypothesis 5: The total cost of investing in an SRI fund (selectivity) is a curvilinear function of the number of screens used by the fund.

Hypothesis 5: $H_o: \beta_{4s} = 0$ $H_a: \beta_{4s} > 0$

To study how exclusionary, restrictive, and positive screens affect fund performance, I test the following hypotheses:

Hypothesis 6: The number of exclusionary screens employed by a fund is inversely related to selectivity.

Hypothesis 7: The number of restrictive screens employed by a fund is inversely related to selectivity.

Hypothesis 8: The number of positive screens employed by a fund is inversely related to selectivity.

Hypothesis 6: $H_o: \mu_{3s} = 0$ $H_a: \mu_{3s} < 0$

Hypothesis 7: $H_o: \mu_{5s} > 0$ $H_a: \mu_{5s} < 0$

Hypothesis 8: $H_o: \mu_{7s} > 0$ $H_a: \mu_{7s} < 0$

Additionally, I test the same three hypotheses with regard to diversification, and net selectivity as dependent variables. I also test the possibility of a curvilinear relationship between selectivity and exclusionary, restrictive, or positive screens.

Hypothesis 9: The total cost of investing in an SRI fund (selectivity) is a curvilinear function of the number of exclusionary/ restrictive/ positive screens used by the fund.

Hypothesis 9a: $H_o: \mu_{4s} = 0$ $H_a: \mu_{4s} > 0$

Hypothesis 9b: $H_o: \mu_{6s} = 0$ $H_a: \mu_{6s} > 0$

Hypothesis 9c: $H_o: \mu_{8s} = 0$ $H_a: \mu_{8s} > 0$

To investigate how the different types of screens used by SRI funds affect financial performance, I test the following hypothesis:

Hypothesis 10: The type of screen used by the mutual fund influences the fund's selectivity.

This can be broken into sub-hypotheses:

Hypothesis 10a: The fund's use of human rights screen and selectivity are related.

Hypothesis 10b: The fund's use of employment practices screen and selectivity are related. And so on.

Hypothesis 10a: $H_o: \mu_{9s} = 0$ $H_a: \mu_{9s} \neq 0$

And so on until Hypothesis 10j.

Additionally, I test the same hypothesis with regard to diversification, and net selectivity as dependent variables. I also test the possibility of compound costs of using several "sin" screens:

Hypothesis 11: Using two restrictive or exclusionary screens of "sin" industries is associated with lower selectivity.

Hypothesis 12: Using two restrictive or exclusionary screens of "sin" industries is associated with greater cost of inadequate diversification.

Hypothesis 13: Using two restrictive or exclusionary screens of "sin" industries is associated with lower net selectivity.

Hypothesis 11:	H_o: $\mu_{19s} = 0$	H_a: $\mu_{19s} < 0$
Hypothesis 12:	H_o: $\mu_{19d} = 0$	H_a: $\mu_{19d} > 0$
Hypothesis 13:	H_o: $\mu_{19n} = 0$	H_a: $\mu_{19n} < 0$

Additionally, I test the same hypothesis with regard to using three restrictive or exclusionary screens.

CHAPTER 5

FINDINGS

Table 4 presents descriptive statistics for selectivity, diversification, and net selectivity obtained from monthly data. Since median diversification and net selectivity are used instead of the mean within a fund, median selectivity, diversification, and net selectivity are also calculated across the funds. As discussed previously, the median is used instead of the mean to minimize the effect of outliers.

Table 4. Descriptive Statistics across Funds – Monthly Data.

	Median	Min	Max
Alpha (%)	-0.02	-1.9	1.56
Diversification (%)	0.07	-0.48	0.32
Net Selectivity (%)	-0.05	-1.52	1.6

N = 68

Notes: One measure of alpha is calculated for each fund using CAPM, according to equation (1) with Newey-West errors with four lags. The median, minimum and maximum measures of alpha are then taken across funds. Multiple measures, one per month, of diversification, and net selectivity are calculated for each fund using equations (2) and (3). A median measure of monthly diversification and net selectivity is taken for each fund. Then median, minimum, and maximum measures are taken across the funds.

The negative but small median Alpha across funds indicates that there exists a small cost of investing in SRI funds. It appears that the cost of investment in SRI funds is due to somewhat inferior manager stock picking skills, judging from the positive median diversification and negative median net selectivity coefficients.

Table 5 presents descriptive statistics for selectivity, diversification, and net selectivity obtained from annual data.

Table 5. Descriptive Statistics across Funds – Annual Data.

	Median	Min	Max
Alpha (%)	-0.05	-7.65	8.84
Diversification (%)	0.2	-0.41	3.89
Net Selectivity (%)	-0.38	-11.44	12.72

N= 49

Notes: One measure of alpha is calculated for each fund using CAPM, according to equation (1) with Newey-West errors with one lag. The median, minimum and maximum measures of alpha are then taken across funds. Multiple measures, one per year, of diversification, and net selectivity are calculated for each fund using equations (2) and (3). A median measure of annual diversification and net selectivity is taken for each fund. Then median, minimum, and maximum measures are taken across the funds.

Annual data show similar results to the monthly data. There appears to be a small cost associated with investing in SRI funds, as indicated by the negative median alpha. SRI funds appear to have managers with poor undervalued security picking ability. An interesting difference in the results between monthly an annual data is that selectivity (alpha) is very small in both cases. This is a result of diversification and net selectivity being opposite effects on selectivity.

To evaluate the statistical significance of selectivity, I test Hypothesis 1 separately for each fund. In the monthly dataset I reject the Hypothesis only in 4 cases out of 68, and in the annual dataset I reject Hypothesis 1 in 7 out of 49 cases. The overview of estimated alpha levels for each fund is presented in Table 6 below. (For details refer to Appendices A and B).

Table 6. Selectivity Summary.

Alpha	Monthly data (n=68)		Annual data (n=49)	
	number	%	number	%
Positive	1	1.47	2	4.08
Negative	3	4.41	5	10.2

Notes: This table reports the number and fraction of funds whose alpha, calculated according to equation (1), was statistically significant at the level 0.1 or higher.

According to the monthly data, most of the funds exhibit no significant cost of investment represented by Alpha, while 4% of funds have a statistically significant negative Alpha, which indicates that these funds underperform their benchmarks. However, 1% of funds have statistically significant positive Alpha, meaning that these funds perform better than their benchmarks. Thus an investor who wishes to purchase a socially responsible fund will choose from a set of funds where most funds perform as well as their non-SRI benchmarks with a 4% chance of picking a fund that performs worse than its benchmark and a 1% chance to pick a fund that performs better than its benchmark. According to the annual data, 4% of funds have a statistically significant positive Alpha and 10% have statistically significant negative Alpha. The results differ in the annual data because there are fewer funds in the sample and because three more funds showed significant Alpha coefficient in the annual regressions. However, using both sets of data, one could draw a conclusion that most SRI funds exhibit no significant cost of investment, while a small fraction of funds perform worse than their benchmarks, and even smaller portion of funds perform better than their benchmarks. It is important to keep in mind that, since funds that cease to exist usually have low returns, the data suffers from survivorship bias. Therefore, the results presented above are likely to underestimate the fraction of SRI funds that perform worse than their style-appropriate benchmarks.

The results of cross-sectional regressions that use fund selectivity, diversification, and net selectivity obtained by time series regression of the monthly data are presented in Table 7.

Table 7. Determinants of Risk-Adjusted Returns – Monthly Data.

Dependent variable	Selectivity (% per month)		Diversification (% per month)		Net Selectivity (% per month)	
Equation	4-a	4-b	4-a	4-b	4-a	4-b
Constant	-0.54	0.85	0.14	0.06	-0.12	1.01
Fund Characteristics						
Log Total Assets	0.11***	0.05	0	0	0.16***	0.12***
Age	-0.01	0	0	0	-0.04***	-0.03***
Screening Intensity						
Total # Screens	-0.05	n/a	-0.04	n/a	-0.08	n/a
Total # Screens^2	0	n/a	0	n/a	0	n/a
# Exclusionary Screens	n/a	-0.65***	n/a	-0.02	n/a	-0.71***
# Exclusionary Screens^2	n/a	0.06***	n/a	0	n/a	0.06***
# Restrictive Screens	n/a	-0.04	n/a	-0.08	n/a	-0.04
# Restrictive Screens^2	n/a	0	n/a	0.01	n/a	-0.01
# Positive Screens	n/a	-0.14	n/a	-0.01	n/a	0
# Positive Screens^2	n/a	0.03	n/a	-0.01	n/a	0
Screen Type (relative to Weapons screen)						
Community Investment	0.19	-0.27	0.13	0.18	-0.19	-0.31
Environmental	-0.09	-1.19***	-0.07	-0.06	0.12	-1.03**
Human Rights	0.33	0.11	-0.07	-0.06	0.26	0.08
Employment Practices	0.31	1***	0.07	0.04	0.59	1.32***
Product Safety	-0.08	-0.06	0.06	0.08	-0.41	-0.15
Animal Rights	-0.09	-0.11	-0.01	0	-0.24	-0.01
Nuclear Power	0.19	0.48	0.05	0.04	-0.05	0.31
Alcohol	-0.46	-0.78***	0.09	0.09	0.03	-0.13
Tobacco	0.25	-0.19	0.01	0.06	0.11	-0.09
Gambling	0.97***	0.66***	-0.13	-0.13	0.72**	0.47
Sin2	-0.3	0.21	0	-0.03	-0.62	-0.13
Sin3	-0.2	0.89	0.12	0.05	-0.76	0.29
F-statistic	5.14	7.87	1.88	1.75	4.08	5
Adjusted R^2	0.5	0.67	0.17	0.18	0.42	0.55

N = 68

Notes: All regressions are calculated with robust standard errors to correct for heteroskedasticity. Total assets are the fund assets under management as of August 2009 and age is the fund age as of August 2009. Weapons screen type is not included to avoid multicollinearity. Thus, the coefficients on all the remaining screen types show the estimated effects of these screens relative to a fund that only has a weapons screen. The variables 'sin2' and 'sin3' are interaction variables that take on a value of 1 if a fund has two or three screens in 'sin' industries (tobacco, alcohol, and gambling).

** indicates significance at .05 level; *** indicates significance at .01 level.

The monthly data show that there is no significant relationship between the total number of screens a fund uses and selectivity, diversification or net selectivity. However, there appears to be a curvilinear relationship between the number of exclusionary screens a fund uses, selectivity, and net selectivity. This means that selectivity and net selectivity decline at first as the number of exclusionary screens increases, but then increase with addition of a larger number of exclusionary screens. For net selectivity, it could be the case that talented managers who do not believe in socially responsible investment are willing to join SRI funds that have only a few exclusionary screens, but not the funds that have many exclusionary screens, while talented managers who believe in socially responsible investment may want to only join funds which have many exclusionary screens. These two effects combined may result in curvilinear relationship between the number of exclusionary screens and net selectivity where funds with either high or low number of exclusionary screens both have higher net selectivity than funds with moderate number of exclusionary screens. The curvilinear relationship between exclusionary screens and manager ability translates into a curvilinear relationship between the number of exclusionary screens and return relative to benchmarks. At the same time, there is no evidence of a significant relationship between the number of either restrictive or positive screens and selectivity, diversification, or net selectivity. Thus, the results indicate that only the exclusionary screens significantly affect SRI fund performance relative to benchmarks.

The difference between equations (4-a) and (4-b) is that the first one does not distinguish among exclusionary, restrictive, and positive screens while the second one

does. Since regressions based on equation (4-b) show significant results for exclusionary screens, differentiating between the types of screens proves to be important. Additionally, the adjusted R-squared coefficients indicate that regressions based on the equation (4-b) explain more of the variability in selectivity, diversification, and net selectivity than regressions based on the equation (4-a). Thus, I refer to the regression based on the equation (4-b) for other results.

An inherent assumption underlying the decision to differentiate between exclusionary, restrictive, and positive screens is that one type of screening intensity is different from another in the degree to which it decreases opportunity for diversification and affects selectivity. However, one may argue that restrictive and exclusionary are not very different from each other inasmuch as they both restrict SRI funds' investment universe, unlike positive screens, which place more emphasis on certain firms within the investment universe (e.g. 'green' firms). In order to test the possibility that exclusionary and restrictive screens are not different enough to be considered separately, I group the restrictive and exclusionary screens into a new category – negative screens and re-run equation 4-b (see appendix C). Both the new variable and its square are not statistically significant in monthly and annual data, which suggests that the results are sensitive to differentiating between restrictive and exclusionary screens and that these two types of screens do influence fund risk-return characteristics differently.

There is evidence of a significant positive relationship between total assets and net selectivity. However, it is difficult to determine whether assets under management influence net selectivity or whether net selectivity influences assets under management

(since funds that perform well tend to attract more assets). Thus, the significant coefficient might be due to this relationship and not to the effect of assets on net selectivity. There is a significant negative relationship between a fund's age and its net selectivity. Older funds tend to have managers with poorer security picking ability. Therefore, a positive learning curve does not appear to exist in socially responsible fund management. This observation is consistent with results of the Girard, Stone and Rahman (2007) study. From all the categories of screens used by SRI funds, only environmental, employment practices, alcohol, and gambling screens exhibit a statistically significant relationship to the funds' risk-return characteristics. The data show that adding an environmental screen (when a fund avoids investment in companies that engage in practices or make products that are harmful for the environment or when a fund seeks to invest in green and environmentally responsible companies) is associated with a 1.19 point decrease in selectivity and 1.03 point decrease in net selectivity. Therefore, funds that use an environmental screen are predicted to underperform their benchmarks by 1.19% per month largely due to the fact that such funds tend to have managers with poor security selection skills. An employment practices screen (when a fund seeks to invest in companies that have fair employment practices) is associated with a 1.00 point increase in alpha and 1.32 points increase in net selectivity. Therefore, funds that use an employment screen are predicted to outperform their benchmarks by 1% per month because using an employment screen is associated with managers being able to pick undervalued securities. This result supports the SRI fund proponents' claim that fair employment practices could be a signal of good management practices. If such a signal

is overlooked in the general market, the SRI funds that screen for employment practices have a better chance of finding undervalued securities. Similarly, using a gambling screen is associated with an increase in alpha. Funds that do not invest in the gambling industry tend to outperform their benchmarks by 0.66% per month. However, funds that use an alcohol screen tend to underperform their benchmarks by 0.78% per month. Although alcohol screen is negatively related to selectivity, there is no evidence of a link between screening for two or three "sin" (alcohol, tobacco or gambling) industries and selectivity, diversification, or net selectivity.

Although in most publications written on performance of socially responsible funds monthly data are used for the analysis, this study analyzes the annual data in addition to the monthly data to examine how the potential costs associated with different types of screens affect long-term investors. The annual data are also likely to be less noisy than the monthly data. However, there are problems with the annual dataset that may potentially lead to biased results. First, since some funds in the sample are young, these funds are not represented in the annual data. Second, the annual data do not reflect the 2009 returns while the monthly data includes returns from January through August 2009. Third, although the annual data are less noisy, there is also has less variability in the dependent variables. Because of these differences between the datasets it is difficult to draw parallels between the two. Nevertheless, keeping the limitations of the annual data in mind, it is still useful to compare the results obtained from the annual data to those obtained from the monthly data.

Table 8. Determinants of Risk-Adjusted Returns – Annual Data.

Dependent variable	Selectivity (% per month)		Diversification (% per month)		Net Selectivity (% per month)	
Equation	4-a	4-b	4-a	4-b	4-a	4-b
Constant	-2.99	8.98	-1.64	0.29	-0.71	3.46
Fund Characteristics						
Log Total Assets	1.03***	1.07***	-0.15**	-0.14**	1.65***	1.57***
Age	-0.1	-0.11	0.08***	0.08***	-0.32***	-0.28**
Screening Intensity						
Total # Screens	-2.02	n/a	0.61	n/a	-2.05	n/a
Total # Screens^2	-0.04	n/a	-0.03	n/a	0.04	n/a
# Exclusionary Screens	n/a	-8.47	n/a	0.15	n/a	-5.03
# Exclusionary Screens^2	n/a	0.81	n/a	0.07	n/a	0.33
# Restrictive Screens	n/a	-0.09	n/a	0.36	n/a	-0.38
# Restrictive Screens^2	n/a	-0.15	n/a	0.04	n/a	-0.13
# Positive Screens	n/a	-1.44	n/a	0.99**	n/a	-2.25
# Positive Screens^2	n/a	0.27	n/a	-0.05	n/a	0.31
Screen Type (relative to Weapons screen)						
Community Investment	1.62	-2.5	-0.84	-1.35	0.72	-1.87
Environmental	6.56	-2.78	-2**	-1.96	7.95	0.72
Human Rights	4.4	1.73	0.02	-0.46	1.65	0.51
Employment Practices	-1	5.84	0.49	-0.25	-2.62	3.82
Product Safety	1.11	-3.08	0.7	-0.06	1.35	0.35
Animal Rights	1.86	-1.56	0.67	-0.01	-1.38	-2.04
Nuclear Power	4.99	4.75	0.1	-0.66	3.9	5.11
Alcohol	0.38	-7.96	-0.22	-0.54	3.7	-1.73
Tobacco	2.92	-1.99	-1.60**	-1.54	4.39	0.47
Gambling	11.77***	14.06***	-1.12**	-1.27**	13.19***	14.61***
Sin2	-4.4	-1.05	2.11**	1.22	-9.55	-5.11
Sin3	7.15	3.74	2.38	1.15	-16.63	-5.98
F-statistic	3.36	2.85	3.02	2.89	3.53	2.69
Adjusted R^2	0.44	0.44	0.4	0.44	0.46	0.41

N = 49

Notes: All regressions are calculated with robust standard errors to correct for heteroskedasticity. Total assets are the fund assets under management as of August 2009 and age is the fund age as of August 2009. Weapons screen type is not included to avoid multicollinearity. Thus, the coefficients on all the remaining screen types show the estimated effects of these screens relative to a fund that only has a weapons screen. The variables 'sin2' and 'sin3' are interaction variables that take on a value of 1 if a fund has two or three screens in 'sin' industries (tobacco, alcohol, and gambling).

** indicates significance at .05 level; *** indicates significance at .01 level.

As with the monthly data, there appears to be a significant relationship between fund assets, selectivity, net selectivity, and diversification, but this might be caused by reverse relationship between risk-return characteristics and fund assets (funds that perform well as a result of being diversified and/or employing talented managers tend to attract more assets). Similarly to the monthly data, annual data do not indicate a significant relationship between the total number of screens and fund risk-return characteristics. Unlike the monthly data, there is no evidence of a significant relationship between exclusionary screens and fund risk-return characteristics found in the annual data, but there is evidence of a significant positive relationship between the number of positive screens and the return due to improper diversification. An additional positive screen is associated with a 0.99% increase in the added return necessary to justify the loss of diversification. Since the total number of funds does not appear to have a significant effect on fund risk-return characteristics, while the number of positive screens does, I rely on results based on equation (4-b) for further analysis. Although younger funds were excluded from the annual dataset, the results show that even within older funds, age is associated with poor manager security selection ability and slightly higher return due to improper diversification (0.08% annually). Out of all the categories of screens used by SRI funds only gambling screen exhibits a statistically significant relationship to the funds' risk-return characteristics. Funds that do not invest in companies associated with gambling tend to outperform their benchmarks by 14.06% annually, have lower return due to improper diversification (by 1.27% per annum), and managers with better security selection ability (net selectivity is 14.61%). There is no evidence of a link between

screening for two or three “sin” industries and selectivity, diversification, or net selectivity. These results partly correspond to the results obtained from the monthly data where ‘sin2’ and ‘sin3’ coefficients were also insignificant, and gambling screens were linked to higher performance, but not to better manager ability. It could be the case that the effect of gambling on net selectivity is more pronounced in the annual data since the managers make more decisions within a year than within a month, thus a screen probably influences manager behavior every given year, but not every given month. Unlike the monthly dataset, there is no evidence of a significant relationship between environmental, employment practices, or alcohol screens and fund risk-return characteristics.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, this study shows that there is a relationship between a socially responsible fund's performance and its screening practices. While the total number of screens does not appear to be related to fund risk-return characteristics, monthly data show that there is a curvilinear relationship between the number of exclusionary screens, selectivity, and net selectivity. Thus, fund returns relative to a benchmark and manager stock selection ability both decline at first as the number of exclusionary screens increases, but then increase with addition of a larger number of exclusionary screens. Additionally, annual data show that having a large number of positive screens is related to higher return due to improper diversification. At the same time, using gambling screens is related to better financial performance compared to a benchmark as shown by both monthly and annual data. Annual data also link gambling screens to lower return due to improper diversification and having a manager with good security selection skills. According to the monthly data, there is an inverse relationship between environmental screens, fund returns relative to benchmark and manager stock selection ability. At the same time, there is a positive relationship between employment practices screens, fund returns relative to benchmark and manager stock selection ability according to the monthly data. Therefore, there is evidence that some screening strategies significantly affect fund performance while others do not. This result implies that investors could

benefit from carefully considering the effects that screening strategies are likely to have on the performance of mutual funds before making investments.

While this study uses some new ways to look at the question of socially responsible mutual fund performance (looking at separate effects of exclusionary, restrictive, and positive screens and examining the compound effect of two or three "sin" screens) there are other ways to explore this question or make the analysis better in the future research. These include using a four factor Carhart model for the time series and comparing the results to the standard CAPM used here, replicating the study using a better dataset which includes more dead funds and encompasses a larger period of time, and separating management and 12b-1fees from fund returns. One may also include vice funds in the data set and compare their returns to those of SRI funds since some vice funds' investment practices could be interpreted as positive screens for tobacco, alcohol, and gambling.

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APPENDICES

APPENDIX A

SELECTIVITY DETAILS – MONTHLY DATA

Table 9. Selectivity Details – Monthly Data.

Symbol	Alpha (% per month)	t	Symbol	Alpha (% per month)	t
AHRAX	-0.14	-0.34	NBSTX	0.24	0.74
AHADX	0	0.02	NALFX	0.09	0.24
AMAGX	0.47	1.6	NCGFX	-0.02	-0.08
AMANX	0.13	0.88	PRBLX	0.36	**1.68***
ATAFX	0.17	0.67	PARNX	0.32	0.81
APPLX	0.76	1.29	PARMX	-0.02	-0.05
CAAPX	0.05	0.27	PARSX	0.5	0.87
ARFFX	-0.01	-0.02	PARWX	0.5	0.77
ARGFX	-0.02	-0.1	PXWGX	-0.02	-0.08
AEIFX	-0.54	**-1.9***	PXSCX	-0.11	-0.11
ADJEX	-0.31	-1.09	PAXVX	0.04	0.13
CCAFX	-0.23	-0.86	PXWEX	-0.8	-0.69
CLGAX	0.09	0.34	MYPVX	0.25	0.63
CMVAX	-0.32	-1.23	WAEGX	-0.13	-0.53
CNVAX	-0.19	-0.68	SPEGX	-0.05	-0.07
CCVAX	-0.36	-1.07	TLGAX	-0.24	-1.02
CSXAX	-0.05	-0.2	TPLNX	0.22	0.8
CSIEX	0.21	0.82	UTCCX	-1.08	-1.37
CMIFX	-0.36	**-1.88***	UTCRX	-1.49	-1.55
DSEFX	0.05	0.27	UTGRX	-1.9	**1.77***
IMANX	0.09	0.43	UTYIX	-0.68	-1.12
DRTHX	-0.09	-0.68	VFTSX	0.12	0.42
ALTEX	-0.4	-0.24	WSEFX	0.11	0.43
FLRUX	-0.1	-0.36	WGGFX	0.1	0.22
GCEQX	-0.01	-0.05	CGAEX	0.04	0.02
IGIAX	-0.11	-0.27	CIOAX	-0.29	-0.34
AQEGX	0.07	0.38	CWVGX	-0.3	-0.97
AQBLX	-0.19	-0.68	DFESX	1.56	**1.25***
AQEIX	-0.2	-1.57	DUPFX	-0.11	-0.13
MMPGX	-0.16	-0.81	DEUFX	0.32	0.52
TMVIAX	-0.28	-1.5	DPAFX	0.31	0.32
MGDEX	-0.27	-1.21	GAAEX	-0.95	-0.68
MMSCX	-0.59	-0.65	PGRNX	-0.39	-0.26
NBSRX	0.16	0.58	PORTX	0.41	0.77

Notes: Alpha is calculated for each fund according to equation (1) using monthly returns adjusted for dividends and splits, as well as management, administrative, and 12b-1 fees, but not for sales charges and redemption fees. The errors are Newey-West errors with lags of order four. * indicates significance at 0.1 level.

APPENDIX B

SELECTIVITY DETAILS – ANNUAL DATA

Table 10. Selectivity Details – Annual Data.

Symbol	Alpha (% per month)	t	Symbol	Alpha (% per month)	t
AHRAX	-3.04	-2.7	NBSTX	2.45	0.64
AHADX	0.36	0.13	NALFX	2.1	0.3
AMAGX	8.31	1.52	NCGFX	2.51	1.41
AMANX	1.64	0.69	PRBLX	4.43	**2.05***
ATAFX	1.83	1.36	PARNX	1.6	0.42
APPLX	n/a	n/a	PARMX	-0.21	-0.04
CAAPX	-0.43	-0.16	PARSX	-0.05	-0.04
ARFFX	-5.61	-5	PARWX	0.77	0.18
ARGFX	-1.29	-0.45	PXWGX	1.51	0.54
AEIFX	-7.65	**-2.40***	PXSCX	n/a	n/a
ADJEX	-2.5	-1.02	PAXVX	n/a	n/a
CCAFX	-1.78	-0.69	PXWEX	n/a	n/a
CLGAX	3.51	1.51	MYPVX	4.26	1.26
CMVAX	-3.69	-1.85	WAEGX	0.39	0.12
CNVAX	-0.83	-0.2	SPEGX	n/a	n/a
CCVAX	-3.39	-0.86	TLGAX	-3.47	**-2.80****
CSXAX	-0.37	-0.22	TPLNX	2.65	0.88
CSIEX	1.61	0.52	UTCCX	n/a	n/a
CMIFX	-3.63	**-2.51****	UTCRX	n/a	n/a
DSEFX	0.3	0.22	UTGRX	n/a	n/a
IMANX	0.8	0.69	UTYIX	n/a	n/a
DRTHX	-1.27	-1.2	VFTSX	-0.59	-0.23
ALTEX	n/a	n/a	WSEFX	3.35	1.81
FLRUX	-0.98	-0.2	WGGFX	4.96	1.6
GCEQX	-0.65	-0.53	CGAEX	n/a	n/a
IGIAX	2.46	0.33	CIOAX	n/a	n/a
AQEGX	-0.28	-0.15	CWVGX	-3.68	-0.92
AQBLX	-3.11	-1.15	DFESX	n/a	n/a
AQEIX	-3.27	**-2.20***	DUPFX	n/a	n/a
MMPGX	-1.87	-0.66	DEUFX	8.84	3.95
TMVIAX	-3.33	**-4.96*****	DPAFX	n/a	n/a
MGDEX	n/a	n/a	GAAEX	n/a	n/a
MMSCX	n/a	n/a	PGRNX	n/a	n/a
NBSRX	1.47	0.43	PORTX	7	**4.23*****

Notes: Alpha is calculated for each fund according to equation (1) using annual returns adjusted for dividends and splits, as well as management, administrative, and 12b-1 fees, but not for sales charges and redemption fees. The errors are Newey-West errors with lags of order one.
* indicates significance at 0.1 level; ** indicates significance at .05 level; *** indicates significance at .01 level.

APPENDIX C

SENSITIVITY TEST

Table 11. Determinants of Risk-Return Characteristics – Sensitivity Test.

Dependent variable	Selectivity (% per month)		Diversification (% per month)		Net Selectivity (% per month)	
Equation	Monthly	Annual	Monthly	Annual	Monthly	Annual
Constant	-0.66	-4.76	0.21	-1.34	-0.37	-0.31
Fund Characteristics						
Log Total Assets	0.10***	1.02***	0	-0.15**	0.16***	1.59***
Age	-0.01	-0.14	0	0.07***	-0.04***	-0.29**
Screening Intensity						
# Negative Screens	0.08	-0.65	-0.08	0.81	-0.05	-1.76
# Negative Screens^2	-0.01	-0.18	0	-0.06	-0.01	0.1
# Exclusionary Screens	n/a	n/a	n/a	n/a	n/a	n/a
# Exclusionary Screens^2	n/a	n/a	n/a	n/a	n/a	n/a
# Restrictive Screens	n/a	n/a	n/a	n/a	n/a	n/a
# Restrictive Screens^2	n/a	n/a	n/a	n/a	n/a	n/a
# Positive Screens	-0.28	-3.52	0.03	0.27	-0.19	-1.11
# Positive Screens^2	0.04	0.15	0	-0.02	0	0.15
Screen Type (relative to Weapons screen)						
Community Investment	0.02	0.16	0.13	-1.41**	0.02	-0.55
Environmental	0.35	6.98	-0.23	-2.31**	0.42	9.3
Human Rights	0.37	4.3	-0.11	-0.07	0.41	0.77
Employment Practices	0.12	-0.34	0.11	0.84	0.58	-4.94
Product Safety	-0.24	1.7	0.06	0.95	-0.28	-0.37
Animal Rights	-0.2	2.26	-0.05	0.92	-0.02	-3.07
Nuclear Power	0.17	4.87	0.02	-0.08	0.15	2.7
Alcohol	-0.48	0.46	0.06	-0.07	0.2	2.1
Tobacco	0.14	1.83	0.02	-1.82**	0.26	3.85
Gambling	1.06***	11.56***	-0.16	-1.51**	0.84**	14.19***
Sin2	-0.32	-3.57	0	2.12**	-0.62	-10.27
Sin3	-0.35	-7.024	0.13	2.29	-0.79	-18.06
F-statistic	4.74	2.91	1.94	2.44	3.54	3.05
Adjusted R^2	0.5	0.42	0.2	0.35	0.41	0.43

Monthly N = 68; Annual N = 49

Notes: All regressions are calculated with robust standard errors to correct for heteroskedasticity. Total assets are the fund assets under management as of August 2009 and age is the fund age as of August 2009. Weapons screen type is not included to avoid multicollinearity. Thus, the coefficients on all the remaining screen types show the estimated effects of these screens relative to a fund that only has a weapons screen. The variables 'sin2' and 'sin3' are interaction variables that take on a value of 1 if a fund has two or three screens in 'sin' industries (tobacco, alcohol, and gambling).

** indicates significance at .05 level; *** indicates significance at .01 level.