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SRI – "Superior Return Investment?"

A study of Swedish socially responsible investment mutual funds over a longer period, evaluating the performance of funds and managers in different market conditions.

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ABSTRACT

The market for socially responsible investment funds has been growing steadily in the recent years, and sustainable growth can be argued to be of great importance to future generations. Previous research has, contradictory to classic financial theory indicated similar performance between mutual funds imposing ethical constraints, and their conventional unrestricted counterparts. This research set out to complement previous research in evaluating performance of SRI funds and their managers over a longer time period, as well as pioneering by investigating a period of economic turmoil in particular. By using cross-sectional data from 266 Swedish mutual funds between the years 2004 and 2014, fund performance for SRI and conventional funds was studied. Performance was analyzed over three sub-periods: pre-, post- and during the 2008 financial crisis. By controlling for differences in investment universe for the two types of funds, differences in fund managers' performance were observed. This paper is consistent with previous research in concluding similar performance between SRI and conventional funds during non-crisis periods. However, in times of economic turmoil, this paper contradicts previous research by concluding that a positive relationship between ethical constraints and return exist.

KEYWORDS:
SRI, Socially Responsible Investment, Ethical Investment, Mutual Fund Performance, Financial Crisis.

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1 Introduction

Investments based on social, ethical and environmental criteria have witnessed an astonishing growth the last couple of years. Sixteen years ago, the European market for socially responsible investment (SRI) funds consisted of 159 retail funds having a total of €11 billion of assets under management (AUM). In 2014 the number of SRI funds were 957 with €127 billion of AUM. Despite the rapid growth, the market for SRI funds is still a niche in Europe, only accounting for 1.7% of the total assets under management. Sweden accounted for roughly 6% percent of this market, totaling €7.5 billion of assets under management (Vigeo, 2014).

The speedy evolution of this new field within the financial community made academics interested in the performance of socially responsible funds compared to funds not taking social, ethical or environmental criteria into consideration (referred to as conventional funds). It has been argued by Rudd (1981) that imposing socially responsible constraints on an investment portfolio and thereby reducing the investment universe available, would only lead to decreased diversification which most likely would not be offset by increased returns. However, the vast majority of empirical studies comparing SRI funds' performance relative to the performance of conventional funds do not support this argument. In fact, the academic consensus is that there seem to be no significant differences in performance between the two types of funds.

In this empirical study, we aim to further investigate whether SRI funds out- or underperform their conventional peers by looking at the Swedish mutual fund market during the years 2004-2014. All analyzed funds are actively managed mutual funds with the common goal of outperforming their respective benchmark indices. Our ambition is to elaborate on to what extent different fund managers can keep their promises to investors.

By dividing the period into three sub-periods, we are able to isolate the recent global financial crisis and investigate whether this period of turmoil display similar results as in the pre-crisis and post-crisis periods. Additionally, this paper examines whether the performance of Swedish SRI funds can be attributed to the skill of SRI fund managers or if it is due to the underlying firms' performance of socially responsible firms. By constructing two benchmark market indices replicating the different investment universes that SRI and conventional fund managers are subject to, we are able to bring clarity in this matter. Our main vehicles for attaining results to evaluate fund performance is the capital asset pricing model (Sharpe, 1964) and the Carhart (1997) 4-factor model.

The aspects which sets this paper apart from previous empirical analysis of the subject are many. Firstly, most studies examine other geographical areas than Sweden, the US and UK being the most frequent regions under investigation. Secondly, previous papers look at long periods of time without dividing them into sub-periods to look for potentially interesting differences. Thirdly, as our sample period is more recent than that of the majority of existing papers have examined, this paper can be seen as a more current outlook on the state of the market of SRI and conventional funds. Finally, the methodology used in this paper to evaluate the performance of the different fund types is unlike that of previous research.

The results from this study shows that the performance of Swedish SRI and conventional funds do not differ considerably from one another during non-crisis periods, but that SRI funds outperform conventional funds during the recent financial crisis. We can also conclude that SRI funds' outperformance during the financial crisis is due to the underlying performance of socially responsible companies, and not due to superior skills of SRI fund managers.

1.1 Question Formulation

1. How do SRI funds' compare to conventional funds in terms of performance? Does the result differ in the period of economic turmoil?
2. Can SRI-funds potential out- or underperformance be derived from fund management skills or underlying firm performance?

2 Theoretical Background

The theoretical background for this research is thoroughly accounted for in this section. The section is structured into four parts, where the first three parts are meant for general knowledge about SRI funds and screening, investor behavior and turnover effects. The final part of this section elaborates on previous research that is more focused on the matter of this paper.

2.1 Socially Responsible Investment - Definition & Screening

Through this paper, the American terminology SRI (Socially Responsible Investment) funds is used to describe funds that have a restricted investment universe due to certain imposed ethical constraints. The definition of these funds vary greatly, in the same way as the kind of criteria that they impose on their investments portfolios vary (Sandberg et al., 2009).

Most ethical funds use some kind of negative screening to exclude certain securities from their investments. Such screens are normally sector screens, where entire sectors are eliminated because of their engagement in unethical business such as alcohol, tobacco or pornography. Another frequently used negative screen is to exclude securities that violate international norms. Moreover SRI-funds often practice positive selection criteria to further narrow their investments and make their securities portfolio more ethical. Such selection criteria could be governance, best-in-class, or environmental criteria.

The SRI fund market has grown rapidly in recent time, and with the larger market, a wider spread in ethical criteria can be observed (Schäfer, 2005). Some fund managers are ideologically motivated to great extent, while others are not as willing to sacrifice potential return for ethical values, and thereby are very similar to their conventional counterparts. In order to evaluate funds (firms) true SRI (CSR) motivation, rating institutes have rated funds and firms since the 1970's in terms of ethical performance (Schäfer, 2005). Moreover many member states in the European Union are passing legislation regarding, and promoting further information on how to present ethical performance to stakeholders (Steurer et al, 2008).

While there is a point in specifying ethical performance to make soft values more transparent, many attempts have been made to mainstream ethical investments, and create a common framework for screening SRI funds. One of the broader, and more recent (2013) definitions of SRI was set by the UN PRI (United Nations Principles for Responsible Investments) when they defined responsible investments as follows:

> *"Responsible investment is an approach to investment that explicitly acknowledges the relevance to the investor of environmental, social and governance factors, and of the long-term health and stability of the market as a whole. It recognizes that the generation of long-term sustainable returns is dependent on stable, well-functioning and well governed social, environmental and economic systems."*

2.2 Socially Responsible Investments - Investor behavior

Bollen (2007) argues that investors investing in SRI-funds finds a 'soft' value in the ethical nature of their investments, and because of that, they are less sensitive to negative returns and more reluctant to sell their shares due to past poor performance. This investor behavior is expected to put less pressure on fund managers to perform.

2.3 The effect of turnover on fund performance

There are many previous studies examining the relation between capital turnover in mutual funds and return. Many argue that high turnover is associated with high transaction costs, both explicit in form of commissions, and implicit in the form of market impact costs. Turnover and associated transaction costs have been concluded relevant for fund performance with up to 1.2% decrease in fund performance for each 100% of turnover (Bogle, 1994; Carhart, 1997).

2.4 Previous Research

Following the rapid growth of the SRI industry, the academic interest in the field has increased. The empirical studies examining SRI funds can be traced back to Moskowitz (1972). His paper marked the beginning of numerous future empirical analyses of the performance of SRI funds compared to conventional funds, which were not limited by socially responsible constraints.

Rudd (1981) argues that investing based on socially responsible criteria should negatively affect portfolio performance. The additional set of constraints that an ethical investor impose on their portfolio limits their investment universe and therefore decrease diversification. The decrease in diversification is not likely to be offset by increased risk-adjusted returns. However, most studies investigating the performance of SRI funds compared to conventional funds find little to no evidence of this argument. In fact, the overwhelming part of the literature investigating SRI fund performance concludes that SRI funds neither seem to outperform, nor underperform conventional funds. Hamilton et al. (1993), Statman (2000) and Bello (2005) concludes that for US SRI funds, there are no significant differences in performance when compared to conventional funds. Similarly, research focused on the UK market suggests that no significant difference in return is present between SRI funds and their conventional counterparts (Luther et al., 1992; Mallin et al., 1995; Gregory et al., 1997 and Gregory and Whittaker, 2007). Multi-country studies examining the performance of SRI funds vis-à-vis conventional funds suggests that significant differences are non-existent overall but with a few exceptions, these studies are carried out by Schroder (2004) for US, UK and Swiss funds; by Bauer et al. (2005) for US, UK and German funds and by Kreander et al. (2005) for selected European countries, including Sweden. Renneboog et al. (2008) studied selected North American, European (including Sweden) and Asia-Pacific countries (France, Japan and Sweden showed statistically significant underperformance of SRI funds compared to conventional funds). Renneboog et al. (2008) also showed indications of SRI funds in the US and Germany going through a catching up phase, meaning that SRI funds went from performing worse than

conventional funds in the early phase of their period to matching their performance during their later period.

When evaluating SRI funds' performance compared to conventional funds, some studies uses a so called matching approach, while others uses time-series without applying a matching approach to run regressions based on a factor model. The matching approach compares SRI and conventional funds' performance by matching an SRI fund to one or several conventional funds by one or more similarities in fund characteristics such as fund size, fund age, investment universe and/or country. The performance measures that are used to explain differences in fund performance when applying a matching approach is the Jensen (1968) alpha from a regression based on a factor model, the Sharpe (1966) ratio and the Treynor (1965) ratio. Major studies based on a matching approach includes Mallin et al. (1995), Statman (2000), Bauer et al. (2005), Kreander et al. (2005) and Renneboog et al. (2008). For time-series regressions based on a factor model the common performance measure is the Jensen alpha for explaining fund performance. Important studies not applying the matching approach are conducted by Luther et al. (1992), Hamilton et al. (1993) and Schroder (2004).

The methodology of research made on the evaluation of differences in fund performance between SRI funds and their conventional equivalents has increased in sophistication over time. Earlier studies solely uses a single index model like the CAPM (Sharpe, 1964) to evaluate SRI fund performance (Luther et al., 1992; Hamilton et al., 1993 and Sauer, 1997). More recent research incorporates a more elaborative multi-factor model like the Fama and French (1993) 3-factor model with the additional size and book-to-market factors or the extended Carhart (1997) 4-factor model which also incorporates a momentum factor in addition to the size and book-to-market factors to measure the different types of funds' performance (Geczy et al., 2003; Bauer et al., 2005; and Renneboog et al., 2008). Studies using the matching approach to measure differences in performance between the two fund types evolved from using fund size and age as the matching criteria (Mallin et al., 1995) to incorporating additional matching criteria such as investment universe and fund country (Kreander et al., 2005), or the presence of load fees and risk exposures (Renneboog et al., 2008).

The sample period used for many of the studies previously listed are pre-financial crisis (naturally, since the vast majority of them have been published before). Some more recent research includes Cortez et al., (2009) who examines the performance of SRI funds from seven European countries until February 2007 and Chang and Witte (2010), who examines US SRI

fund performance until March 2008, but also these studies fail to cover the full duration of the financial crisis. The main part of the existing literature uses a sample period consisting of about ten years of data, a few use shorter periods such as Kreander et al. (2005) who uses three years of data during the period 1996-1998. Renneboog et al. (2008) who concludes that Swedish SRI funds underperform their conventional peers, examines data between 1991 and 2003, not covering any part of our sample period.

As Luther and Matatko (1994) points out, SRI funds tend to invest a larger portion of their portfolio in small-cap stocks than conventional funds. This evidence is further reinforced by Gregory et al. (1997), Geczy et al. (2003), Schroder (2004) and Bauer et al. (2005), who all reach the same conclusion. To mitigate this bias when evaluating the performance of SRI funds and conventional funds, a multi-factor model is used. Some studies instead include a broad market index and a small-cap index and combining this with the CAPM, and thereby effectively creating a two-factor model to benchmark the funds' performance against (Luther and Matatko, 1994; Gregory et al., 1997 and Schroder, 2004).

The majority of previously mentioned studies benchmark their investigated funds against a general market index based on the geographical focus of the investment universe of their funds. Bauer et al. (2005) also benchmark the SRI funds against an SRI index i.e. an index which excludes firms that are "non-SRI". The constituents of this index are therefore only firms that are categorized as socially responsible. The reasoning behind using this approach is to benchmark SRI funds against an index that imitates the limited investment universe that an SRI fund manager is facing. Renneboog et al. (2008) construct an additional factor, an "ethics" factor which is based on the excess returns of an ethical index, to the Carhart 4-factor model. The authors argues that this additional factor controls for the potential style difference that SRI fund managers have compared to conventional managers. However, this ethics factor only had limited influence on the risk-adjusted returns of SRI funds.

3 Hypothesis

Based on previous research and the theoretical framework, three hypotheses regarding performance of Swedish SRI funds compared to conventional funds are derived.

Previous literature, as described above, generally concludes that no significant difference in performance between SRI and conventional funds are present over longer time

periods. Our research is investigating a longer perspective as well, but we focus on shorter periods of time by dividing the full period into three sub-periods: pre-, financial- and post-crisis. Our first hypothesis rely on our results being consistent with results from previous research: during the pre- and post-crisis periods, the performance of SRI and conventional funds should not differ considerably.

However, when isolating the period of the recent financial crisis, we expect our results to differ from the non-crisis periods. Our second hypothesis is that SRI funds should outperform conventional funds during this period. This hypothesis builds on our third hypothesis, that the potential outperformance of SRI funds during the financial crisis cannot be attributed to fund managers skills, but the underlying firm performance of SRI companies. We base these hypotheses on several arguments.

Firstly, SRI fund managers may, by having an investment universe only containing socially responsible companies, avoid potential costs associated with companies being subject to bad publicity due to environmental impact or violation of social norms, especially in bad times when companies' practices are heavily scrutinized. One could argue that SRI fund managers' use of elaborate positive screening processes, raises their potential of actively choosing investments with desirable characteristics. This process however, is associated with costs in form of monitoring companies regularly, why we expect this skill to be balanced out by the increase in costs. Secondly, firms which are commonly seen as unethical are heavy industries, such as mining and steel production, due to their violations of norms or environmental impact. Such industries are (above average) dependent on the general market conditions that prevail, and firms within these industries would likely suffer during a financial crisis. As unethical firms experience stagnant growth and less return during periods of hardship compared to other firms, conventional funds holding such securities should be affected negatively. It is worth noting that there are also unethical securities, so called 'sin' stocks, such as gambling, alcohol, weapons and tobacco that experience higher returns in bad times (Hong and Kacperczyk, 2009). For example, budget cuts in the military/defense sector were nonexistent during the 2008 financial crisis for the European member states (European Parliament, 2011).

Prior to our research we do not see any net value added to the stock-picking abilities by the more rigorous screening process of SRI fund managers. We do however estimate there to be a positive net value in applying ethical constraints to the investment universe during

periods of economic turmoil, for the reasons stated above. We therefore expect SRI funds to perform better during the financial crisis, not because of managers' performance, but because of the restricted (SRI) investment universe performing better than the unrestricted.

Hypothesis 1

SRI funds are expected to perform similar to conventional funds during periods of non-crisis.

Hypothesis 2

SRI funds are expected to perform better than conventional funds during the recent financial crisis.

Hypothesis 2.1

SRI funds expected outperformance comes from underlying firm performance and not SRI fund managers' skills.

4 Data

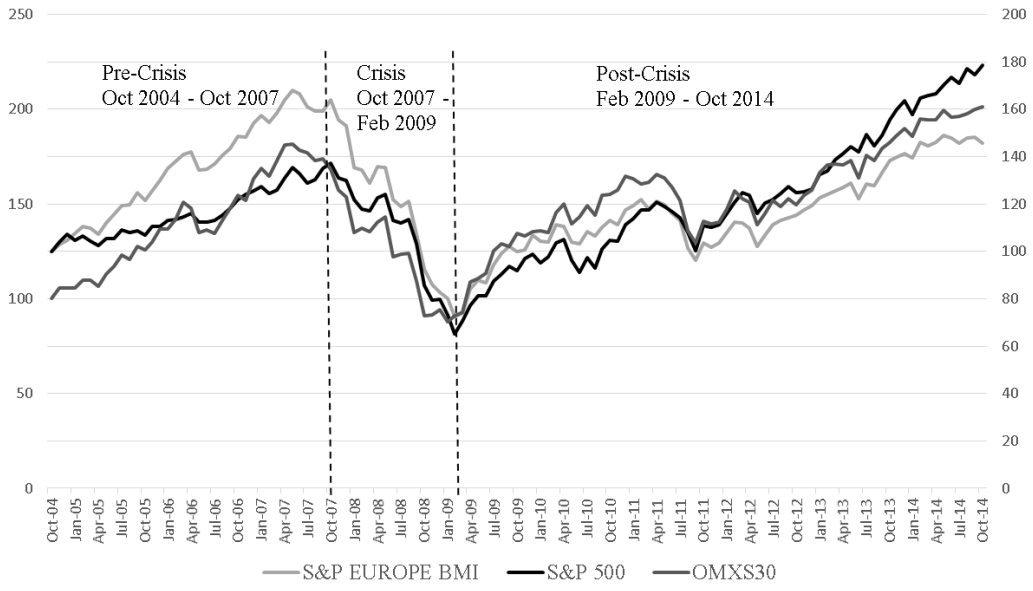


Figure 1 - Market development (normalized values) for relevant indices during the period of October 2004 to October 2014.

Evaluating fund return during the most recent financial crisis requires defining the crisis in terms of setting a start and an end date for the crisis period. Such dates can be defined in many

ways. The US Federal Reserve Bank of Saint Louis (2015) have published a timeline for the crisis stretching from February 2007 to April 2011. As this research is focused on values in terms of return, dates for the start and end were set to where markets peaked and started to recover respectively. We have, by looking at normalized values for some broad indices for different markets (Figure 1), defined our crisis period to be between October 2007 and February 2009. The period before October 2007, is labeled pre-crisis, and later than February 2009 is labeled post-crisis.

4.1 Fund data

Morningstar Sweden, an independent provider of investment research (Morningstar Sweden, 2015) have provided us with time series data of fund returns. The data provided consists of monthly returns, net of management fees, for all active mutual and index funds registered in Sweden between October 2004 and October 2014. The original fund set consisted of 1355 funds. Only actively managed Swedish mutual funds are under investigation in this paper, hence all passive funds and funds managed from abroad have been excluded. Further, we have restricted this study to only include equity funds which Morningstar defines as funds investing at least 75% of their holdings in equity. All funds are traded in Swedish Krona (SEK). Lastly, we limit the geographical investment universe of the funds to Europe, including Sweden. These limitations result in a final fund set consisting of 266 funds. However, as we divide our timeline into three periods, the number of funds active during each period deviate.

One pitfall when estimating fund performance over a period of time is the possible presence of a survivorship-bias (Brown et al., 1992). A survivorship-bias arises when funds which have ceased to exist during the period under investigation are excluded from the sample set. This results in an overestimation of fund performance as those dead funds which have been excluded from the analysis are likely to have been poor performing funds. Our fund sample mitigates this bias as Morningstar have provided us with a survivorship-bias free set of funds, meaning that the funds which have died during the period are still included.

4.2 Benchmark indices

We have constructed two benchmark indices in order to evaluate SRI funds' and conventional funds' performance. These are from this point on called the unrestricted market index and the SRI market index. Our benchmark indices are constructed by weighting individual country subsets of the S&P Europe BMI index to construct the unrestricted market index and the DJSI Europe index to construct the SRI market index. In our regressions we are using these

benchmark indices as proxies for the market return, both for an unrestricted investment universe as well as for the restricted SRI market. The reason for constructing our own benchmark indices is to match the funds' investment distribution between countries (i.e. how big of a portion of their AUM funds invest in each country) better than the S&P Europe BMI and the DJSI Europe does. Our constructed indices therefore redistributes country weights to match the investment distribution of our funds. The methodology of constructing these more appropriate benchmarks is described in method section.

The reasoning behind using subsets of the S&P Europe BMI to construct our own unrestricted market index is that the S&P Europe BMI is widely used as a proxy for the expected return of the (unrestricted) European market portfolio (i.e. not subject to SRI constraints). Similarly, our SRI market index is constructed using subsets of the DJSI Europe, which is a market index that imitates the restricted investment universe that an SRI fund manager is facing. It represents a proxy for the expected return of a European SRI market portfolio (i.e. a portfolio containing socially responsible companies solely). The returns from both indices are calculated based on price returns, meaning that the indices track capital gains but not cash distributions.

As a robustness check, we run regressions on the regular S&P Europe BMI and DJSI Europe indices to see if our own constructed indices explains variation in fund returns better. Also, as another robustness check, we use the Swedish OMXS30 as a benchmark index.OMXS30 is used to investigate whether our funds are subject to a home-bias that our weighted indices cannot capture.

4.2.1 S&P Europe BMI

S&P Europe BMI (Standard & Poor's Europe Broad Market Index) is a subset of the S&P Global BMI, and comprises 1780 constituents from 16 European countries. In terms of market capitalization, the UK have the biggest country allocation with a 31% index weight, Sweden is in 6th place with a 5% index weight (see detailed country allocation in the method section below). The index includes small-, mid- and large-cap companies.[1]

4.2.2 DJSI Europe

The DJSI Europe (Dow Jones Sustainability Index Europe) is a subset of the S&P Global BMI, and comprises 154 constituents from 16 European countries. Concerning country allocation, the UK is biggest with an index weight of 28.5% based on market capitalization, Sweden has

[1] S&P Dow Jones Indices, accessed on 2015-05-08.

the 9th highest allocation with an index weight of 1.5% (see detailed country allocation in the method section below). The index includes small-, mid- and large-cap companies. The DJSI Europe uses a best-in-class approach when deciding which companies to include. The companies are sorted into 57 industry groups and then ranked based on a sustainability score (the more sustainable a company is, the higher their score is).The sustainability score accounts for general as well as industry-specific sustainability trends and evaluates companies based on various criteria including climate change strategies, energy consumption, human resources development, knowledge management, stakeholder relations and corporate governance. The leaders in each industry, i.e. the top 20% of companies in terms of the sustainability score are included in the index. From the remaining companies, below the top 20% threshold, some are included in order to reduce turnover.[2]

4.2.3 OMXS30

The OMXS30 consists of the 30 most actively traded stocks on the Stockholm Stock Exchange. We use this index as a replacement for the S&P Europe BMI in order to investigate whether our set of funds may be subject to home-bias when measuring the performance of SRI funds and conventional funds. The home-bias phenomenon refers to the possible tendency among our Swedish fund set to overweigh Swedish stocks at the expense of limited European exposure (even though they have Europe as their investment universe).[3]

4.3 Risk-free rate

As a proxy for the risk-free rate, we use the Euribor (short for Euro Interbank Offered Rate) one month interbank rate. It is the average interest rate at which many European banks borrow funds from one another. In the European money market, the Euribor is referred to as being the major reference rate. The interest rates provide the basis for the price and interest rates of various financial products like interest rate swaps, interest rate futures, saving accounts and mortgages.[4]

4.4 Carhart Factors

The market portfolio factors *SMB*, *HML* and *MOM* used in our regressions based on the Carhart 4-factor model are obtained from Asness, Frazzini and Pedersen (2014) through AQR AM[5].

[2] Dow Jones Sustainability Indices, accessed on 2015-05-08.
[3] NASDAQ, accessed on 2015-05-08.
[4] Euribor-Rates, accessed on 2015-05-08.
[5] AQR Asset Management, accessed on 2015-05-13.

The factors are provided for each country and weighted in the same way as our weighted benchmark indices. Moreover, a set of factors for the European market is obtained from the Kenneth R. French data library for reference[6]. Monthly data was retrieved on the size, book-to-market and momentum portfolios. A more elaborate explanation of the construction of the factors can be found under the method section.

5 Method

The methodology of this research can be divided into three different working areas. First a semi-manual screening process, where funds are screened to our delimitations, and where SRI-funds are separated from conventional funds based on negative screens and positive selection criteria. In the same part of the methodology, the funds' investment universes are analyzed for future construction of a weighted benchmark index and weighted market factors. Following the screening process, regression analysis is conducted where fund return is regressed in line with the CAPM and Carhart 4-factor model using our constructed benchmark indices. Regressions are done for conventional and SRI-funds individually, during the three different sub-periods (pre-, financial-, and post crisis). Finally, different indices are used as a proxy the market return in order to determine a level of robustness in the results, and ensure reliable conclusions.

[6] Kenneth French data library, accessed on 2015-05-08.

5.1 Screening and benchmark indices

Table 1 - Strategies for socially responsible investments

Negative Screening • **Sector based** • **Norm based**	Excluding companies based on criteria relating to their activities, products, policies or performance. Sector based refers to excluding whole sectors. Norm based screening implies that companies are excluded if they are considered to have violated international norms such as the UN Global Compact or ISO 26000.
Positive screening	Selecting companies or industries to invest in based on their activities, products, policies or performance.
Best-in-Class	Investing in companies considered to be leaders in their respective industry in terms of their governance and management processes, as well as Environmental, Social, and Governance (ESG**)** performance.
Thematic investments	Selecting assets on the base of investment themes such as climate change or demographic change.
Active Ownership	Investors use their formal rights and informal influence to encourage companies to improve.

Source : UN PRI, (2013)

In order to measure the performance of SRI funds compared to conventional funds, a distinction between which funds belong to the former or the latter group, needed to be made. As we have covered previously, there is no uniform classification of what constitutes a socially responsible fund. As our study does not examine the variation in definitions of SRI funds per se, we have chosen to use a broad definition of what constitutes an SRI fund. We classify funds that can be determined as socially responsible using the screens listed in table 1 as SRI funds. The screens are formulated to be in line with the UN PRI (2013), and the screening process is conducted by examining the fact sheets available to investors, fund by fund. The screens are defined as clearly as possible and the screening process is strict to avoid selection bias to arise. Screening resulted in a group consisting of 81 (7891 observations) SRI funds, the remaining 185 (14670 observations) funds being classified as conventional.

In order to compare the return of SRI and conventional funds, and the performance of managers through regression analysis, indices are used as proxies for the return of the markets available to fund managers. Two benchmark indices are needed. The unrestricted benchmark will show whether SRI funds perform worse or better than their conventional peers, on a more general level, i.e. compared to the European stock market as a whole. The second

index is used when controlling for SRI-managers restricted investment universe due to their ethical constraints.

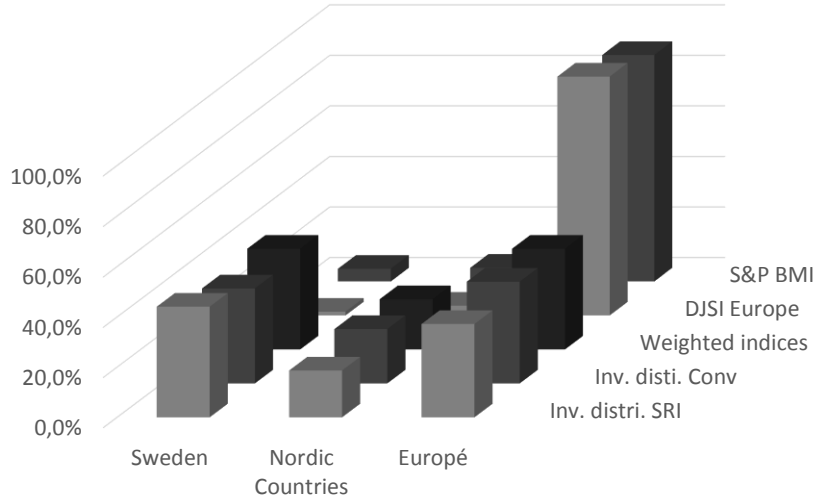


Figure 2 – From front to back: Regional distribution for the evaluated SRI and conventional funds' investments. Our weighted indices distribution across regions. The distribution of regular indices (DJSI Europe & S&P Europe BMI).

During the screening process, the geographical investment distribution between different European areas was recorded for the funds as seen in figure 2. In order to create an adequate benchmark index, subsets of the S&P Europe BMI index and the DJSI Europe index was weighted according to the geographic regional distribution of our funds' investments (figure 2) while keeping the country-within-region distribution fixed as seen in figure 3**.** The complete weighting distributions for the indices can be observed in Appendix A.

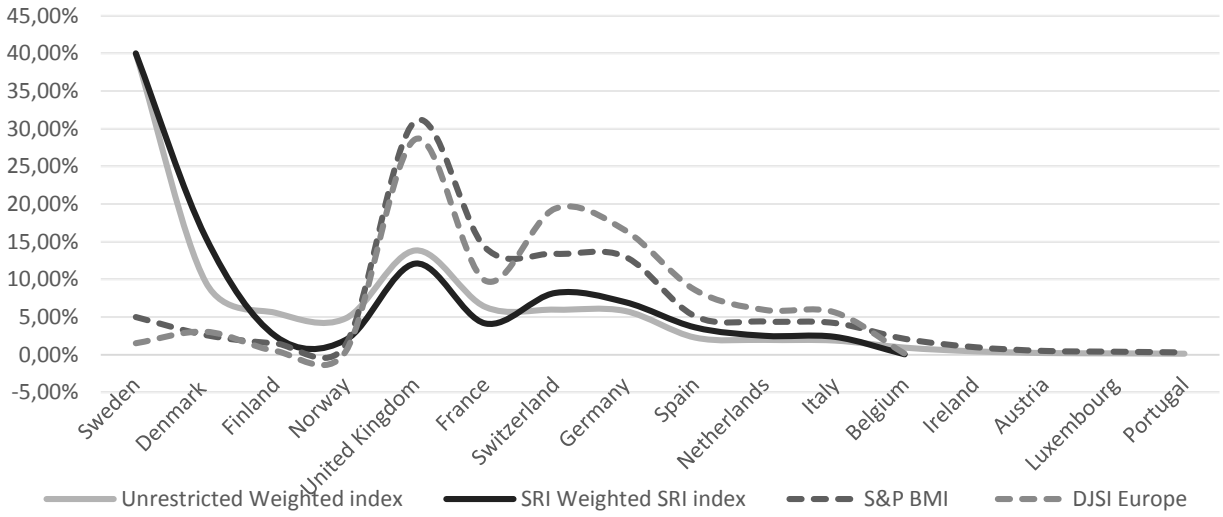


Figure 3 – Weight of indices for different countries.

5.2 Regression analysis

We have conducted several regressions based on the CAPM and the Carhart 4-factor model. In this section our regressions and the used models will be explained.

5.2.1 Regressions

To compare the performance of SRI and conventional funds, we run regressions based on two models. One based on the CAPM single-index model and the other on the Carhart 4-factor model.

First, we run regressions using our weighted unrestricted market index as a proxy for the European market return. This index is believed to replicate a portfolio consistent with our funds' investment universe regarding distribution of funds investment between countries and industries. The result from regressions benchmarked against the unrestricted index will show whether SRI funds perform better or worse than their conventional peers, on a strict return basis, i.e. compared to the European stock market as a whole (same benchmark). This market index takes the geographical investment universe that that the two types of fund managers are facing into consideration, but it does not take the restricted investment universe that SRI fund managers are facing into consideration.

Second, we run regressions using the same models on the SRI funds using our weighted SRI index as a proxy for the returns on the European SRI market portfolio. We thereby investigate whether SRI funds, given their restricted investment universe, out- or underperform the underlying SRI index. The SRI index is assumed to offer the highest risk-adjusted returns in the restricted market. These regressions gives us indication whether SRI fund managers perform better or worse than conventional fund managers, given their different investment universes. The same approach have previously been used by Bauer et al. (2005).

5.2.2 Winsorizing input data

Ordinary least square (OLS) regression is the basic technique to find a linear relation between independent and dependent variables and the technique is used throughout this research. Each observation is treated equally through the regression and there is no controlling for entity-specific properties that would alter the result. The model is rather primitive and aims to minimize the squared residuals (the vertical distance between the observation and the approximation line). Because of the simplicity of regression technique, outliers in data can affect the approximation to an unjustified extent. We expect there to exist outliers within our

dataset that are not characteristic for fund returns in general, such data points arise from extraordinary circumstances which we do not want regressions to account for. To decrease the impact of outliers in our regression results, we have chosen to winsorize (Winsor, 1947) the fund returns for the different sub periods. Data points above/below the top/bottom percentile of observations is set to the $99^{th}/1^{st}$ percentile. The winsorizing technique is deemed favorable to options such as truncation, as it leaves the number of funds intact and, to a limited and justified extent, allows regressions to take replaced observations into account.

5.2.3 CAPM single-index model

The most common way of measuring mutual fund performance is to use a single-index model based on the CAPM. The intercept of the CAPM model, α, is the Jensen alpha, commonly interpreted as a measure of out- or underperformance of a portfolio relative to a market proxy. As described above, we use the CAPM to evaluate the performance of SRI funds and conventional funds during our three time periods. The CAPM is defined as:

$$R_{it} - R_{ft} = \alpha_i + \beta_{0i}\left(R_{mt} - R_{ft}\right) + \varepsilon_{it} \quad (1)$$

Where R_{it} is the return for fund *i* in month *t*, R_{ft} a proxy for the risk-free rate (the Euribor one month interbank rate) in month *t*, R_{mt} a proxy for the return on the market portfolio (the return on the relevant equity benchmark) in month *t* and ε_{it} an error term.

5.2.4 Carhart 4-factor model

Research made by Fama and French (1993) on cross-sectional variation of stock returns lead researchers to start questioning the sufficiency of a single-index model like the CAPM to explain the performance of mutual funds. The Fama-French 3-factor model extends the CAPM model by adding two additional market proxies, namely the return on size- and book-to-market sorted equity portfolios. The *SMB* factor captures the superior returns that small stocks have compared to large stocks while the *HML* factor captures the superior returns that value stocks have compared to growth stocks. Work by Carhart (1997) showed that that adding a fourth factor, a momentum factor, captures the Jegadeesh and Titman's (1993) momentum anomaly. In the paper by Jegadeesh and Titman (1993), the authors documented that strategies which buy stocks with previous good performance and sell stocks with previous poor performance generate significant positive returns over 3 to 12 month holding periods. As mentioned in the previous research section, Geczy et al. (2003), Bauer et al. (2005) and Renneboog et al. (2008) use the Carhart 4-factor model to evaluate the performance of their respective sets of SRI and conventional funds.

The resulting model which we use in a second step to further evaluate the performance of SRI funds and conventional funds during the three time periods therefore is:

$$R_{it} - R_{ft} = \alpha_i + \beta_{0i}(R_{mt} - R_{ft}) + \beta_{1i}SMB_t + \beta_{2i}HML_t + \beta_{3i}MOM_t + \varepsilon_{it} \quad (2)$$

Where the factors common with the CAPM are the same, and where SMB_t is the equal-weight average of the returns on three small stock portfolios, minus the equal-weight average on three big stock portfolios at time *t*, HML_t is the equal-weight average returns for two high book-to-market portfolios, minus the average return of two low book-to-market portfolios at time *t* and MOM_t is the equal-weight average of the returns for two winner portfolios minus the average of returns for two loser portfolios at time *t*. As in the CAPM, the intercept, α, is the Jensen's alpha measuring the out- or underperformance of a portfolio relative to a market proxy.

The market portfolio factors used in the regressions are obtained from Asness, Frazzini and Pedersen (2014) and are constructed in line with the method outlined by Fama and French (1992, 1993 and 1996), Asness and Frazzini (2013) and Asness, Frazzini and Pedersen (2014)[7]. These are country-specific factors which are based on all stocks in each country. The country-specific factors are weighted in the same way as the benchmark index used for the regression as described in the screening section of the methodology, in figure 3 and appendix A. All Carhart regressions made in this paper (except in the robustness section) are made using weighted market factors.

[7] The *SMB* and *HML* factors, are constructed by sorting the European stocks into two market capitalization and three book-to-market equity groups. Big stocks are those in the top 90% of the region, while small stocks are those in the bottom 10%. The book-to-market breakpoints are the 30th and the 70th percentiles of book-to-market for the big stocks. The independent sorts, of two market cap and three book-to-market groups (2x3) produce six value-weighted portfolios: Small Value, Small Neutral, Small Growth, Big Value, Big Neutral and Big Growth. Value indicates high book-to-market whereas Growth indicates low book-to-market. The *SMB* and *HML* factors are calculated using the following equations:

SMB = 1/3*(Small Value + Small Neutral + Small Growth) - 1/3*(Big Value + Big Neutral + Big Growth)

HML = 1/2*(Small Value + Big Value) - 1/2*(Small Growth + Big Growth)

The *MOM* factor is constructed by sorting European stocks based on size and lagged momentum (prior 12-month return). The momentum breakpoint are 30th and 70th percentiles of momentum returns of the big stocks. This produces six value-weight portfolios: Small Losers, Small Neutral, Small Winners, Big Losers, Big Neutral and Big Winners. This procedure is repeated every month to obtain a rolling momentum factor. The *MOM* factor is calculated using:

MOM = 1/2*(Small Winners + Big Winners) – 1/2*(Small Losers + Big Losers)

5.3 Bias and Robustness - Tests and analysis

The OLS regressions rely on certain assumptions as described by Chris Brooks (2014)**,** and in order to validate our results and make solid conclusions, we check for robustness by performing a couple of additional regressions and tests.

5.3.1 Robustness tests

Additional CAPM regressions are done using different benchmark indices, namely the S&P Europe BMI and the DJSI Europe, as a proxies for the market return in order to evaluate the robustness of our results. We know that the different indices to have slightly different properties, which we do not control for in our regressions. We are able to draw conclusions on the robustness of our results given the differences in outcome between the different regressions.

We also use a country-specific index, a local equity index (the OMXS30) to analyze if the funds under investigation, both SRI and conventional funds, are subject to the home-bias phenomenon. The home-bias phenomenon, explained briefly above, refers to the tendency among fund managers to overweight their portfolios with domestic stocks at the cost of limited foreign exposure (French and Poterba, 1991). If home-biasness is present among our funds, we would expect the local index being able to better explain variations of fund returns compared to the weighted unrestricted stock market index.

5.3.2 Diagnostics tests

In order to verify the correctness of the results and methods, tests are performed to verify normality and collinearity. Heteroskedasticity is assumed to be controlled for, as all regressions are done with robust standard errors.

5.3.2.1 Normality

An assumption for linear regressions is that the errors are normally distributed conditional on the regressors. However, as described by Brooks (2014), samples that are large enough will make popular tests such as the normality test developed by D'Agostino et al. (1990) reject the null hypothesis of normal distribution even though it is not practically significant for the correctness of the model. For this reason, normality of residuals is examined graphically as suggested by Brooks (2014).

5.3.2.2 Collinearity

In order to test for collinearity between the regressors, a multi-collinearity test is conducted (Brooks, 2014). The test incorporates several diagnostics measures such as VIF, tolerance, eigenvalues etc. to assess the level of collinearity. As the rule of thumb, collinearity is assumed to be non-existent if VIF values are lower than 10, tolerance values are larger than 0.1 and eigenvalues are larger than 0.1.

6 Results

Summary statistics for the data is explained at the beginning, before the results from the regressions based on the CAPM and the Carhart 4-factor model.

6.1 Descriptive Statistics

Table 2 - Summary statistics of SRI and conventional funds during the three sub-periods
Notes: All numbers are presented in monthly terms.

	Pre-Crisis Oct 2004 - Sep 2007		**Financial Crisis Oct 2007 - Feb 2009**		**Post-Crisis Mar 2009 - Oct 2014**	
Fund type	Conventional	SRI	Conventional	SRI	Conventional	SRI
Avg. monthly return %	1,96	1,90	-3,41	-3,36	1,40	1,49
Std. dev	3,84	3,50	6,73	6,69	4,86	4,81
Min	-19,22	-11,88	-36,57	-27,12	-19,84	-16,29
Max	26,43	14,75	17,24	12,85	35,57	31,89
No. Of funds	126	73	136	70	171	78

Table 3 - Summary statistics of the general and SRI index during the three sub-periods
Notes: All numbers are presented in monthly terms.

	Pre-Crisis Oct 2004 - Sep 2007		**Financial Crisis Oct 2007 - Feb 2009**		**Post-Crisis Mar 2009 - Oct 2014**	
Index	General Index	SRI Index	General Index	SRI Index	General Index	SRI Index
Avg. monthly return %	1,72	1,62	-4,00	-3,47	1,24	1,31
Std. dev	3,00	3,15	5,86	5,63	4,11	4,39
Min	-7,06	-7,32	-16,21	-14,46	-10,38	-12,80
Max	6,03	6,77	3,18	3,60	16,34	14,10

Presented in table 2 are the average monthly returns (not winsorized) for both SRI and conventional funds, and in table 3 the average monthly returns for the benchmark indices we

use in our regressions. The equally weighted average monthly returns for SRI funds and conventional funds are similar, both fund types' returns are positive during the non-crisis periods and negative during the financial crisis. Furthermore, the standard deviation of the returns for both types of funds are similar. Comparing the average fund returns with the relevant indices: both SRI and conventional funds seem to outperform the unrestricted market index during all three periods, indicated by the higher average return of the funds compared to the unrestricted market index. The SRI funds also have higher average returns than the SRI market index during all periods, indicating that SRI funds outperform this index during the investigated time period as well.

6.2 Benchmarking against the unrestricted market index

Our first regression results are derived by using the unrestricted market index as the benchmark equity index. This index, as previously explained, serves as a proxy for the returns on the European stock market on a general level (i.e. in an unrestricted investment universe) weighted to match the geographical investment distribution of our funds. Results from this first part will show us whether SRI funds out- or underperform conventional funds during the three investigated time periods.

6.2.1 CAPM

Table 4 - Results from the CAPM using the unrestricted market index

Notes: All numbers are in monthly terms. The dependent variable is excess fund returns, $R_{it} - R_{ft}$. The independent variable is the unrestricted market index which beta value, β, measures how sensitive excess fund returns are to excess market returns. The intercept (constant) of the model is Jensen's alpha, $\propto$, measuring the out- or underperformance relative to the unrestricted market index. The adjusted R^2 value is a measure of well the data fits the model. Robust standard errors are reported in parentheses below the coefficients/constants. Significance levels at the 10%, 5% and 1% are denoted as *, ** and *** respectively.

	Pre-Crisis		**Financial Crisis**		**Post-Crisis**	
	Oct 2004 - Sep 2007		**Oct 2007 - Feb 2009**		**Mar 2009 - Oct 2014**	
Fund type	Conventional	SRI	Conventional	SRI	Conventional	SRI
Unrestricted market beta, β	1,035***	1,029***	0,785***	0,780***	0,944***	0,984***
	(0,0106)	(0,0113)	(0,0078)	(0,0098)	(0,0067)	(0,0094)
Alpha, α	0,226***	0,137***	0,466***	0,636***	0,195***	0,206***
	(0,0367)	(0,0373)	(0,0732)	(0,0867)	(0,0256)	(0,0306)
Adj. R^2	0,675	0,777	0,755	0,797	0,722	0,798

Presented in table 4 are the results from our initial regression using the CAPM. We have run the regressions on the aggregate excess returns of SRI funds and conventional funds during

each period separately. The alpha's of the regressions display that both fund types outperform the unrestricted market index in all periods, significant at the 1% level. SRI funds have an economically and statistically significant outperformance compared to conventional funds during the financial crisis, indicated by the larger alpha. During the pre-crisis period, SRI funds underperform conventional funds, while in the post-crisis period the performance is similar. The adjusted R^2, measuring the part of returns that are explained by the model, is higher for SRI funds during all periods compared to conventional funds. The unrestricted market beta, which measures how sensitive excess fund returns are to excess market returns, display no considerable differences between the two fund types during any of the periods.

6.2.2 Carhart 4-factor model

Table 5 - Results from the Carhart using the unrestricted market index

Notes: All numbers are in monthly terms. The dependent variable is excess fund returns, $R_{it} - R_{ft}$. The independent variables are: the unrestricted market index which beta value, β, measures how sensitive excess fund returns are to excess market returns, the SMB factor captures the superior returns that small stocks have compared to large stocks , the HML factor captures the superior returns that value stocks have compared to growth stocks and the MOM factor captures the effect that past winners outperform past losers. The intercept (constant) of the model is Jensen's alpha, ∝, measuring the out- or underperformance relative to the unrestricted market index. The adjusted R^2 value is a measure of how well the data fits the model. Robust standard errors are reported in parentheses below the coefficients/constants. Significance levels at the 10%, 5% and 1% are denoted as *, ** and *** respectively.

	Pre-Crisis		**Financial Crisis**		**Post-Crisis**	
Fund type	Conventional	SRI	Conventional	SRI	Conventional	SRI
Unrestricted market beta, β	1,017***	1,042***	0,809***	0,762***	1,008***	1,027***
	(0,0112)	(0,0118)	(0,00825)	(0,00947)	(0,00847)	(0,0107)
SMB	0,232***	0,0830***	-0,0046	-0,207***	0,267***	0,137***
	(0,0242)	(0,0231)	(0,0253)	(0,0290)	(0,0151)	(0,0179)
HML	0,0548	-0,0901***	-0,0528	-0,0520	-0,0646***	-0,0624***
	(0,0336)	(0,0320)	(0,0355)	(0,0378)	(0,0185)	(0,0222)
MOM	-0,0273	-0,0889***	0,0844***	-0,0580***	0,111***	0,0633***
	(0,0247)	(0,0235)	(0,0191)	(0,0204)	(0,00778)	(0,0104)
Alpha, α	0,251***	0,269***	0,311***	0,531***	0,0587**	0,119***
	(0,0428)	(0,0436)	(0,0856)	(0,0972)	(0,0278)	(0,0338)
Adj. R^2	0,684	0,780	0,757	0,812	0,736	0,802

The second regression, based on the Carhart 4-factor model is used to further investigate the relationship between the funds excess returns and the excess returns of the unrestricted market. In table 5 one can observe statistical significant figures for all coefficients used in the model. During the crisis period, the alphas for both fund types have decreased, but the pattern is still

consistent, as SRI funds outperform the conventional funds quite considerably. The pre-crisis period alphas have increased for both types of funds', especially for the SRI funds, and they now seem to perform relatively on par compared to one another. Inversely, during the post-crisis period both alphas have decreased, the difference being that SRI funds show an outperformance compared to their conventional counterparts (although a fairly small difference in absolute terms). In all instances, the adjusted R^2 values have increased, but the magnitude of the increase is small. There are no major differences in the market betas compared to the CAPM model. We can see that both fund types seem to have some exposure to small cap stocks during non-crisis periods, but to large cap stocks during crisis-periods, given by the positive and negative coefficients during these periods respectively. Overall though, the coefficients *SMB*, *HML* and *MOM* are small and therefore cannot seem to aid much in explaining either of the two types of funds' returns.

6.3 Benchmarking against the SRI market index

Following previous regressions of fund returns using the unrestricted weighted benchmark index, we move on, to regressing SRI returns using the weighted SRI benchmark index. This is done in order to control for the restricted investment universe that SRI fund managers' face due to the constraints imposed on their portfolio. Results below are discussed when evaluating difference in fund manager performance between the different fund types.

6.3.1 CAPM

Table 6 - Results from the CAPM using the SRI/unrestricted market index

Notes: Definition of sub-periods are as following: pre-crisis (Oct 2004 - Sep 2007), financial crisis (Oct 2007 - Feb 2009), post-crisis (Mar 2009 - Oct 2014). All numbers are in monthly terms. The dependent variable is excess fund returns, $R_{it} - R_{ft}$. The independent variable is the SRI/unrestricted market index which beta value, β_{SRI}/β_U, measures how sensitive excess fund returns are to the relevant excess market returns. The intercept (constant) of the model is Jensen's alpha, $\propto_{SRI}/\propto_{CON}$, measuring the out- or underperformance relative to the SRI/unrestricted market index. The adjusted R^2 value is a measure of well the data fits the model. Robust standard errors are reported in parentheses below the coefficients/constants. Significance levels at the 10%, 5% and 1% are denoted as *, ** and *** respectively.

	Pre-Crisis	**Crisis**	**Post-Crisis**		**Pre-Crisis**	**Crisis**	**Post-Crisis**
Fund type	SRI	SRI	SRI	**Fund type**	Conventional	Conventional	Conventional
SRI market beta, β_{SRI}	0,934***	0,810***	0,901***	**Unrestricted market beta, β_U**	1,035***	0,785***	0,944***
	(0,0119)	(0,0104)	(0,0115)		(0,0106)	(0,0078)	(0,0067)
Alpha, α_{SRI}	0,371***	0,326***	0,235***	**Alpha, α_{CON}**	0,226***	0,466***	0,195***
	(0,0428)	(0,0900)	(0,0326)		(0,0367)	(0,0732)	(0,0256)
Adj. R^2	0,705	0,791	0,755	**Adj. R^2**	0,675	0,755	0,722

Presented in table 6 are results from regressing excess returns of SRI funds on the geographically weighted SRI index**.** The aggregate excess return of the SRI funds are explained by the alpha and beta coefficient seen in the table. The statistically significant (at the 1% level) alphas indicate that SRI fund managers outperform their index during all periods although alphas decrease from period to period. The R^2 values are all slightly lower than the observed values for the CAPM regression in section 6.2.1 with the unrestricted index.

6.3.2 Carhart 4-factor model

Table 7 - Results from the Carhart using the SRI/unrestricted market index

Notes: Definition of sub-periods are as following: pre-crisis (Oct 2004 - Sep 2007), financial crisis (Oct 2007 - Feb 2009), post-crisis (Mar 2009 - Oct 2014). All numbers are in monthly terms. The dependent variable is excess fund returns, $R_{it} - R_{ft}$. The independent variables are: the SRI/unrestricted market index which beta value, β_{SRI}/β_U, measures how sensitive excess fund returns are to excess market returns, the SMB_{SRI}/SMB_{CON} factor captures the superior returns that small stocks have compared to large stocks , the HML_{SRI}/HML_{CON} factor captures the superior returns that value stocks have compared to growth stocks and the MOM_{SRI}/MOM_{CON} factor captures the effect that past winners outperform past losers. The intercept (constant) of the model is Jensen's alpha, $\propto_{SRI}/\propto_{CON}$, measuring the out- or underperformance relative to the unrestricted market index. The adjusted R^2 value is a measure of how well the data fits the model. Robust standard errors are reported in parentheses below the coefficients/constants. Significance levels at the 10%, 5% and 1% are denoted as *, ** and *** respectively.

	Pre-Crisis	**Crisis**	**Post-Crisis**		**Pre-Crisis**	**Crisis**	**Post-Crisis**
Fund type	SRI	SRI	SRI	**Fund type**	Conventional	Conventional	Conventional
SRI market beta, β_{SRI}	0,958***	0,814***	0,882***	**Unrestricted market beta, β_U**	1,017***	0,809***	1,008***
	(0,0113)	(0,0116)	(0,0106)		(0,0112)	(0,00825)	(0,00847)
SMB_{SRI}	0,442***	-0,0724**	0,137***	**SMB_{CON}**	0,232***	-0,0046	0,267***
	(0,0246)	(0,0290)	(0,0198)		(0,0242)	(0,0253)	(0,0151)
HML_{SRI}	0,255***	0,304***	0,000287	**HML_{CON}**	0,0548	-0,0528	-0,0646***
	(0,0309)	(0,0362)	(0,0241)		(0,0336)	(0,0355)	(0,0185)
MOM_{SRI}	-0,111***	0,0467**	-0,0509***	**MOM_{CON}**	-0,0273	0,0844***	0,111***
	(0,0250)	(0,0218)	(0,0122)		(0,0247)	(0,0191)	(0,00778)
Alpha, α_{SRI}	0,318***	0,215**	0,314***	**Alpha, α_{CON}**	0,251***	0,311***	0,0587**
	(0,0467)	(0,101)	(0,0371)		(0,0428)	(0,0856)	(0,0278)
Adj. R^2	0,755	0,801	0,764	**Adj. R^2**	0,684	0,757	0,736

The results in table 7, aims to illustrate management performance controlled for different investment universes. Carhart 4-factor model regressions of the SRI-funds' performance benchmarked against the weighted SRI index can be observed on the left half of the table. On the right half, regressions of conventional funds' performance using an unrestricted index as a benchmark are found. The conventional fund regression results are copied from table 5 for easy

comparison. Statistical significant figures can be observed for all SRI fund coefficients. Alphas during the pre- and post-crisis periods are higher for SRI funds than for conventional funds. During the crisis period, a decrease in the alpha is observed for SRI funds, whereas conventional funds' alpha increase, the net effect being that the alpha are higher for conventional funds during the financial crisis. Results indicate that SRI funds keep a more constant alpha and thereby return against their investment universe over time than conventional funds. The coefficients for the market factors *HML* and *MOM* are, as previously stated, small. Although not statistically significant for both fund categories, a lower value for *SMB* is observed during crisis period. As in the CAPM regression against the weighted SRI index, the adjusted R^2 values for the SRI fund regressions are lower than when using an unrestricted investment universe as a proxy for market return.

6.4 Robustness and Diagnostics

A couple of tests were performed to ensure robust and correct results. For robustness, we have run the main regressions with the unweighted market factors using the regular S&P Europe BMI index as a proxy for the unrestricted market return as well as the DJSI Europe index as a proxy for the SRI market return. When evaluating if our funds are subject to the home-bias phenomenon a regression was run using the OMXS30 index as benchmark. Further tests were performed to ensure that the fund returns are normally distributed, and that the regressors are non collinear.

The results from the regressions indicates consistency, the usage of a specific benchmark index does not alter the main results previously attained. The OMXS30 regressions show a lower overall R^2 value with a mean of 0,723 as opposed to a mean of 0,754 for the CAPM regression in section 6.2.1. The less good fit of the regressions using the OMXS30 index as a benchmark, indicates no presence of any major home-bias in our funds. The full results of the robustness tests can be found in Appendix B.

The graphical examination of residuals show no worrying indication of not being normally distributed (Appendix B). Regressors are also concluded to be non collinear as VIF values were less than 3, Tolerances larger than 0.6 and all Eigenvalues by far larger than 0 (Appendix C).

7 Discussion

The results posted in previous sections will be discussed below. We have chosen not to discuss every number in detail but instead discuss the results used to draw conclusions of the research made. We will also discuss the main limitations to our methodology and data, enabling for future research.

7.1 Fund performance

The discussion of fund performance has been divided into a non-crisis and a financial crisis part in order to clearly distinguish between the periods and to aid when drawing conclusions and confirming hypotheses.

7.1.1 Non-crisis periods (2004-2007 and 2009-2014)

An apparent result from our regressions done on the non-crisis periods is that the performance of SRI and conventional funds do not show any considerable differences between the two types of funds' performance, which is in line with the overall academic consensus. Renneboog et al. (2008) who investigated Swedish funds (among other countries) performance during the years 1991-2003, did however conclude that Swedish SRI funds underperformed their conventional counterparts. There could be several reasons why our results conflict with theirs. Firstly, Renneboog et al. (2008) used the matching approach (explained in the previous research section). Secondly, the sample size of SRI funds differ (our sample is significantly larger, 81 funds compared to 26). Thirdly, our data does not cover the same period (not even overlapping). Because of these differences, our study complement previous studies rather than contradicts them. There could also be several other possible reasons why Swedish SRI funds perform more similar to conventional funds during recent years. One explanation could be that Swedish SRI funds performance have gone through a catching up phase relative to conventional funds during this time, something which Renneboog et al. (2008) could see indications of for US and German SRI funds during their sample period.

7.1.2 The financial crisis (2007-2009)

When isolating the performance of SRI and conventional funds during the financial crisis, we see a different result. Swedish SRI funds outperform their conventional equivalents quite considerably. The result is consistent using both the CAPM single-index model as well as the Carhart 4-factor model. It is not however consistent with previous studies, perhaps mainly because few have studied such short time periods, and there exist few or no high quality papers

examining this particular time period. While we have not investigated the primary reasons for the SRI funds outperformance during the financial crisis, one apparent cause might simply be that SRI compatible firms have performed better than all firms have in general. We can see indications of this, as the SRI market index have a less negative average return compared to the unrestricted market index during the financial crisis (see table 3). Even though conventional fund managers can choose from all the same securities that SRI fund managers can (as they act within an unrestricted investment universe), they most likely hold portfolio also consisting of companies categorized as being not socially responsible. These companies have obviously performed worse than SRI compatible companies during the financial crisis, the result being an impaired performance of conventional funds.

7.2 Fund managers' performance

Observing the results and particularly the Jensen alpha values in our regressions using different benchmark indices, we observe varying performance from period to period and between fund categories.

7.2.1 Non-crisis periods (2004-2007 and 2009-2014)

SRI funds are benchmarked against the weighted SRI index as described in section 5.2.1. An alpha of 0.318 is obtained for the period before the crisis implying that SRI-funds generally perform 0.32% better on a monthly basis than the weighted SRI index. The weighted SRI index replicates the investment universe available to managers of SRI funds, and we can thus use regression results to isolate fund managers skills. For the same period, regressions indicate that conventional funds outperform their market index with a monthly excess return of 0.25%. According to our regressions, SRI funds seem to outperform their index with an additional 0.07% per month compared to their conventional counterparts for the pre-crisis period. When looking at the post-crisis period the same trend is observed as the SRI managers outperform their index with 0.31% as opposed to conventional peers that only yield an outperformance of 0.06% implying a 0,25% difference in monthly performance between the fund categories relative their benchmarks.

Even though we cannot precisely explain the differences in management performances through our regressions, we are aware of the differences, and we have two theoretical explanations for this. Firstly, conventional fund managers may have had a propensity towards buying and selling fund holdings more frequently. As conventional fund managers only take returns relative to risk into account, they might engage in more active trading in order to

try increase portfolio returns. SRI fund managers on the other hand, also take socially responsible concepts into account when constructing portfolios, something which might relieve pressure and make them less sensitive to try chasing the highest returns. It might seem contradictory, that by not actively chasing the highest returns, fund performance gets better. However, as we have previously mentioned, increased capital turnover is associated with high transaction costs, something which impair fund performance. Subsequently, as previously argued by Renneboog et al. (2008), the more rigorous screening of securities conducted by managers of SRI funds, could also make their general stock-picking ability superior to their conventional peers yielding higher returns.

7.2.2 The financial crisis (2007-2009)

During the financial crisis, opposite results are observed, as SRI fund managers suddenly underperform conventional fund managers given their restrictions in investment universe (even though they still outperform their respective benchmarks). SRI funds are estimated to outperform their benchmark with 0.22% as opposed to 0.31% monthly for their conventional counterparts.

As in the previous section, our regressions do not permit us to exhaust the reasons behind the lower management performance of SRI fund managers during the crisis. However one explanation for the observed tendency could lie within the theory of liquidity preference developed by Keynes (1937). According to the theory we can derive two plausible reasons for conventional funds to have a higher preference for liquidity during the crisis. Higher liquidity would explain higher returns in times of crisis for obvious reasons. The reasons for conventional fund managers to keep higher liquidity are two. One, being more stressed when chasing highest return to risk during crisis, conventional fund managers are likely to value liquidity higher while equities are experiencing negative returns as stated by Keynes (1937). Two, as previously explained, conventional funds experience more capital outflow in bad times (Bollen, 2007). With the higher outflow of capital, it is likely that conventional funds would keep a higher cash buffer due to needs and legislation.

7.3 CAPM versus Carhart

As our results showed, the Carhart 4-factor model does not seem to be able to incrementally explain mutual funds returns compared to the CAPM single-index model, given the small differences in the adjusted R^2 values. The regressions based on the Carhart 4-factor model using the unrestricted market index as the benchmark equity index show that overall, the added factors

of the Carhart model can be assigned little value in explaining fund returns when we benchmark against the unrestricted market index. Given by the *SMB* factor, both SRI and conventional funds are to some extent exposed to small cap stocks during non-crisis periods, but to large cap stocks during the financial crisis. The *HML* factor, which is rather insignificant for both types of funds, indicate that neither of the fund types on an aggregate level are particularly exposed to one of value, or growth stocks, but a blend of the two (or middle book-to-market stocks). The momentum factor does not seem to have considerable impact on any of the fund types during any of the periods.

7.4 Limitations to research

We have strived to practice an empirically tested methodology of research, and we assess our input data to be of good quality. However, as will be discussed in the Future Research section there are still methodological additions to be made to this research, in order to improve the practical applicability and significance of the research.

We believe the often discussed home-bias phenomenon to be controlled for due to our extensive screening as we see no indication of such a bias. We also see minimal evidence of a small-cap bias in our regressions making us confident in using our indices. We have some concerns regarding the chosen SRI benchmark index. When fund managers performance is investigated, a slightly lower R^2 value is observed for the regressions of SRI funds on the weighted SRI index than for regressions on the unrestricted index. This phenomena has previously been observed by Bauer (2005), and as they were cautious about drawing conclusions based on their results on those regressions, so must we.

8 Conclusions

The rapid evolution of the SRI fund market have lead many researchers to try evaluating the relative performance of these funds compared to their conventional peers. While several things set previous studies apart, the main result seem to be consistent: SRI funds neither out- nor underperform conventional funds. By studying the Swedish market of actively managed mutual funds during three sub-periods between 2004 and 2014, we investigate the questions whether SRI funds' performance differ from that of conventional funds' when evaluated during periods of significantly diverse market conditions, and if these differences in performance can be assigned to fund managers skills or an underlying market performance. By applying commonly

used models to evaluate performance of mutual funds, the CAPM (Sharpe 1964) single-index model and the Carhart (1997) 4-factor model, we have reached the following conclusions.

First, our primary conclusions are based on the models using the unrestricted market index as a benchmark (i.e. not controlling for the investment universe that SRI fund managers are constrained to). During periods of non-crisis we report findings which are in line with the overall academic consensus, namely that SRI funds display a similar performance relative to conventional funds. During the recent financial crisis however, SRI funds outperform conventional funds, something which contradicts the main findings of previous papers. We also cannot support the notion of SRI funds being more exposed to small cap stocks which has been reported by other academics.

Subsequently, our secondary conclusions are based on using the SRI market index, which controls for the limited set of securities SRI fund managers can choose from, as the benchmark index in the models. During periods of non-crisis, SRI fund managers outperform their matched (SRI) benchmark index more than conventional fund manager do relative to their unrestricted benchmark index. These results indicate that both SRI and conventional fund managers seem to add some value to their portfolios, and that SRI fund managers have been slightly more skilled than their conventional counterparts given their respective investment universes during these two periods. During the financial crisis, the inverse relation can be observed, conventional fund managers perform better relative to their benchmark index than SRI counterparts do relative to theirs. The outperformance of SRI funds compared to conventional funds during crisis therefore seem to stem from the fact that the underlying market of SRI companies have performed better than the market as a whole.

Our research complements previous research by looking at the Swedish mutual fund market in depth, by looking at a different sample period, and by taking into account the different market conditions that prevail during a longer period of time. Our results supports our three hypotheses, that the performance of SRI and conventional funds do not differ during the pre- and post-crisis periods, that SRI funds' performance is superior to that of conventional funds during the financial crisis, and that this outperformance during the financial crisis is due to underlying SRI firms performance and not SRI fund managers superior skills. In addition, our results indicate that managers of SRI funds add relatively more value to their funds during pre- and post-crisis than their conventional peers. The inverse relation is indicated for the crisis period, when conventional managers seem to possess a higher degree of skills.

8.1 Future Research

We deem that this paper contributes to research in a significant way, but as stated earlier, we also acknowledge room for future research within the field of SRI fund performance evaluation.

As previously stated, the definition of SRI is wide and unstandardized. Our screening process categorizes all funds that complies with the wider definition of SRI set by the UN PRI (2013) as SRI funds. The funds within that definition however have different focuses and there is a significant difference in the level of dedication to being socially responsible between managers of SRI funds. The ethical focus and dedication of fund managers to ethical values are believed to be interesting variables to include when conducting further research as it could explain some of our results further.

Another factor to look into when investigation fund management performance more closely would be the size of funds. Including an asset under management (AUM) variable would make for interesting research, to investigate whether capacity constraints are present for a certain group of managers. This could perhaps explain differences in overall performance that is observed in this research.

Last but not least, due to data availability, we were only able to examine one financial crisis. In order to draw more general results on SRI funds' performance during financial crisis or economic turmoil, including multiple crises and multiple geographical areas should be analyzed.

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10 Appendix

10.1 A- Investment distribution for indices

Table 8 - Country and regional distribution for S&P BMI

Sweden	Sweden	5,00%	5,00%
Nordic	Denmark	2,60%	5,40%
	Finland	1,50%	
	Norway	1,30%	
Europé	United Kingdom	31,00%	89,60%
	France	14,20%	
	Switzerland	13,40%	
	Germany	13,00%	
	Spain	5,10%	
	Netherlands	4,40%	
	Italy	4,20%	
	Belgium	2,10%	
	Ireland	1,00%	
	Austria	0,50%	
	Luxembourg	0,40%	
	Portugal	0,30%	

Table 9 - Country and regional distribution for DJSI Europe

Sweden	Sweden	1,51%	1,51%
Nordic	Denmark	3,04%	3,90%
	Finland	0,48%	
	Norway	0,38%	
Europé	United Kingdom	28,61%	94,59%
	France	9,82%	
	Switzerland	19,39%	
	Germany	16,51%	
	Spain	8,59%	
	Netherlands	5,93%	
	Italy	5,61%	
	Belgium	0,12%	

Table 10 - Country and regional distribution for our weighted unrestricted index

Sweden	**Sweden**	40,00%	**40,00%**
Nordic	**Denmark**	9,63%	**20,00%**
	Finland	5,56%	
	Norway	4,81%	
Europé	**United Kingdom**	13,84%	**40,00%**
	France	6,34%	
	Switzerland	5,98%	
	Germany	5,80%	
	Spain	2,28%	
	Netherlands	1,96%	
	Italy	1,88%	
	Belgium	0,94%	
	Ireland	0,45%	
	Austria	0,22%	
	Luxembourg	0,18%	
	Portugal	0,13%	

Table 11 - Country and regional distribution for our weighted SRI index

Sweden	**Sweden**	40,00%	**40,00%**
Nordic	**Denmark**	15,58%	**20,00%**
	Finland	2,46%	
	Norway	1,95%	
Europé	**United Kingdom**	12,10%	**40,00%**
	France	4,15%	
	Switzerland	8,20%	
	Germany	6,98%	
	Spain	3,63%	
	Netherlands	2,51%	
	Italy	2,37%	
	Belgium	0,05%	

10.2 **B – Regressions for robustness verification**

Table 12 – CAPM regression of conventional fund return on OMXS30

VARIABLES	PRE-CRISIS	CRISIS	POST-CRISIS
MktRF_OMXS30	0.838***	0.646***	0.864***
	(0.0105)	(0.00727)	(0.00670)
Constant	0.352***	-0.652***	-0.00678
	(0.0414)	(0.0741)	(0.0270)
Observations	3,861	2,162	8,647
R-squared	0.607	0.704	0.691
r2_a	0.607	0.704	0.691

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13 – CAPM regression of SRI fund return on OMXS30

VARIABLES	PRE-CRISIS	CRISIS	POST-CRISIS
MktRF_OMXS30	0.871***	0.659***	0.918***
	(0.0102)	(0.00873)	(0.00860)
Constant	0.202***	-0.396***	-0.0313
	(0.0383)	(0.0865)	(0.0304)
Observations	2,432	1,190	4,269
R-squared	0.760	0.778	0.796
r2_a	0.760	0.778	0.796

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 14- CAPM regression of conventional fund return on S&P BMI Europe

VARIABLES	SRI	Conventional
MktRF_SPEUR	0.883***	0.875***
	(0.00865)	(0.00621)
Constant	0.417***	0.367***
	(0.0303)	(0.0244)
Observations	7,891	14,670
R-squared	0.672	0.628
r2_a	0.672	0.628

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 15 – CAPM regression of SRI fund return on DJSI Europe

VARIABLES	SRI
MktRF_DJSI_EUR	0.865***
	(0.00900)
Constant	0.745***
	(0.0314)
Observations	7,891
R-squared	0.642
r2_a	0.641

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

10.3 **C- Diagnostics tests**

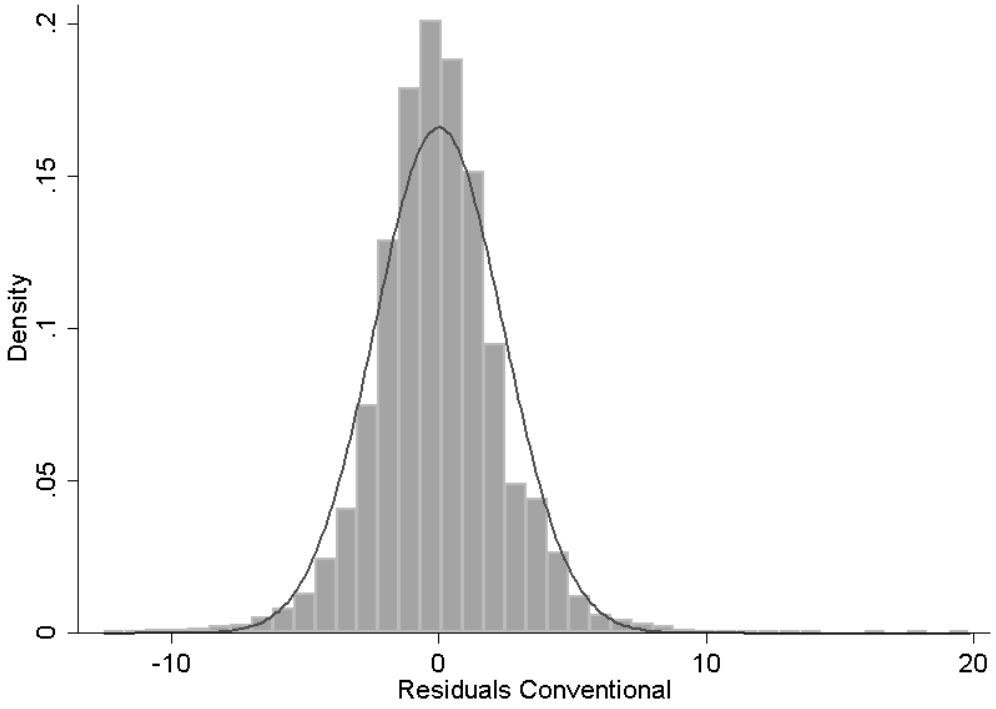


Figure 4 – Distribution of residuals from Carhart regression on the unrestricted index for conventional funds. The normal distribution is graphed for reference.

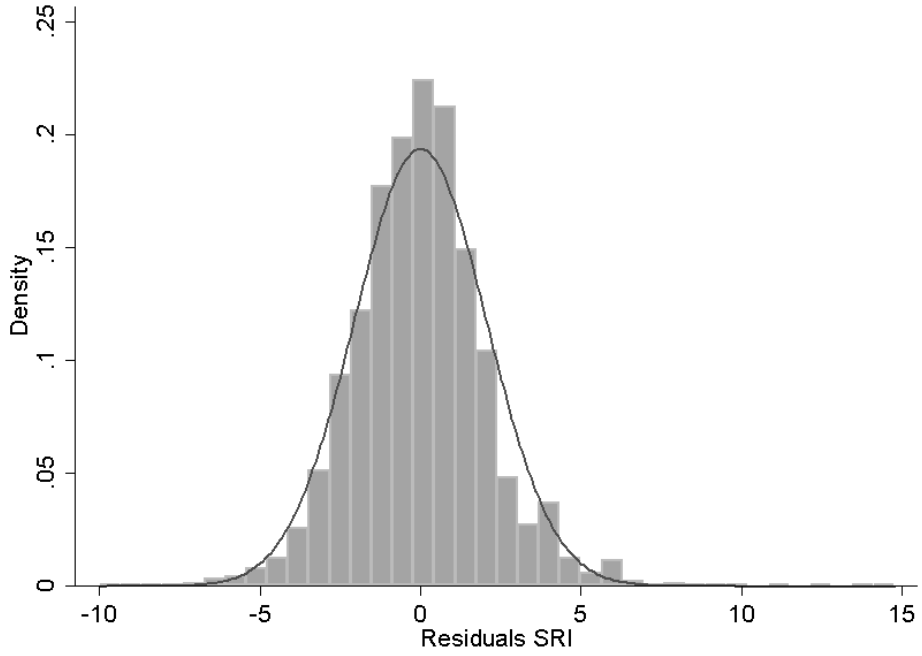


Figure 5 - Distribution of residuals from Carhart regression on the unrestricted index for SRI funds. The normal distribution is graphed for reference.

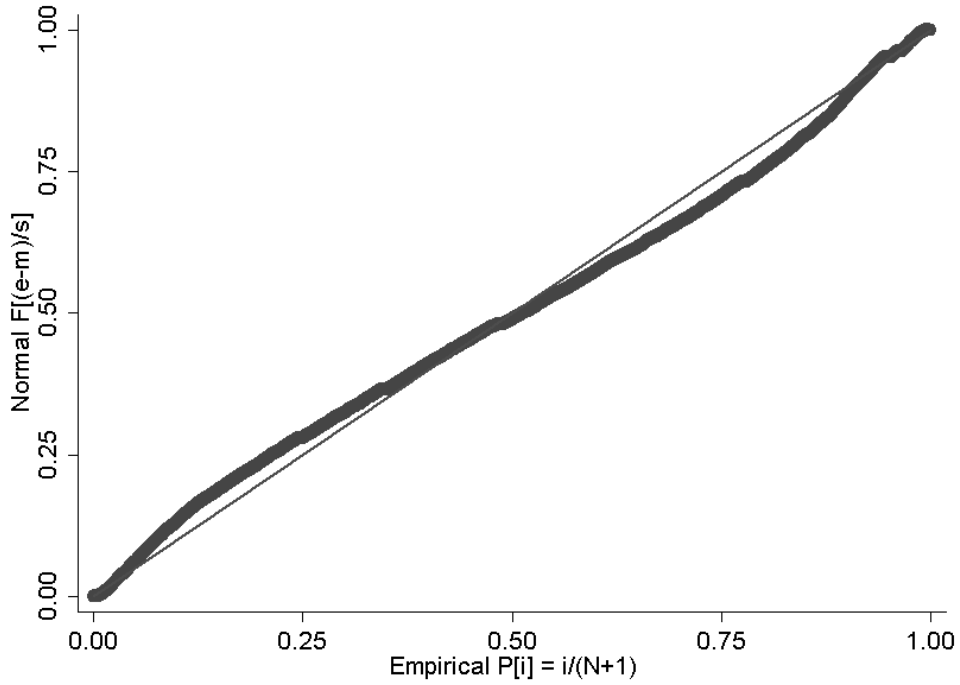


Figure 6 – Distribution of residuals from the Carhart regression of conventional fund return on the unrestricted benchmark index. The straight line represents normal distribution.

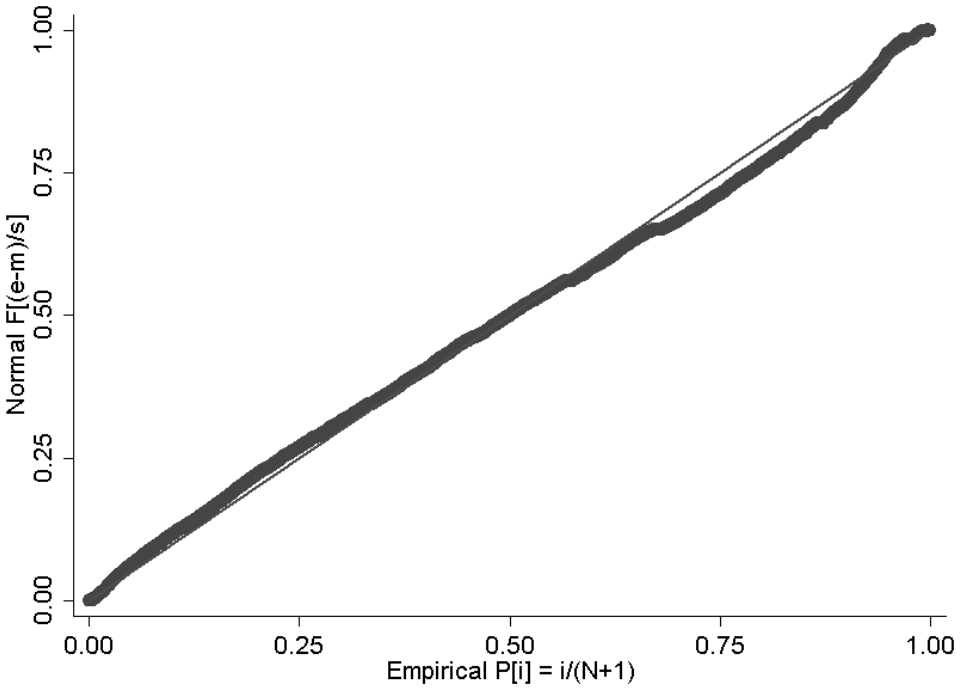


Figure 7 - Distribution of residuals from Carhart regression of SRI fund return on the unrestricted benchmark index. The straight line represents normal distribution.

Table 16 – Results from collinearity tests on all dependent variables

Variable	VIF	SQRT VIF	Tolerance	R-Squared
MktRF_GEN	1.34	1.16	0.7480	0.2520
SMB_W	1.15	1.07	0.8723	0.1277
HML_W	1.16	1.08	0.8587	0.1413
WML_W	1.33	1.15	0.7536	0.2464
Mean VIF	1.24			

	Eigenval	Cond Index
1	1.7187	1.0000
2	1.2820	1.1578
3	0.8621	1.4119
4	0.7221	1.5428
5	0.4151	2.0348
Condition Number		2.0348

Eigenvalues & Cond Index computed from scaled raw sscp (w/ intercept)
Det(correlation matrix) 0.6437