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A Comparison between the Performance of Ethical and Conventional US Funds

- *Do different ethical characteristics matter?*

Anna Mattsson & Lina Sandström

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Supervisor: Charles Nadeau

Abstract

This thesis investigates if there are differences in performance and investment styles between ethical and conventional US funds in the time period January 2004 – January 2014. We study both a pooled ethical portfolio and different ethical subgroups divided based on ethical characteristics and do a comparison with matched conventional portfolios. By applying Carhart (1997) four-factor model we control for the market, size, book-to-market ratio and momentum factors and get the risk-adjusted returns for our portfolios. We find no statistically significant difference in performance when examining the pooled ethical portfolio but when studying our ethical subgroups we find a statistically significant underperformance of our environmental friendly funds and our ESG funds, while we find a statistically significant outperformance of our religiously responsible funds. We only find small differences in investment styles between our portfolios. Our results indicate that ethical funds should not be treated as a homogenous group when examining ethical fund performance.

JEL classification: G11, G12

Key Words: performance evaluation, ethical funds, heterogeneity, environmental friendly, ESG, religiously responsible, social responsible, investment styles

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Authors Contact Details
Anna Mattsson, Telephone: +46 70 642 6604, E-mail: annamattsson3@hotmail.com
Lina Sandström, Telephone: +46 70 877 6869, E-mail: lina_sandstrom@hotmail.com

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Introduction

Purpose and contribution

This thesis investigates the performance of ethical and conventional funds in the US market to see if there is a significant difference in performance between ethical and conventional funds. We also explore if there are differences in investment styles. The literature about ethical fund performance is substantial. Nevertheless, in general little literature explores the heterogeneity among the ethical funds, in particularly not much research investigates how performance are affected by different ethical characteristics i.e. different ethical focuses such as environmental focus, social focus et cetera. We will contribute to this modest literature with new results, through dividing ethical funds into subgroups based on ethical characteristics, to examine differences between the subgroups and matched conventional funds. We will also contribute to the literature by grounding our analysis on the latest performance data available, which is for the time period January 2004 – January 2014.

Background

Nowadays the investment decisions for numerous investors do not only include financial concerns, also social, environmental and religiously considerations are integrated into the investment decision, since some investors derive non-financial utility from ethical responsible investments. The definition of an ethical fund is ambiguous and includes investments with a great set of intentions and purposes (Sandberg et al. 2008; Kreander et al. 2005). One ethical fund may invest in companies that put effort into environmental issues, while another ethical fund exclude investments in companies that operate in the alcohol, tobacco or pornography industries (Kreander et al. 2005).

When fund managers select companies to invest in, different ethical screening criteria are applied that restrict their investment opportunities. The screening criteria are usually divided into negative and positive screens. The negative screening excludes companies that meet one or more of the negative screening criteria. Instead of excluding companies, the positive screening includes companies meeting superior standards on ethical issues. One approach combined with positive screening is the best-in-class. The best-in-class approach rank companies based on specific criteria, for example pollution, where the companies that are best-in-class i.e. the least polluting, are selected (Renneboog et al. 2008). An ethical portfolio using the best-in-class screen does not exclude any sectors and is therefore more balanced across industries (Kempf & Osthoff 2007).

Research questions

Our research question is to examine if there is a difference in the risk-adjusted return between an ethical portfolio and a matched conventional portfolio. By using the Carhart (1997) four-factor model, we estimate alphas using OLS as estimator. Due to the choice of model, we are also able to look at differences in investment styles between ethical and conventional funds. Our principal objective is also to include an investigation on the heterogeneity of our sample. By dividing our ethical funds into subgroups we look at differences in performance between the ethical subgroups and the conventional funds and explore if there are differences in investment style between the subgroup pairs.

Figure 1: Hypothesis Explanation

Baseline question, using pooled portfolios	***First Hypothesis***
	H0: no difference in performance between ethical and conventional funds
	H1: a difference in performance between ethical and conventional funds
	Second Hypothesis
	H0: no differences in investment styles between ethical funds and conventional funds
	H1: differences in investment styles between ethical funds and conventional funds
Hetergeneity question, using subgroup portfolios	***Third Hypothesis***
	H0: no difference in performance between an ethical subgroup and conventional funds
	H1: a difference in performance between an ethical subgroup and conventional funds
	Fourth Hypothesis
	H0: no differences in investment styles between an ethical subgroup and conventional funds
	H1: differences in investment styles between an ethical subgroup and conventional funds

There are various theories regarding if and how ethical screening will affect fund returns. One theory states that the expected returns from an ethical portfolio will give lower return due to that the ethical portfolio will have a smaller investment universe, hence less diversification opportunities and therefore increased idiosyncratic risk (Humphrey & Lee 2011). It also exists theories stating that the universe of ethical funds is still large enough to not affect the diversification possibilities and that the additional ethical screening will therefore not affect the returns (Goldreyer et al. 1999). Other hypothesis supports that socially and environmentally responsible corporations can give higher returns due to lower operational costs, such as low worker turnover and less litigation costs (Goldreyer et al. 1999). Underestimates from investors regarding the probability of negative information about conventional companies being released, also gives support to possibilities that ethical funds can give higher returns (Hamilton et al. 1993; Bauer et al. 2005).

Results

Results in this paper show that there is no statistically significant difference in performance between the Pooled Ethical and the matched Conventional portfolio. This is a common result in prior literature. When it comes to investment styles there are great similarities between the counterparts; both the ethical and the conventional portfolios are exposed to small cap, are growth-oriented and do not follow the momentum strategy. Exploring the heterogeneity of our ethical portfolio gives us the notable results that there is a statistically significant difference in performance between the ESG, Religiously Responsible and Environmental Friendly subgroups and their matched conventional portfolios. While the Religiously Responsible portfolio outperformed its matched conventional counterpart with both an economical and statistical significance, both the ESG portfolio and Environmental Friendly portfolio underperformed their matched conventional portfolios. We only detect differences in investment styles for the Religiously Responsible and the Socially Responsible portfolios compared to the conventional funds. The results show that the heterogeneity among the ethical funds is worth exploring. Implications are that the results when using a pooled methodology could give a statistically insignificant difference even though there may be statistically and economically significant differences in performance within the sample.

Delimitations

We have mitigated survivorship bias but do not have a survivorship bias free sample. It was not possible since we did not have the time or information needed to do a follow up on the missing values in our sample. See survivorship bias discussion under the Data Section. We have made the assumption that betas are constant, hence used an unconditional performance model. An alternative method would be to allow the betas to vary by using a conditional performance model, based on the work of Ferson and Schadt (1996). Common is that results from an unconditional performance model are robust when the model is developed into a conditional performance model (Bauer et al. 2006; Otten & Bams 2004; Renneboog et al. 2008). We believe that it would not influence our results remarkable. Our methodology is also in line with plenty of previous research (Bauer et al. 2005; Renneboog et al. 2008; Humphrey & Lee 2011).

Section description

This thesis is organized as follows. The next section contains a literature review of previous research of ethical fund performance which applies equivalent methods. It also provides a theory review explaining the model applied. The following section present the data and methodology used. Continuing section reports the main results and the analyses of the main results. The final section concludes.

Literature Review

We primarily review research made on the US market, where single and multi-factor models have been applied. We also review research where the heterogeneity of ethical funds has been explored.

Initial work on evaluation of ethical mutual fund performance was made by Hamilton et al. (1993) in the US market. By applying the Capital Asset Pricing Model (CAPM), which is a single-factor model and using Jensen's alpha (1968), they compare the performance of ethical mutual funds with the performance of conventional mutual funds, over the years 1981 – 1990. Hamilton et al. (1993) find a statistically insignificant difference in performance between ethical and conventional funds. A statistically insignificant difference is a result that declares that there is no difference in performance between ethical and conventional funds. In the work of Mallin et al. (1995), a matched pair approach is introduced through matching ethical and conventional funds by age and size. Their results show a statistically insignificant difference when evaluating the performance of ethical and conventional funds in the UK, over the years 1986 – 1993. Also Statman (2000) concludes that the difference in performance is statistically insignificant when comparing performance of ethical mutual funds with a size-matched sample of conventional funds, over the years 1990 – 1998 in the US.

Prior studies often apply single-factor models. This method has met criticism concerning that it does not capture cross sectional differences when only one factor is used (Fama & French 1992, 1993, 1995, 1998; Jegadeesh & Titman 1993). Therefore, the literature has evolved through the use of multi-factor models. Bauer et al. (2005) analyze the performance and investment style of 103 ethical mutual funds in the US, the UK and Germany, over the years 1990 – 2001, using a matched pair approach. By applying Carhart (1997) four-factor model they overcome benchmark problems that previous studies have suffered from. To mitigate potential survivorship bias, dead funds are included in the sample. The results show a performance difference between ethical and conventional funds that is statistically insignificant. Using the same model, Bauer et al. (2006, 2007) extend the research to additional countries by examining the performance and investment style of ethical mutual funds in the Australian and the Canadian market. Their results in these studies support previous conclusions regarding the insignificant difference of performance of ethical mutual funds compared to conventional funds. Equivalent conclusions are confirmed by Renneboog et al. (2008). Chang and Witte (2010) use data for different time periods but all with the

ending observation in March 2008. In contradiction to previous research, their conclusion is that US ethical funds as a group give a lower reward-to-risk and that domestic ethical funds have statistically significant lower risk-adjusted return than their conventional counterparts.

While much has been explored regarding the performance of the ethical funds industry as a united sector, not much research explores the heterogeneity of ethical funds. Some studies explore the heterogeneity when it comes to differences in screening activities, and their influences on performance. Goldreyer et al. (1999) investigate if performances of ethical funds depend on the screening process applied, in the US market over the period 1981 – 1997. The ethical funds are divided into two subgroups where one subgroup employ an inclusion screening process (which means only including companies that have a social policy) and the other subgroup does not. By using CAPM, Goldreyer et al. (1999) calculate Jensen's alpha, Sharpe ratio and Treynor ratio. For Jensen's alpha, a statistically significant result is found; the subgroup applying an inclusion screening process outperforms the other subgroup. Goldreyer et al. (1999) do not account for management fees or survivorship bias problems in their research. Also Renneboog et al. (2008) explore the influence on risk-adjusted returns by dividing ethical funds based on screening intensity (the kind of screening process the fund managers use and how many screens they do on funds) and screening criteria (what they screen on, for example if they do an environmental screen). Age, size, fees and the reputation of the fund is controlled for and a conditional four-factor model is used. Renneboog et al. (2008) have observations on funds from 17 countries, from a survivorship bias free dataset, over the period 1991 – 2003. The results show a significant impact on the risk-adjusted return due to screening activities. Using CAPM and Carhart four-factor model, Humphrey and Lee (2011) examine the performance of ethical funds in the Australian market during the years 1996 to 2008. They conclude that there is no statistical significant difference in performance. They also explore the performance of ethical funds with regards to screening activity, showing that there is little evidence that performance is affected by the number of positive or negative screens. They found weak evidence that more screens can result in higher risk-adjusted returns. Kempf and Osthoff (2007) examine the impact of negative, positive and best-in-class screens on performance. By constructing their portfolios based on ethical rating and applying the Carhart (1997) four-factor model, over the period 1992 – 2004, they detect that negative screening results in negative alphas, while positive and best-in-class screening results in positive alphas.

Differences in the screening process and their impact on performance seem to be the most common way to explore the heterogeneity. Not many researchers proceed to explore the heterogeneity in regards to other aspects, for example ethical characteristics, and its possible effects on performance.

However, one study on heterogeneity with regards to ethical characteristics is made by Climent and Soriano (2011). They investigate the performance of US mutual funds with environmental friendly characteristics, during 1987 – 2009. Climent and Soriano find that there is a statistically significant difference in performance, showing that the environmental friendly funds underperform the conventional funds. Climent and Soriano claim that the underperformance of environmental friendly funds is due to lack of diversification through a smaller investment universe. Their research only includes environmental funds and no other ethical subgroups.

By using the latest data available on the US market and by following the methodology used in Bauer et al. (2005), we contribute with updated results in the research field using multi-factor models. We contribute to the modest research done in exploring the heterogeneity, with regards to ethical characteristics, among ethical funds. By dividing our sample into subgroups, based on ethical characteristics, we investigate and demonstrate differences in performance among the subgroups.

Theory Review

Carhart four-factor model

In previous literature of the risk-adjusted return of ethical and conventional funds, three models are often applied; CAPM, Fama and French three-factor model and Carhart four-factor model (Bauer et al. 2005). We will use Carhart (1997) four-factor model, the present customary methodology in mutual fund performance evaluation. It has its basis in Fama and French's extension of the CAPM model (also referred to as Fama and French three-factor model) but has an additional factor that captures the momentum strategy. The model can either be interpreted as including four risk premium factors or as controlling for four investment strategies. The four-factor model explains the cross-sectional variations in returns better than the CAPM (Bauer et al. 2005). The four-factor model has a lower pricing error than both the CAPM and the Fama-French model (Carhart 1997). The model is linear in its parameters. Carhart's four-factor model specification:

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}Mom_t + \varepsilon_{it} \qquad (1)$$

R_{it} = return on the individual portfolio at time t.

R_{ft} = the risk-free rate at time t.

α_i = four-factor alpha i.e. the risk-adjusted return for portfolio i.

$R_{mt} - R_{ft}$ = excess return of the market at time t.

SMB_t = Fama-French's risk premium capturing size effects at time t.

HML_t = Fama-French's risk premium capturing book-to-market effects at time t.

Mom_t = Carhart's riks premium capturing momentum effects at time t.

ε_{it} = error term for portfolio i at time t.

Economic and empirical theory behind the variables

The first variable, called the Market factor, captures the excess return of the market in accordance with the well-known CAPM model. CAPM was developed individually by Sharpe (1964), Lintner (1965) and Mossin (1966) and was based on Markowitz's (1952) Portfolio Theory. The factor captures the systematic risk, the risk that is non-diversifiable. Controlling for a linear relationship between returns and systematic risk is in line with classical portfolio theory and previous research (Bodie et al. 2011). Considering the factor as an investment style, one may think of β_{1i} as the sensitivity towards the market. If the manager has a β_{1i} larger

than 1 for her portfolio, the manager takes on extra risks, compared to the market, by having more volatile assets in her portfolio.

The second variable was developed by Fama and French. They found evidence for a negative relationship between the size and return of a company. They believed small firms to be more sensitive to market risks than large firms, which explain why such a proxy can capture abnormal returns (Fama & French 1992, 1993). Petkova (2006) finds a negative relationship between SMB and surprises in the aggregated default risk thus SMB can work as a proxy for default risk. Hahn and Lee (2006) show the same results as Petkova (2006), giving additional support to a link between Fama and French's factors and systematic risk. Considering the factor as an investment style, the manager can choose between investing in small cap corporations or large cap corporations. One may think of β_{2i} as the sensitivity towards a factor portfolio capturing size effects. If β_{2i} is positive, the manager is assumed to invest more in small cap companies than large cap. This could give the manager extra return due to the mentioned risks that can be connected to small cap corporations. A negative β_{2i} indicates that the manager is investing more in large cap assets than small cap assets. In the model a risk premium associated with only small cap companies (SMB) is included as a second factor.

Fama and French also found a positive relationship between the book-to-market ratio and the average return of a company. Fama and French explanation of this relationship is that firms that have a high book-to-market ratio have a low confidence from the market, which might position them in a financial distressed situation, hence also a higher risk (Fama & French 1995, 1998). A positive correlation between variations in the yield curve and HML is found and shows that HML can work as a proxy for the risk associated with changes in the term structure slope (Petkova 2006; Hahn & Lee 2006). Considering the factor as an investment style, the manager can choose between investing in value stocks (stocks with high book-to-market ratio) or growth stocks (stocks with low book-to-market ratio). One may think of β_{3i} as the sensitivity towards a factor portfolio capturing book-to-market effects. If β_{3i} is positive, the manager invests more in value stocks and if β_{3i} is negative the manger invest more in growth stocks. A manger may choose assets with high book-to-market ratio to get additional returns by taking on the mentioned risks that can be connected to value stocks. A risk premium to capture this relationship (HML) is consequently included as a third factor in the model.

The fourth factor intends to capture the one-year momentum anomaly found by Jegadeesh and Titman (1993). Hendricks et al. (1993) find that the portfolios of mutual funds that previously performed badly would continue to perform badly in the near future. Goetzmann and Ibbotson (1994) find that in the short-term funds repeat their performance. Wermers (1996) concludes that following the momentum strategy can explain the persistence found in performance. When controlling for the momentum effect in stocks the persistence disappears. Persistence in the longer-run for mutual fund performance has also been documented. Grinblatt and Titman (1992) conclude that there is persistence and that it is consistent with the manager's stock-picking ability. Elton, Gruber, Das and Blake (1996) find performance predictability based on former performance. Considering the mom factor as an investment style, the manager can choose to follow the momentum strategy or the contrarian strategy. The β_{4i} can be interpreted as the sensitivity towards a factor portfolio following the momentum strategy. The momentum strategy is a strategy where investors buy the past winners in the stock market and selling the past losers. Followers of this strategy believe that conducting technical analysis can give excess return because the investors can capitalize on predictable price pattern (Bodie et al. 2011). The opposite of the momentum strategy is to invest in contrarian stocks, i.e. not follow the common opinion of the stock market. An investor following the contrarian strategy buys the stocks that are rejected by the rest of the investors, and sells the stocks that are preferred by the rest of the investors. According to Bodie et al. (2011) the contrarian strategy can be profitable if for example there is a long-run reversal in prices of securities. The risk premium (Mom) capturing momentum effects, is included in the model as a fourth factor.

After controlling for the four risk factors, what is left in the model is the risk-adjusted return, also referred to as the four-factor alpha. If α takes a positive value, it can be interpreted as that the portfolio outperforms the market. A negative alpha indicates an underperformance compared to the market.

The error term consist of an equal-weighted average of firm-specific risk. Since firm-specific risk can be diversified away, there are no risk premium connected to it, and it is not considered as a risk factor to be included in a model. The firm-specific risk is believed to be uncorrelated with systematic risk i.e. with the other factors, leading to a zero conditional mean. When holding a well-diversified portfolio, the firm-specific risk will cancel out according to the law of averages. The formula for the error term is:

$$e_p = \frac{1}{n} \sum_{i=1}^{n} e_i \qquad (2)$$

As can be seen in the formula, the error term decreases when adding securities (n) and approaches zero when n is large (Bodie et al. 2011).

Data and Methodology

Data

The structure of our dataset is time series with monthly frequency over the time period January 2004 to January 2014. The number of observations is 121. The dataset is collected using the data bases: Bloomberg, Kenneth R. French Data Library and Morningstar Direct.

Outliers

We have identified a few outliers in the return data. We know that the financial crises are the reason behind the extreme values and that the outliers are real values. We therefore decided to keep the outliers. Performed tests show that the outliers are not influential, i.e. they do not affect our baseline result if they are dropped. Test results are available upon request from the authors.

Survivorship bias

When collecting the data a concern about sample selection bias is required, due to fund attrition when there is a correlation with performance (Brown et al. 1992). When gathering fund data for performance evaluation, a survivorship bias may arise if only the funds that are currently available for purchase are included in the sample. The most poorly performed funds, those which were merged into other funds or that are defunct, would be omitted from the sample. An evaluation of this sample would lead to an overestimation of the average performance, since only the returns of the best performing funds are evaluated (Stock & Watson 2012). Henceforth, when we use the term "inactive funds" we will refer to funds that do not provide price data anymore. This could be due to that these funds were merged into other funds or that they are dead et cetera. Chegut et al. (2010) find that there is no general panacea of the survivorship bias, not even a common survivorship bias recognition, in the performance literature. Nevertheless, to mitigate this survivorship bias we add back the inactive funds so that both active and inactive funds are included in our sample. When adding back inactive funds, their returns are accounted for during the time they were active, when they stopped providing price data, the portfolios are reweighted. This method is in line with the work of Bauer et al. (2005, 2006) and Bello (2005). In our case, the inactive funds stand for 24 percent in our conventional portfolio and 21 percent in our ethical portfolio. Since the ethical and conventional portfolios are almost equally biased we believe our conclusions will not be distorted by a survivorship bias. However the large portion signals the importance of

including the inactive funds. Average annual return for the ethical portfolio is 8.10 percent when excluding inactive funds and 7.83 when including inactive funds. For the conventional portfolio the corresponding figures are 9.11 percent and 8.75 percent. In both cases we see a drop in the annual rate of return when including the inactive funds. It gives support to the mentioned theory regarding a correlation between the attrition and a lower performance and that our method of including inactive funds alleviates this problem. Due to the decision of adding back inactive funds we get missing values for these funds for the time after they became inactive. We also have missing values for the entering funds (new funds being listed during our time period). In previous literature it is not clear if they include entering funds or not. We include them since we want to investigate the performance of all existing funds without putting a restriction on that they had to be active before our sample period starts. Our choice of accepting both exits and entries of funds in our portfolios gives us an unbalanced data set. Having a balanced data set has many benefits but a drawback is that it would give a sample selection bias if the entries or exits correlate with the dependent variable (Olley & Pakes 1996). We believe that using an unbalanced sample is a better method since we want to mitigate the survivorship bias and avoid a sample selection bias as much as possible.

Mutual funds selection

Our data selection consist of US mutual open-ended equity funds with at least twelve months of data. When using only equity funds, we control for differences in return due to different fund objectives. Equity funds are defined as funds investing at least 80 percent in equities. Consistency when calculating returns is easier when using only open-ended funds. By only focusing on US funds, we also control for macroeconomic effects like business cycles and inflation. A screening process on Bloomberg's whole universe of funds have been done based on the country of domicile (US), the objective of the fund (equity), type of fund (open-ended), type of open-ended fund (mutual) and general attributes (ethical or conventional). To control for different growth rate in different markets we screen the funds on geographical focus. We only include domestic US funds. With domestic we mean that the funds are American and have US as their geographical investment focus. The funds must have a percentage of investments equal to or larger than 75 percent in the US market to be included in our sample. The screening process resulted in a total of 62 ethical US funds and 4295 conventional US funds. To ensure the ethicality of the funds in our list, we did additional controls by reading the prospectus of the funds and reviewing the websites of the funds.

Methodology

Fund portfolio construction

Of our 62 ethical funds we construct a pooled equal-weighted ethical portfolio, hereafter referred to as the Pooled Ethical portfolio. We calculate an equal-weighted monthly average return for the portfolio since we choose to look at fund performance from an investor's point of view, which normally tends to deposit equal amount of its investments in different funds regardless of the fund size. This method is in line with the work of Bauer et al. (2005) and Renneboog et al. (2008). To construct the conventional counterpart portfolio, hereafter referred to as the Conventional portfolio, we use a matched pair approach. For each ethical fund, we collect two conventional funds from our screened sample, which are matched based on size and age. This is done to control for possible size and age effects on returns. This procedure resulted in 124 conventional US funds included in our Conventional portfolio. To further enhance comparability when evaluating the performance between ethical and conventional funds we estimate a difference portfolio. The Difference portfolio is constructed by subtracting the monthly returns of the conventional portfolio from the monthly returns of the ethical portfolio.

Ethical subgroup portfolios construction

To explore if ethical characteristics matter, a division of the ethical funds into subgroup portfolios is made. With the help of Bloomberg's fund screening tool we are able to divide the funds into four subgroups based on the characteristics; *ESG* (Environmental, Social and corporate Governance), *Environmental Friendly*, *Religiously Responsible* and *Socially Responsible*. Each subgroup is a new portfolio. All the portfolios are equal-weighted. The new portfolios are named: the ESG portfolio, the Environmental Friendly portfolio, the Religiously Responsible portfolio and the Socially Responsible portfolio. We follow the same method and match, based on size and age, the four ethical subgroup portfolios with four conventional portfolios. We also construct four difference portfolios for the subgroup portfolios and their matched conventional portfolios. This is resulting in four ethical subgroup portfolios, four matched conventional portfolios and four difference portfolios.

Figure 2: Definitions of the Ethical Subgroups, Bloomberg 2013

Environmental Friendly:	Funds investing in companies contributing to improvements of the quality of the environment and funds investing in companies which are working with regulations regarding the climate change.
ESG:	Funds investing in companies compliant with the ESG criteria (Environmental responsible, Social responsible and Corporate Governance responsible) are included.
Religiously Responsible:	Funds investing in companies that do not contradict the center beliefs of a specific religion.
Socially Responsible:	Funds investing in companies that fulfill socially responsible criteria.

Econometric model specification

To measure the performance and to investigate investment styles of our ethical and conventional funds we apply the Carhart (1997) four-factor model (discussed in the Theory Review above). We believe that the model suits our research question based on previous research (Bauer et al. 2005; Carhart 1997; Jegadeesh & Titman 1993) and have support through economic theory (see Theory Review section). It is also suitable for the data collected and for testing our hypothesis since we can evaluate the performance through the risk-adjusted return (the alpha) in this model.

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}Mom_t + \varepsilon_{it} \qquad (3)$$

R_{it} = *return on an individual portfolio at time t.*

R_{ft} = *a local one-month Tresaury Bill.*

α_i = *four-factor alpha i.e. the risk-adjusted return for portfolio.*

R_{mt} = *a market index collected from Kenneth R. French.*

SMB_t = Δ *between the return of small cap and large cap portfolios at time t.*

HML_t = Δ *between the return of value and growth stocks portfolios at time t.*

Mom_t = Δ *between the return of portfolios consisting of past winners and past losers at time t.*

ε_{it} = *error term for portfolio i at time t.*

When estimating the model we receive estimates for betas and alpha. The betas show the sensitivity of the dependent variable against the specific factor, holding the other variables constant. When evaluating performance we want to control for the risk, therefore the four-factor alpha are of high importance when we interpret our regressions results.

When creating our portfolio returns, we start off with a panel data of returns of individual funds. The individual monthly returns are collected from Bloomberg and are calculated using the formula:

$$r_{it} = \frac{P_t - P_{t-1} + DIV}{P_{t-1}} \qquad (4)$$

r_{it} is the monthly return for an individual fund. P_t is the price of the fund at the end of the month and P_{t-1} is the price of the fund in the beginning of the month. DIV stands for dividends and are assumed to be reinvested. Returns are net of management fees. When constructing the portfolio return, R_{it} we calculate an equal-weighted average of the returns, r_{it}, of all the funds that belong to the specific portfolio. We choose to not transform the return to log returns since we are working with portfolio returns and not individual fund returns.

$$R_{it} = \sum r_{it} \qquad (5)$$

As a proxy for the risk-free rate, R_{ft}, we choose a 1-month Treasury bill (T-bill) collected from Kenneth. R. French Data Library. Using a T-bill as a proxy for the risk-free rate is the same proxy used in the article of Bauer et al. (2005). Bodie et al. (2011) argue that T-bills are more or less risk-free. This is because they have a lower price risk and they are default risk-free. We use a local T-bill to avoid exchange rate fluctuations (Kreander et al. 2005). To get the excess return, ($R_{it} - R_{ft}$), for our ethical and conventional portfolios we subtract the monthly rate of the T-bill from the average monthly return of the portfolio.

Factor portfolio construction

The variables in our model ($R_{mt} - R_{ft}$, SMB, HML and Mom) are called factor portfolios. A factor portfolio is a portfolio consisting of stocks that are highly sensitive (a beta of 1) to one factor and low sensitivity (a beta of 0) to the other factors. The return of the factor portfolios respond to changes in that specific factor but are uncorrelated with other factors. The monthly return data for all factor portfolios are collected from Kenneth R. French Data Library, which provides data for the US market.

The excess return for the market, ($R_m - R_f$), is the value-weighted return for all US companies that are listed on the AMEX, NYSE or NASDAQ, minus the rate from the one month T-bill. To construct the SMB and the HML factors, Kenneth. R. French first construct six value-weighted portfolios ranked on size and book-to-market of all AMEX, NYSE or NASDAQ stocks. These six portfolios are the intersections of two portfolios ranked on size (small or big) and three portfolios where the stocks are ranked on their book-to-market ratio (value, neutral and growth). The size median for the NYSE market equity is used as the breakpoint for if the stocks are defined as small or big at year t. To sort the stocks on growth, neutral and value the 30^{th} and 70^{th} percentiles are used as breakpoints when the stocks are ranked on their

book-to-market ratios. The stocks with low book-to-market ratio, within the 30th percentile are growth stocks, the stocks with high book-to-market ratio, from the 70th percentile are values stocks and the stocks in between are neutral stocks.

Figure 3: Six Portfolios Ranked on Size and Book-to-Market, Kenneth R. French Data Library (2014)

	Median ME	
70th BE/ME percentile	Small Value	Big Value
	Small Neutral	Big Neutral
30th BE/ME percentile	Small Growth	Big Growth

To construct the SMB factor Kenneth. R. French subtracts the average return of the three big portfolios from the average return of the three small portfolios.

$$SMB = \frac{1}{3}\,(Small\,Value + Small\,Neutral + Small\,Growth) - \frac{1}{3}\,(Big\,Value + Big\,Neutral + Big\,Growth) \quad (6)$$

To construct the HML factor Kenneth. R. French subtracts the average return for the two growth portfolios from the average return of the two value portfolios.

$$HML = \frac{1}{2}\,(Small\,Value + Big\,Value) - \frac{1}{2}\,(Small\,Growth + Big\,Growth) \quad (7)$$

To construct the Mom factor Kenneth. R. French first construct six value-weight portfolios, formed on size and prior return, of all AMEX, NYSE and NASDAQ stocks. These six portfolios are the interactions of two portfolios ranked on size (small or big) and three portfolios ranked on prior twelve month return. The monthly size median for NYSE market equity is the breakpoint for if the stocks are accounted as small or big. The breakpoints for the twelve month prior return are the 30th and 70th NYSE percentile. Where the 30th percentile includes the stocks that went down, the stocks above the 70th percentile went up.

Figure 4: Six Portfolios Ranked on Size and Prior Return, Kenneth R. French Data Library (2014)

	Median ME	
70th prior (2-12) percentile	Small Up	Big Up
	Small Medium	Big Medium
30th prior (2-12) percentile	Small Down	Big Down

To construct the Mom factor the average return of the two down prior return portfolios is subtracted from the average return of the two up, prior return, portfolios. To obtain a rolling Mom factor this process is repeated monthly (Kenneth R. French Data Library, 2014).

$$Mom = \frac{1}{2}\,(Small\,Up + Big\,Up) - \frac{1}{2}(Small\,Down + Big\,Down) \quad (8)$$

Descriptive Statistics

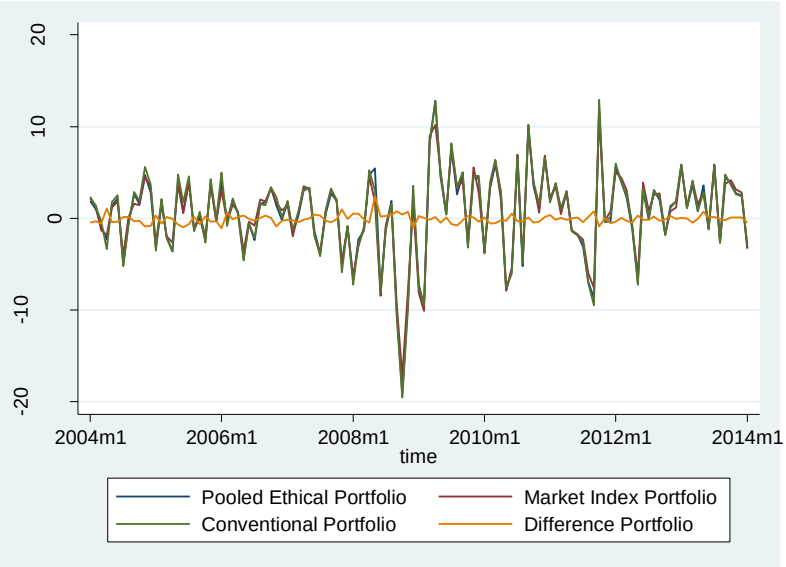
Table 1: Descriptive Statistics of the Portfolios

	Portfolios	Obs	Return	Std. Dev.	Min	Max	# of Funds	Age	Size
Pooled Portfolios	Pooled Ethical	121	.526	4.587	-19.135	12.822	62	13	472
	Conventional	121	.603	4.772	-19.519	12.892	124	13	476
	Difference Portfolio	121	-.077	.473	-1.100	2.416			
Subgroup Portfolios	Environmental Friendly	121	.452	5.386	-22.316	14.233	8	10	232
	Matched Conventional	121	.662	4.925	-17.617	12.825	16	11	234
	Difference Portfolio	121	-.210	1.456	-4.698	3.667			
	ESG	121	.519	4.482	-18.626	13.265	20	14	838
	Matched Conventional	121	.643	4.579	-19.590	12.853	40	14	852
	Difference Portfolio	121	-.124	.652	-1.867	1.495			
	Religiously Responsible	121	.647	4.242	-17.331	12.374	10	12	408
	Matched Conventional	121	.603	4.772	-19.519	12.892	20	12	406
	Difference Portfolio	121	.044	.830	-1.908	2.188			
	Socially Responsible	121	.526	4.702	-19.212	12.415	25	13	283
	Matched Conventional	121	.551	4.942	-19.769	13.568	50	13	281
	Difference Portfolio	121	-.025	.740	-1.822	5.216			
Factor Portfolios	Market	121	.589	4.348	-17.23	11.34			
	SMB	121	.223	2.199	-4.22	5.79			
	HML	121	.129	2.346	-9.86	7.59			
	Mom	121	.048	4.811	-34.72	12.53			

Notes: This table reports the descriptive statistics for our Pooled Ethical portfolio, the matched Conventional portfolios, our subgroup portfolios, the factor portfolios and all the respective difference portfolios. Obs is number of observations. Std. Dev. is the standard deviation. Min and Max are minimum and maximum return. Returns are average annual excess returns. Number of funds is the amount of funds included in the portfolios. Age is in years and size is the total asset in millions of US dollars.

From the Descriptive Statistics, in Table 1, we can see that in general the ethical portfolios have a lower average monthly return than the conventional counterpart portfolios. An exception is the Religiously Responsible portfolio which has a higher monthly average return than the matched conventional portfolio. We cannot say from this table if there is any statistical significance. The standard deviation is slightly larger in general for the conventional portfolios with the exception of the Religiously Responsible portfolio and the Environmental Friendly portfolio, which has a higher standard deviation than the conventional counterparts. The minimum and maximum values have a large spread due to high volatility during the financial crises. This causes some outliers in the data but they are not influential (see earlier discussion). The Environmental Friendly portfolio is the smallest and the youngest of the ethical subgroups while the ESG portfolio is the largest and the oldest subgroup. Due to application of the matched pair approach the conventional portfolios are equal in age and size to their ethical counterparts.

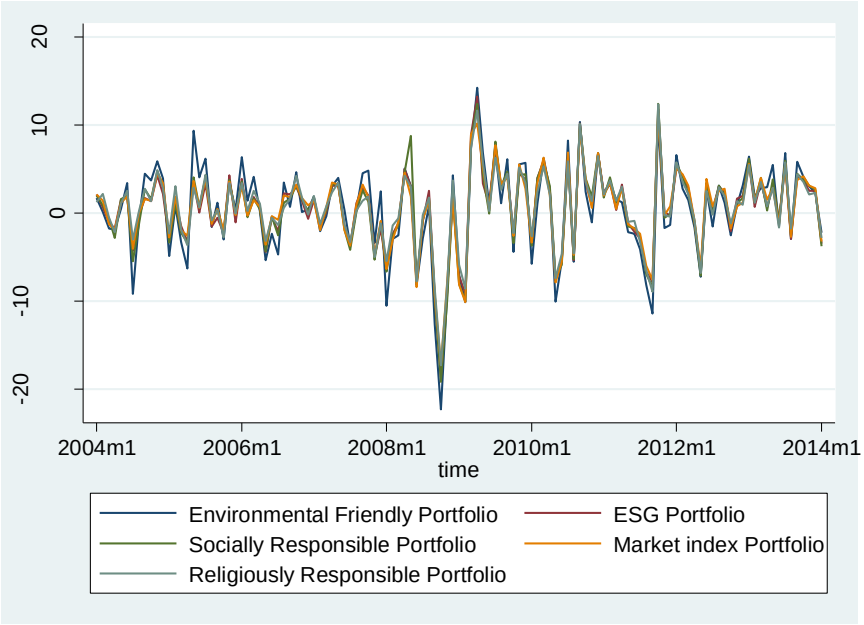
Graph 1: Monthly average returns for the pooled portfolios



Notes: The graph show monthly average returns for the Pooled Ethical portfolio, the Conventional portfolio, the Difference portfolio and the Market Index portfolio. .

In Graph 1 we see that there are small differences between the Pooled Ethical portfolio, the Conventional portfolio and the Market Index portfolio. The return of the Difference portfolio vary around zero, showing that the difference is very small and that the Pooled Ethical portfolio sometimes performs better than the Conventional portfolio and sometimes worse.

Graph 2: Monthly Average Return for the Ethical Subgroup Portfolios



Notes: The graph show monthly average returns from the ethical subgroup portfolios and the Market Index portfolio.

In Graph 2 we see that in general the portfolios follow the Market Index portfolio but we can see that the Environmental Friendly portfolio have slightly higher volatility and therefore both larger positive and negative returns than the other portfolios. Due to the extreme values during the financial crises, the graph gets scaled up and differences can be hard to spot. (See Appendix 1.a. Graphs 3 and 4, for more detailed graphs on the subgroup portfolios).

Results

All the results are estimated using OLS as estimator on the Carhart (1997) four-factor model. Results are written in the following order. First are the baseline results where we analyze our Pooled Ethical portfolio, our Conventional portfolio and their Difference portfolio. The baseline results give answers to our first and second hypothesis. Following is a section with our heterogeneity investigation. During our heterogeneity investigation we use our subgroup portfolios. We begin with examining what drives the results of our first and second hypothesis. After that we continue with answering the third and fourth hypothesis by analyzing the four difference portfolios made from the ethical subgroup portfolios and their matched conventional portfolios. Finally the result section ends with four robustness test.

Baseline Results

First Hypothesis – difference in performance

This section examines differences in performance between our Pooled Ethical portfolio and its matched Conventional portfolio. Table 2 summarizes the results of applying the Carhart (1997) four-factor model on our Pooled Ethical portfolio, matched Conventional portfolio and their Difference portfolio.

Table 2: Baseline Regression Results

Variables	Pooled Ethical Portfolio	Conventional Portfolio	Difference Portfolio
4-factor alpha	-0.100**	-0.055	-0.046
	(0.049)	(0.047)	(0.037)
Market	0.993***	1.032***	-0.039***
	(0.016)	(0.020)	(0.009)
SMB	0.231***	0.259***	-0.029
	(0.026)	(0.027)	(0.025)
HML	-0.068***	-0.055**	-0.013
	(0.016)	(0.024)	(0.016)
Mom	-0.025*	-0.010	-0.015*
	(0.015)	(0.014)	(0.008)
Observations	121	121	121

Notes: Reported are estimates from the Pooled Ethical portfolio and the matched Conventional portfolio for the period January 2004 - January 2014. The betas are estimated by regressing monthly excess returns on the monthly factor returns. The returns are net of management fees. The difference portfolio is created by subtracting the returns of the conventional portfolio from the returns of the ethical portfolio. Newey-West standard errors are in parentheses, correcting for serial correlation and heteroskedasticity. Regression is made using OLS on equation:

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}Mom_t + \varepsilon_{it}$$

The 4-factor alpha is the risk-adjusted return. The Market variable is the Kenneth. R. French market index. The SMB variable is a size factor portfolio. The HML variable is a Book-to-Market factor portfolio. The Mom variable is a momentum factor portfolio.
*** Significant at the 1 % level.
** Significant at the 5 % level.
* Significant at the 10 % level.

After controlling for our four risk factors, the alpha is the risk-adjusted return. When interpreting the alphas in Table 2, both the ethical and the conventional portfolios have negative alphas, i.e. they underperform the market. The estimates have economic significance, but only the alpha for the Pooled Ethical portfolio has a statistical significance. To see if there is a difference in performance between the ethical and the conventional portfolio we look at the Difference portfolio. It shows a statistically insignificant alpha, meaning no differences in performance. This is in consonance with results from previous research on mutual funds in the US by Bauer et al. (2005), Goldreyer et al. (1999), Statman (2000) and Renneboog et al. (2008). However, it contradicts with the finding of a significant underperformance among domestic ethical US funds reported by Chang and Witte (2010). Our results does not give support to the common theory that by adding an ethical screening, the investment universe decreases and therefore an ethical portfolio is a portfolio that is subset to the market portfolio, hence giving lower returns. This could be because the mentioned concept, that maintains the universe for ethical investments is large enough to not hamper the return by being a subset universe, is valid. Additional reason for an insignificant difference in performance could be the absence of standardized ethical definitions and lack in standardized screening processes. It could cause the distinction between ethical and conventional funds to diminish. Bauer et al. (2007) point out that it could happen when using the best-in-class screening process. As we see later on in this thesis we also have yet another reason for this result; the large set of heterogeneity in our portfolio might cause insignificant results when using a Pooled Ethical portfolio.

The answer of the first hypothesis is that there is no difference in performance between the Pooled Ethical portfolio and the Conventional portfolio.

Second Hypothesis – differences in investment styles

This section analyses differences in investment styles between our Pooled Ethical portfolio and our Conventional portfolio. Results are displayed in Table 2.

First, when analyzing the Market factor, Table 2, we see that the ethical funds are less exposed to the Market factor than the conventional funds. We see in the market beta for the Difference portfolio that this difference is statistically significant. The magnitude of the coefficients is similar, but the ethical funds are slightly less volatile than the market while the conventional are slightly more volatile. The coefficients are both economically and statistically significant. These results are equivalent with the results of Bauer et al. (2005,

2006). Jegourel and Maveyraud (2010) find a connection between exposure to the market and ethical screenings, stating that more ethical screenings give less exposure to the market.

Second in Table 2, the estimates for the SMB factor for the Pooled Ethical and Conventional portfolio are statistically significant, are of similar magnitude and have the same sign. This indicates that the Pooled Ethical and the Conventional portfolio are similarly sensitive to the SMB factor. This is confirmed by the Difference portfolio that shows no differences in investments style regarding the SMB factor. The positive sign and the high magnitude for both of the portfolios can be interpreted as the portfolios being exposed to small caps due to relatively more investments in small caps than large caps companies. The estimates for the SMB factor are in accordance with the results of Bauer et al. (2005) and Renneboog et al. (2008) for the US market. One reason for our portfolios exhibiting a large sensitivity towards the SMB factor could be because we only have equity funds in our data sample. Equity funds in general have characteristics of higher returns and higher risk compared to for example interest funds. One strategy for managers to receive higher returns is by taking on extra risk, e.g. they can tilt their portfolios towards small cap. In the Theory Review we also mentioned that SMB can work as a proxy for other unknown factors or as a default risk premium. Thus it might also be that the portfolios are sensitive to potential unknown factors that are captured by the SMB factor.

Third, the estimates for the HML factor in Table 2 show that both of the portfolios are growth-oriented but the ethical portfolio has a slightly larger exposure to growth stocks. Bauer et al. (2005) show that their ethical portfolio is more growth-oriented than its counterpart, but they obtain positive estimates in contrast to our negative estimates. Bauer believes that the more growth-oriented approach found in the ethical portfolio is due to fewer investments in corporations belonging to typical value industries, such as chemicals and energy. Guerard (1997) also find that the stocks of the Domini 400 Social Index universe have historically been growth-oriented. However in our results this larger exposure is not statistically significant, when observing the Difference portfolio. Since different industries tend to include either value or growth stocks we believe that the insignificant difference is due to that both our portfolios are funds that invest in US, hence probably investing to a large proportion in the same industries. It could also be that both of them might be growth-oriented because this strategy is more in line with the efficient market hypothesis, i.e. that the stocks reflect available information and managers buy them for a hopefully good growth in the stock.

Value stocks are seen as mispriced and as the US market is quite transparent and mature, it might be hard to find mispriced stocks.

Fourth in Table 2, both the ethical and the conventional funds get a negative coefficient for the momentum factor. However, it is only statistical significant for the Pooled Ethical portfolio. A negative beta for the Mom factor tells us that the portfolios contain more of contrarian stocks relative to momentum stocks. The negative and the statistically significant estimate for the momentum factor in the difference portfolio can be interpreted as the ethical portfolio is following the momentum strategy less than the conventional portfolio. Reasons for not following the momentum strategy could be that even when there is a short-term momentum effect, if this effect is due to the market overreacting, there are reasons to believe that the overreaction will reverse in the long-run, hence favoring a contrarian strategy. Taking into account this possible long-run reversal of prices and that our time period is relatively long, the manager might hold contrarian stocks in the longer-run, even though she might use momentum strategies during shorter periods. Another point of view is raised by Carhart (1997) that declares, a negative beta does not necessarily mean that the fund manager actively follow a contrarian strategy, it could be that the fund manager just happens to hold the contrarian stocks of last year.

The answer of the second hypothesis can be summarized as that there is only a statistical significant difference in investment styles between the Pooled Ethical and the Conventional portfolios against the Market and the Mom factor. Both the Pooled Ethical and the Conventional portfolio tilt towards investing in small cap companies and growth stocks.

Heterogeneity Results

Does a certain subgroup channels our results of our Pooled Ethical portfolio?

In this section we examine if a specific subgroup is driving the baseline results from the previous two sections. Table 3 summarizes the results from regressions made on the ethical subgroup portfolios.

Table 3: Heterogeneity Portfolios Results

	Ethical Subgroup Portfolios			
Variables	ESG	Environmental	Religiously	Socially
4-factor alpha	-0.085*	-0.266*	0.078	-0.119*
	(0.047)	(0.145)	(0.067)	(0.066)
Market	0.975***	1.129***	0.914***	1.001***
	(0.015)	(0.045)	(0.020)	(0.016)
SMB	0.174***	0.379***	0.180***	0.263***
	(0.030)	(0.074)	(0.031)	(0.040)
HML	-0.061***	-0.249***	-0.053	-0.021
	(0.019)	(0.056)	(0.036)	(0.016)
Mom	-0.043**	-0.008	-0.038***	-0.010
	(0.017)	(0.039)	(0.014)	(0.013)
Observations	121	121	121	121

Notes: Reported are estimates for the ESG, Environmental Friendly, Religiously Responsible and Socially Responsible subgroup portfolios containing of US ethical funds for the period January 2004 - January 2014. The betas are estimated by regressing monthly excess returns on the monthly factor returns. The returns are net of management fees. ESG is the portfolio containing ethical funds fulfilling Bloomberg's ESG requirements. Environmental is the portfolio containing the ethical funds fulfilling Bloomberg's Environmental Friendly requirements. Religiously is the portfolio containing the ethical funds fulfilling Bloomberg's Religiously Responsible requirements. Socially is the portfolio containing the ethical funds fulfilling Bloomberg's Socially Responsible requirements. Newey-West standard errors are in parentheses, correcting for serial correlation and heteroskedasticity. Regression is made using OLS on equation:

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}Mom_t + \varepsilon_{it}$$

The 4-factor alpha is the risk-adjusted return. The Market variable is the Kenneth. R. French market index. The SMB variable is a size factor portfolio. The HML variable is a Book-to-Market factor portfolio. The Mom variable is a momentum factor portfolio.

*** Significant at the 1 % level.
** Significant at the 5 % level.
* Significant at the 10 % level.

When interpreting the alphas in Table 3 we see that all of the subgroup portfolios, except for the Religiously Responsible, have negative alphas that are statistically significant at a ten percent level. These results show an underperformance compared to market. The alpha for the Environmental Friendly subgroup portfolio has a larger negative magnitude, yielding a large impact on the estimated negative alpha for the Pooled Ethical portfolio in Table 2. One explanation for why the Environmental Friendly portfolio has a larger underperformance against the market than the other ethical subgroups could be that it is younger, which is displayed in the Descriptive Statistics, Table 1. Gregory et al. (1997) discuss that younger funds may have higher marketing costs, starting-up costs and higher transaction costs in the beginning which affect the performance. We also notice that our Environmental Friendly

subgroup has a large proportion of entering funds in the year 2008. Combining the financial crises with the extra costs for younger funds might have impacted the average performance for the environmental friendly funds.

For the Market factor in Table 3, the Environmental Friendly portfolio is the only subgroup with a beta larger than 1. This is in line with the results of Climent and Soriano (2011) who find that green funds tend to be more sensitive to the market than other ethical funds.

Concerning the SMB factor in Table 3, all of the subgroup portfolios have positively and statistically significant betas; they are all exposed to small cap stocks. No specific subgroup is driving the result for the Pooled Ethical portfolio displayed in Table 2.

For the HML factor in Table 3, all of the subgroups have negative signs, implying that they are all growth-oriented, which corroborates our baseline results. The magnitude for the Environmental Friendly portfolio is considerably larger than of the other subgroups, which gives a large influence on the beta of the HML factor for the Pooled Ethical portfolio in Table 2. Environmental Friendly funds could be even more bond to investing in growth stocks compared to the other subgroups, since they might exclude typical value sectors to a larger extent. Examples are chemical and basic industries, as they are often seen as the villains concerning the environment.

Regarding the Mom factor in Table 3 we cannot conclude that a certain subgroup portfolio is driving the estimated beta for the Mom factor for the Pooled Ethical portfolio in Table 2.

Third Hypothesis – differences in performance among subgroups

This section explores if there are any differences in performance between the ethical subgroup portfolios and their matched conventional portfolios. Table 4 summarizes the results of estimating the difference portfolios, constructed from the ethical subgroup portfolios and their matched conventional portfolios.

Table 4: Subgroup Difference Portfolio Results

	Difference Portfolios			
Variables	ESG	Environmental	Religiously	Socially
4-factor alpha	-0.106*	-0.255*	0.132**	0.019
	(0.063)	(0.136)	(0.057)	(0.053)
Market	-0.017	0.063	-0.118***	-0.067***
	(0.020)	(0.041)	(0.019)	(0.009)
SMB	-0.008	0.081	-0.079**	-0.061
	(0.040)	(0.067)	(0.033)	(0.039)
HML	-0.038	-0.078	0.003	0.084***
	(0.024)	(0.062)	(0.031)	(0.020)
Mom	-0.017	0.006	-0.028**	-0.021**
	(0.015)	(0.024)	(0.012)	(0.010)
Observations	121	121	121	121

Notes: Reported are estimates from regressing monthly excess returns net of management fees on monthly factor returns. The regression is done on the difference portfolios during the period January 2004 - January 2014. The Difference Portfolios are constructed as followed: The *Difference Portfolio ESG* is created by subtracting the returns of the matched conventional portfolio from the returns of the ethical portfolio consisting of only ESG responsible funds. The *Difference Portfolio Environmental* is constructed by subtracting the returns of the matched conventional portfolio from the returns of the ethical portfolio consisting of only environmental responsible funds. The *Difference Portfolio Religiously* is created the same way, subtracting the returns from the matched conventional portfolio from the returns of the ethical portfolio consisting of only religiously responsible funds. The *Difference Portfolio Socially* is constructed by subtracted the returns of the matched conventional portfolio from the returns of the ethical portfolio consisting of only socially responsible funds. Newey-West standard errors are in parentheses, correcting for serial correlation and heteroskedasticity. Regression is made using OLS on equation:

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}Mom_t + \varepsilon_{it}$$

The 4-factor alpha is the risk-adjusted return. The Market variable is the Kenneth. R. French market index. The SMB variable is a size factor portfolio. The HML variable is a Book-to-Market factor portfolio. The Mom variable is a momentum factor portfolio.

*** Significant at the 1 % level.
** Significant at the 5 % level.
* Significant at the 10 % level.

In Table 4 we discover that when dividing the ethical funds into different subgroup portfolios, and estimating the differences in alpha, we now get the prominent results that we have a statistically significant difference in the risk-adjusted return. The ESG funds and the Environmental Friendly funds underperform the matched conventional funds on a ten percent significant level. This supports the theory that when adding an ethical screening the investment universe gets smaller, hence poorer returns. Climent and Soriano (2011) also get a statistical significant negative difference between environmental funds and conventional funds. In our case this difference is of high economic significance. We believe that the notable

negative difference in alpha for the Environmental Friendly portfolio could have two sources; potential negative screening and low support of environmental issues.

The theory regarding a smaller investment universe due to additional screenings can give a greater impact if the fund uses a negative screening since negative screening can exclude whole sectors, hence resulting in an even smaller investment universe. We believe that environmental funds tend to exclude whole sectors to a greater extent since they have a narrower ethical focus. Climent and Soriano (2011) find in their sample that the environmental funds are not very diversified across sectors. Negative screening together with an exclusion of whole sectors lowers the performance more than the use of a negative screening that does not exclude entire sectors (Jegourel & Maveyraud 2010). In our case, since we have chosen domestic funds, the investment universe is already restricted on international investments. An ethical screening together with extra exclusions for the environmental funds might be enough to give a significant lower performance.

We believe that the drop of the oil price after the previous financial crisis has impaired the situation for companies dealing with alternative fuels. The financial crisis can also have had an impact on the prioritization of environmental issues, some government subsidies to companies for dealing with environmental issues could plausibly have been withdrawn when the economic situation got worsen which resulted in higher cost for those companies, hence weaker performance. We believe that to worry about the environmental is more of a modern approach in the US, since the interest for funds that request environmentally friendly investment has increased in recent time (Climent & Soriano 2011). Even though a recent increase in interest, the environmental concerns might not yet be fully integrated in the society and therefore easier to modify or disregard in hard economic times.

The underperformance of the ESG portfolio compared to the matched conventional portfolio could plausible have similar explanations as the underperformance of the Environmental Friendly portfolio since also ESG contain environmental responsible assets.

Noteworthy in our results is that the Religiously Responsible funds outperform their matched conventional funds. The difference in performance is both statistically and economically significant. This outperformance could be due to the importance of religiously beliefs in the US. Religiously beliefs were also the first source for ethical investments (Kurtz 2008). Faith is a central force in the US since the country denotes as an extraordinarily religious country

(Demerath 1998). Therefore, we think that companies working after religiously guidelines have a constant demand for its products, giving a stable performance. Peifer (2011) displays religiously responsible fund to be more stable than other ethical fund and explains this with morality leading to perseverance among religious investors, hence the steadiness. We also believe that people does not abandon their religiously values easily. Looking at Appendix 1.a, Graph 5, we see that the difference portfolio between the Religiously Responsible and its matched conventional portfolio has a positive performance during the year 2008 (financial crisis).

Another reason for this outperformance could be explained by a bias. When searching through our Religiously Responsible portfolio we discover that is has a proportion of inactive funds of only 10 percent, while its conventional matched portfolio include inactive funds of a proportion of 20 percent. We discussed earlier, in the Data Section, that inactive funds had a lower average return. The larger proportion of inactive funds found in the conventional portfolio might have affected the return of the conventional portfolio negatively.

The answer to hypothesis three is that there are statistically significant differences in performance. The ESG and the Environmental Friendly portfolio underperform their matched conventional counterparts and the Religiously Responsible portfolio outperforms its matched conventional portfolio.

Fourth Hypothesis –differences in investment styles among subgroups

This section examines differences in investment styles between the ethical subgroups and their matched conventional portfolios. Results are displayed in Table 4.

Table 4 shows a negative and highly significant difference for both the Religiously Responsible Difference portfolio and the Socially Responsible Difference portfolio for the Market factor. This means that the Religiously Responsible and Socially Responsible portfolios are less sensitive to changes in the market return than the conventional portfolios.

Further, in Table 4, the Religiously Responsible portfolio is significant less exposed to small caps compared to the conventional portfolio. Seeing as we only get one difference that is significant for the SMB factor we think that this significance could be because of the small sample of funds. There might not be a specific reason why Religiously Responsible is less exposed to small cap.

In Table 4, The Socially Responsible portfolio is more exposed to value stocks than growth stocks compared to the conventional funds. This result is highly statistically and economically significant. It contradicts with the earlier mentioned theory regarding ethical funds to be more growth-oriented. This might be because socially responsible funds do not specifically exclude particular sectors since there are many socially responsible companies in both value and growth sectors, hence socially responsible funds are able to invest in both growth and value stocks. In Table 3 we see that the Socially Responsible portfolio has a HML beta close to zero, meaning that the portfolio is neither growth- nor value-oriented.

The estimated betas for the Mom factor in Table 4 are significant with a negative sign for the Religiously Responsible Difference portfolio and the Socially Responsible Difference portfolio. This means that the Religiously Responsible and Socially Responsible portfolio is less exposed to momentum stocks meaning that they are holding more contrarian stocks than their conventional counterparts.

The answer to the fourth hypothesis is that there are small differences in investment styles between the ethical subgroups and their matched conventional counterparts. For the Religiously Responsible portfolio it differs referring the Market, the SMB and the Mom factor. For the Socially Responsible portfolio it differs in the Market, the HML and the Mom factor.

Robustness and sensitivity tests

To affirm robustness of our results we perform four different robustness tests which are considering management fees, alternative benchmark, model specification and attrition effects. The interpretation of our robustness tests are found in the following paragraphs and the results of our robustness tests are attached in Appendix 1.c.

Influences of management fees

It can be costly for managers to perform an ethical screening which may result in a higher management fee hence affecting the net return (Bauer et al. 2005, 2006). In this thesis we use net returns, meaning that management fees have been deducted. To test if our results are robust, we test the influence of fees on performance, through using gross returns. Management fees are here assumed to be the expense ratio and sales charges. The front-load fee is used as a proxy for the sales costs. Management fee is calculated using the formulae:

$$Annualized\ management\ fee = yearly\ expense\ ratio + \frac{front-load\ fee}{7} \qquad (9)$$

The extracted yearly expense ratios for each fund are collected using Morningstar Direct and the front-load fee is collected from Bloomberg. In the formulae, the front-load fee is annualized by amortizing the fee over a seven-year period, which is assumed to be the average holding period (Sirri & Tufano 1998). The annualized management fee is then divided by twelve to get the monthly fee for each fund. Equal-weighted monthly averages of the fee for each portfolio are calculated. The fee is then added back to the respective net return of the portfolios so we instead have gross return before running the four-factor model.

The results show that alpha is now positive for both the Pooled Ethical and the Conventional portfolio. The difference between the alphas is still negative and insignificant, as in earlier observations. We conclude that management fees do not influence the performance noteworthy and that our results are robust when using gross returns. (Results are available upon request).

Benchmark

Since we use a proxy for the market portfolio it is important to find a proxy that is efficient. Using an incorrect benchmark would lead to a benchmark error. The choice of benchmark can have considerable impact on conclusions about fund performance, and the use of different benchmarks can lead to different conclusions (Bodie et al. 2011). To check the robustness of

our results we run our baseline and heterogeneity regressions with two different market proxies, the benchmark index collected from Kenneth. R. French Data Library and an additional index; the MSCI ACWI Broad Market index collected from Bloomberg. Our additional index is a market capitalization weighted index of large, mid, small and micro cap US equities and it aims at covering 99.5 percent of the US market capitalization. Switching the benchmark does not change our results notably. Some betas change slightly in magnitude and significance, which show that the choose of benchmark could be of importance, but our conclusions regarding the difference in performance between the ethical and the conventional funds is still insignificant, regardless of which benchmark we use. The uniformly regression results indicate robustness of our conclusions. (See Appendix 1.c., Table: 8, 9 and 10 for regression results).

Model specification

Additional robustness test is done on the model specification. We compare three commonly used models; CAPM, Fama-French three-factor model and Carhart four-factor model, and conclude that we get similar estimates from the different models. The difference in alpha using the Pooled Ethical portfolio has the same sign and is still statistically insignificant. The difference in alpha when using our ethical subgroup portfolios also has similar magnitude, same sign and same significance level. When applying multifactor models instead of the CAPM, the alpha is expected to decrease since we control for additional risk premiums. The alpha in this robustness test does not decrease in all cases but the alphas are however not statistically significant. (See Appendix 1.c., Table 11 and 12 for regression results).

Attrition

To check for robustness of our baseline result in Table 2, and to see if it is sensitive towards effects of attrition of funds, we restrict our sample to a shorter time period where attrition is less substantial and where also a possible survivorship bias is smaller. For the time period April 2011 – January 2014 we have an attrition of 9.3 percent for the ethical funds and an attrition of 9.4 percent for the conventional funds (compared to 21 percent attrition for the ethical funds and 24 percent for the conventional funds in the baseline sample). The outcomes when having a lower attrition is similar to our baseline results. The alphas slightly change in magnitude and significance but the conclusion remains; there is no statistically significant difference in performance between the ethical and the conventional funds. The HML beta is no longer statistically significant and changes sign for the ethical portfolio. The similarity in

the regression results between our sample with less attrition and our full sample indicates that our conclusions of the baseline results do not problematically suffer from attrition effects. (See Appendix 1.c., Table 13 for regression results).

Conclusions

The primary objective of this study is to investigate if there is a difference in performance between ethical and conventional funds. This is done by first examine a Pooled Ethical portfolio compared to a matched Conventional portfolio and then by dividing the Pooled Ethical portfolio into different ethical subgroups and consequently matched conventional portfolios. With a matched pair approach we control for size and age effects. We use Carhart (1997) four-factor model to estimate the risk-adjusted return. With our choice of model we are also able to investigate differences in investment styles between our ethical and conventional portfolios. The return data consists of time series for ethical and conventional funds in the US market during the time period January 2004 to January 2014. Our test results indicate robustness towards influences of management fees, different benchmarks, alternative model specification and attrition.

When examining the performance, our results show no statistically significant difference in performance between our Pooled Ethical portfolio and the Conventional portfolio. This result is in line with previous research done by Bauer et al. (2005), Goldreyer et al. (1999), Statman (2000) and Renneboog et al. (2008). An implication of this is that in the US market during our time period there was no financial penalty for investing ethically. Our results contradict the economic theory which states that ethical screenings should cause a subset portfolio and lower the returns. An explanation could be that the ethical investment universe is large enough to not affect diversification negatively. Another explanation for not finding a statistically significant difference could be the absence of standardized definition of ethical funds which could decrease potential differences among the two portfolios. When investigating the investment styles we see great similarities between the Pooled Ethical portfolio and the Conventional portfolio. Both the ethical and the conventional funds are small cap and growth stock oriented.

Conversely, when dividing our Pooled Ethical portfolio into the subgroups: ESG, Environmental Friendly, Religiously Responsible and Socially Responsible, we see statistically significant differences in performance between the ethical subgroups and their matched conventional funds for the first three pairs. The ESG portfolio and the Environmental Friendly portfolio have statistically significant lower performances than their matched counterparts. For the Environmental Friendly portfolio, this difference is of a high magnitude. The underperformance of the Environmental Friendly portfolio compared to its matched

conventional counterpart could be due to a possible use of negative screening among the Environmental Friendly funds, which decreases the investment universe notably when entire sectors are excluded. Another thought is that the environmental concerns do not get the same support through hard economic times; the environmental issues might have got erased from the political agenda. On the contrary the Religiously Responsible portfolio has a statistically significant performance that is greater than its conventional counterpart. This may be due to religiously beliefs being of greater importance for the American population, giving a more stable demand for companies included in the Religiously Responsible funds.

Our results challenge the view that ethical funds can be treated as a homogeneous group. In our case, two of the ethical subgroups underperform and one outperforms the conventional funds. This results in an alpha that approaches zero when aggregating the ethical funds into a Pooled Ethical portfolio. This could be the reason for why a statistically significant difference in performance between ethical and conventional funds cannot be detected. Our results points toward an apparent heterogeneity among the ethical funds, which needs to be considered when testing the performance of ethical funds. In previous research it is common to treat the ethical fund market as a unity when evaluating their performance. We therefore suggest that future research should explore this heterogeneity more and investigate what channels previous results. Another implication of our results is that when investing in the US market during our time period, the investor got a financial penalty if choosing environmental friendly and ESG funds and got a finical advantage if choosing religiously responsible funds.

A word of caution, all of our results are limited to our sample and our time period.

Finally, answering the question raised in our title, we believe different ethical characteristics do matter when examining differences in performance between ethical and conventional funds and should therefore be controlled for.

References

Bauer, R., Koedijk, K. and Otten, R. (2005). International Evidence on ethical mutual fund performance and investment style. *Journal of Banking & Finance*, 29, pp. 1751-1767.

Bauer, R., Otten, R. and Rad, A,T. (2006). Ethical investing in Australia: Is there a financial penalty? *Pacific-Basin Finance Journal*, 14, pp. 33-48.

Bauer, R., Derwall, J. and Otten, R. (2007). The Ethical Mutual Fund Performance Debate: New Evidence from Canada. *Journal of Business Ethics*, 70, pp. 111-124.

Bello, Z.Y. (2005). Socially Responsible Investing and Portfolio Diversification. *The Journal of Financial Research*, 1, pp. 41-57.

Bodie, Z., Kane, A. and Marcus, A.J. (2011). *Investments*. Ninth Edition. New York: McGraw-Hill/ Irwin.

Brown, S.J., Goetzmann, N.W., Ibbotson, R.G. and Ross, S.A. (1992). Survivorship bias in performance studies. *Review of Financial Studies*, 5, pp. 553-580.

Carhart, M. (1997). On Persistence in Mutual Fund Performance. *Journal of Finance*, 52 (1) pp. 57-82.

Chegut, A., Schenk, H. and Scholtens, B. (2010). Assessing SRI Fund Performance Research: Best Practices in Empirical Analysis. *Sustainable Development*, 19, pp. 77-94.

Chang, C. E. and Witte, H.D. (2010). Performance Evaluation of U.S. Socially Responsible Mutual Funds: Revisiting Doing Good and Doing Well. *American Journal of Business*, 25 (1), pp. 9-24.

Climent, F., Soriano, P. (2011). Green and Good? The Investment Performance of US Environmental Mutual Funds. *Journal of Business Ethics*, 103, pp. 275-287.

Demerath, N. J. (1998) Exceptionalism: American Religion in Comparative Reliefs. *Annals of the American Academy of Political and Social Science*, 558, pp. 28-39.

Elton, E, Gruber, M, Das, S. and Blake, C. (1996). The Persistence of Risk-Adjusted Mutual Fund Performance, *Journal of Business*, 69 (2), pp. 133-157.

Fama, E.F. and French, K.R. (1992). The Cross-Section of Expected Stock Returns. *The Journal of Finance*, 47, pp. 427-465.

Fama, E. F. and French, K.R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33, pp. 3-56.

Fama, E.F. and French, K.R. (1995). Size and Book-to-Market factors in Earnings and Returns. *The Journal of Finance*, 50, pp. 131-155.

Fama, E.F. and French, K.R. (1998). Value versus growth: the international evidence. *The Journal of Finance*, 53, pp. 1975-1999.

Ferson, W. and Schadt, R. (1996). Measuring fund strategy and performance in changing economic conditions. *Journal of Finance*, 51, pp. 425–462.

Goldreyer, E.F., Ahmed, P. and Diltz, J.D. (1999). The performance of socially responsible mutual funds: Incorporating sociopolitical information in portfolio selection. *Managerial Finance*, 25 (1), pp. 23–36.

Goetzmann, N. W. and Ibbotson, G. R. (1994). Do winners repeat? Pattern in mutual fund performance. *Journal of Portfolio Management*, 20, pp. 9-18.

Gregory, A., Matatko, J. and Luther. R (1997). Ethical Unit Trust Financial Performance: Small Company Effects and Fund Size Effects. *Journal of Business Finance & Accounting*, 24 (5), pp. 705–25.

Guerard, J. B. (1997). Is There a Cost to Being Socially Responsible in Investing? *Journal of Forecasting.* 16, pp. 475 – 490.

Grinblatt, M. and Titman, S. (1992). The persistence of mutual fund performance. *Journal of Finance*, 42, pp. 1977-1984.

Hahn, J. and Lee, H. (2006). Yield Spreads as Alternative Risk Factors for Size and Book-to-Market. *The Journal of Financial and Quantitative Analysis*, 41 (2), pp. 245-269.

Hamilton, S., Jo, H. and Statman, M. (1993). Doing well while doing good? The investment performance of socially responsible mutual funds. *Financial Analysts Journal*, 49 (6), pp. 62-66.

Hendricks, D., Patel, J. and Zeckhauser, R. (1993). Hot Hands in Mutual Funds: Short-Run Persistence of Relative Performance, 1974-1988. *The Journal of Finance*, 48 (1), pp. 93-130.

Humphrey, J. E. and Lee, D. D. (2011). Australian Socially Responsible Funds: Performance, Risk and Screening Intensity. *Journal of Business Ethics*, 102 (4), pp. 519-533.

Jegadeesh, N. and Titman, S. (1993). Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. *Journal of Finance*, 48 (1), pp. 65-91.

Jegourel, Y. and Maveyraud, S. (2010) A reassessment of the European SRI Funds "underperformance": does the intensity of extra-financial negative screening matter?, *Economics Bulletin*, 30 (1), pp. 913-923.

Jensen, M. (1968). The Performance of Mutual Funds in the Period 1945–1964. *Journal of Finance*, 23, pp. 389-416.

Kempf, A. and Osthoff, P. (2007). The Effect of Socially Responsible Investing on Portfolio Performance. *European Financial Management,* 13 (5), pp. 908-922.

Kreander, N., Gray, R.H., Power, D.M. and Sinclair, C.D. (2005). Evaluating the Performance of Ethical and Non-ethical Funds: A Matched Pair Analysis. *Journal of Business Finance & Accounting*, 32, pp. 1465-1493.

Kurtz, L. (2008). "*Socially Responsible Investment and Shareholder Activism".* In Crane, A., McWilliams, A., Matten, D., Moon, J. and Siegel, D. (eds) *The Oxford Handbook of Corporate Social Responsibility*, Oxford University Press, pp. 249-280.

Lintner, J. (1965). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *Review of Economics and Statistics*, 47 (1), pp. 13-37.

Mallin, C.A., Saadouni, B., and Briston, R.J. (1995). The financial performance of ethical investment funds. *Journal of Business Finance & Accounting*, 22, pp. 483-496.

Markowitz, H. (1952). Portfolio Selection. *Journal of Finance,* 12, pp. 71-91.

Mossin, J. (1966). Equilibrium in a Capital Asset Market. *Econometrica, 34* (4), 768-83.

Olley, G.S., and Pakes, A. (1996). The Dynamics of Productivity in the Telecommunications Equipment Industry. *Econometrica*, 64, pp. 1263-1297.

Otten, R. and Bams, D. (2004). How to measure mutual fund performance: economic versus statistical relevance. *Accounting and Finance,* 44, pp. 203-222.

Peifer, J. L. (2011). Morality in the financial market? A look at religiously affiliated mutual funds in the USA. *Socio-Economic Review,* 9, pp. 235-259.

Petkova, R. (2006). Do the Fama-French Factors Proxy for Innovations in Predictive Variables*?*. *The Journal of Finance*, 61 (2), pp. 581-612.

Renneboog, L., Ter Horst, J., and Zhang, C. (2008). The Price of Ethics and Stakeholder Governance: The Performance of Socially Responsible Mutual Funds. *Journal of Corporate Finance*, 14 (3), pp. 302-322.

Sandberg, J., Carmen, J., Hedesström, T. M., Hamilton, I. (2008). The Heterogeneity of Socially Responsible Investment. *Journal of Business Ethics*, 87, pp. 519-533.

Sharpe, W.F. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *Journal of Finance, 19* (3), pp. 425-42.

Sirri, R. E., Tufano, P. (1998). Costly Search and Mutual Fund Flows. *The Journal of Finance,* 53 (5), pp. 1589-1622.

Statman, M. (2000). Socially responsible mutual funds. *Financial Analysts Journal*, 56 (3), pp. 30-39.

Stock, J.H.,Watson, M.M. (2012). *Introduction to Econometrics*. Third Edition. Lavis: Pearson.

Wermers, R. (1996). Momentum investments strategies of mutual funds, performance persistence, and survivorship bias. Working paper, Graduate School of Business and Administration, University of Colorado at Boulder, Boulder, Col.

Databases

Bloomberg (2013). *BLOOMBERG FUND CLASSIFICATIONS, Guide to our new Funds Classification System.* Bloomberg Finance L.P. Available from Bloomberg.

Bloomberg. (2014) *Bloomberg.* (Online). Available at: Subscription Service (Accessed: 03 Mars 2014)

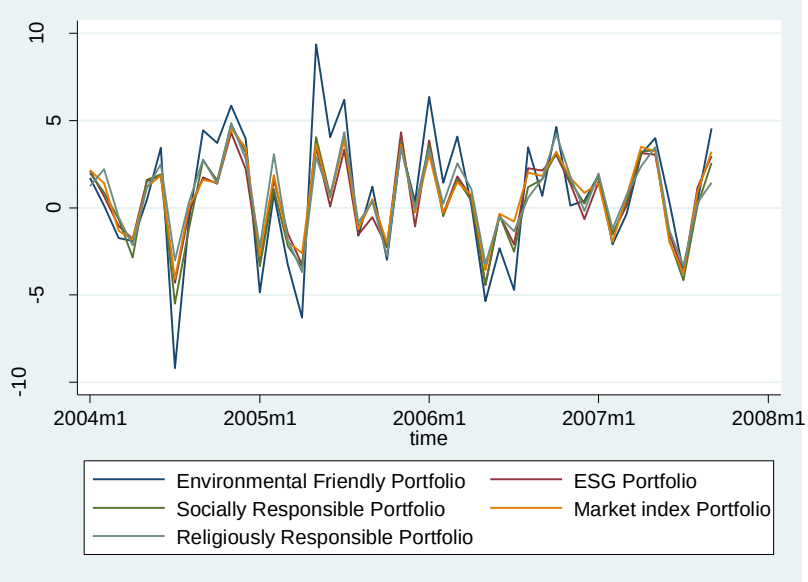
Kenneth R. French (2014) *Kenneth R. French Data Library* (Online). Available at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html (Accessed: 05 February 2014)

Morningstar. (2014) *Morningstar Direct*. (Online). Available at: Subscription Service (Accessed: 7 February 2014)

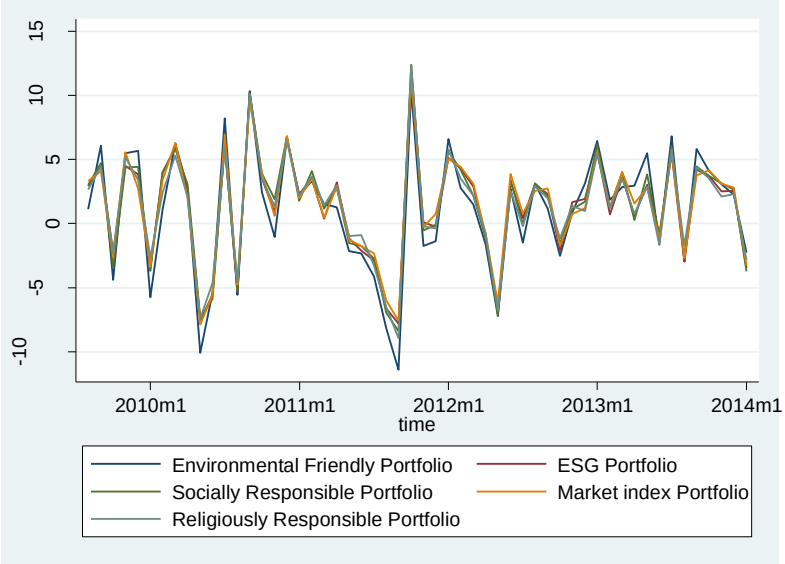
Appendix

1. *a. Descriptive statistics*

Graph 3: Monthly returns for the ethical subgroups, during 2004-2008

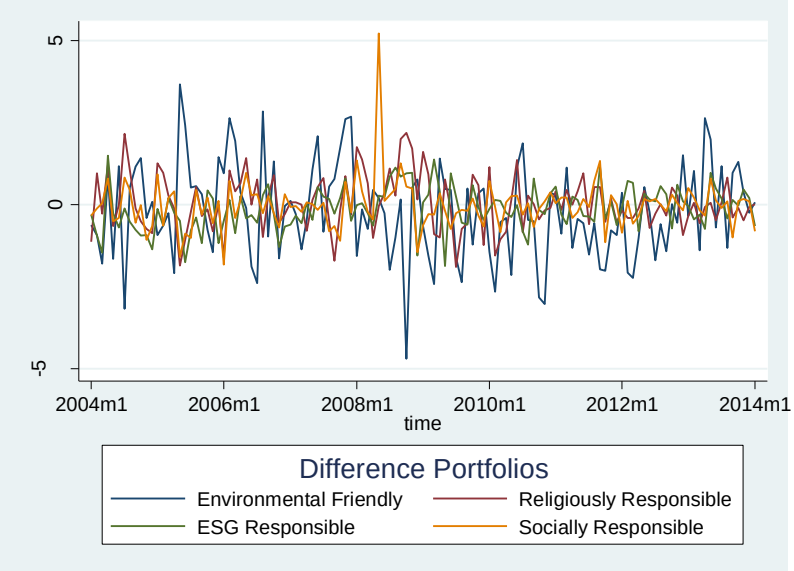


Graph 4: Monthly returns for the ethical subgroups, during 2009-2014



When dropping the year 2008 and 2009 to avoid some of the extreme values to scale up the graph, we can see more clearly the higher volatility in the Environmental Friendly portfolio (Graph 3 and 4). The ESG portfolio and Socially Responsible portfolio seem to have similar returns as the Market Index portfolio.

Graph 5: Monthly returns for the subgroup difference portfolios



Graph 5, we see that from 2008 and onwards, the Environmental Friendly portfolio has performed worse than its conventional counterpart since the Difference portfolio is mostly below zero. All of the difference portfolios linger around zero.

1. b. Results from testing the OLS assumptions

Table 5: Correlation Matrix

	Market	SMB	HML	Mom
Market	1.0000			
SMB	0.4611	1.0000		
HML	0.3396	0.1747	1.0000	
Mom	-0.3325	-0.0974	-0.3248	1.0000

Table 5 shows cross-correlations between our factor portfolios. From the table we see that we do not have perfect collinearity between our variables. We also see low cross-correlations indicating no problem with multicollinearity.

Table 6: Variance Inflation Factor test

Variable	VIF	1/VIF
Market	1.49	0.670984
SMB	1.28	0.782717
HML	1.20	0.832964
Mom	1.20	0.834108
Mean VIF	1.29	

Notes: A vif>10 or a 1/vif<0,1 indicates problems with multicollinearity. The table shows post estimation results from the Variance Inflation Factor test. OLS with robust standard errors is used on equation:

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}Mom_t + \varepsilon_{it}$$

Table 6 shows that we do not have problem with multicollinearity.

Table 7: Heteroskedasticity results

	Portfolios	Breusch-Pagan	White
Pooled US Portfolios	Pooled Ethical	Homoskedasticity	Homoskedasticity
	Conventional	Homoskedasticity	**Heteroskedasticity**
	Difference Portfolio	**Heteroskedasticity**	Homoskedasticity
Heterogeneity Portfolios	Environmental Friendly	Homoskedasticity	Homoskedasticity
	Matched Conventional	Homoskedasticity	**Heteroskedasticity**
	Difference Portfolio	Homoskedasticity	Homoskedasticity
	ESG Responsible	Homoskedasticity	**Heteroskedasticity**
	Conventional	**Heteroskedasticity**	**Heteroskedasticity**
	Difference Portfolio	Homoskedasticity	**Heteroskedasticity**
	Religiously Responsible	Homoskedasticity	Homoskedasticity
	Conventional	Homoskedasticity	**Heteroskedasticity**
	Difference Portfolio	Homoskedasticity	Homoskedasticity
	Socially Responsible	Homoskedasticity	Homoskedasticity
	Conventional	Homoskedasticity	Homoskedasticity
	Difference Portfolio	**Heteroskedasticity**	Homoskedasticity

Notes: Table 7 show results from post estimation test for homoskedasticity. The Breush-Pagan test has H0: constant variance. H1: the error variances are a multiplicative function of one or more variables. The White test has H0: homoskedasticity and H1: unrestricted heteroskedasticity.

We did graphical inspection of the error terms for our regressions and spotted possible heteroskedasticity. Table 7 show post estimation results from the Breusch-Pagan test and the White test. The White test is suitable if the heteroskedasticity is not linear. Due to the mixed test results and guidance from previously research that often show finding of heteroskedasticity in returns, we decide to correct for possible heteroskedasticity by using Newey West standard errors. To be consistent we use Newey West standard errors in all our regressions. Test results are available upon request from the authors.

Our test results for serial correlation show that we have no serial correlation in the error term in 12 of our 15 portfolios and weak serial correlation in three portfolios. Performed test are the Durbin-Watson test, the Breusch-Godfrey test and graphical inspection of autocorrelations. To correct for this possible serial correlation we use Newey West standard errors with one lag. To be consistent throughout the empirical work, we use Newey West standard errors with one lag in all our regressions. Test results are available upon request from the authors.

1. *c. Robustness and Sensitivity tests*

Benchmark; Baseline Regression

Table 8: Regression Results Robustness Test Benchmark; Baseline Regression

Variables	Pooled Ethical Portfolio	Conventional Portfolio	Difference Portfolio
4 factor-alpha	-0.099**	-0.053	-0.045
	(0.047)	(0.042)	(0.037)
MSCI Market Index	0.983***	1.023***	-0.040***
	(0.013)	(0.016)	(0.009)
SMB	0.241***	0.269***	-0.028
	(0.024)	(0.023)	(0.025)
HML	-0.083***	-0.071***	-0.012
	(0.017)	(0.023)	(0.016)
Mom	-0.024*	-0.009	-0.015**
	(0.012)	(0.011)	(0.008)
Observations	121	121	121

Notes: Reported are estimates from the Pooled Ethical portfolio and the Conventional portfolio for the period January 2004 - January 2014. The difference portfolio is created by subtracting the conventional portfolio's return from the ethical portfolio's return. Newey-West standard errors are in parentheses, correcting for serial correlation and heteroskedasticity. Regression is made using OLS on equation:

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}Mom_t + \varepsilon_{it}$$

The 4-factor alpha is the risk-adjusted return. The Market variable is the MSCI Broad Market US Index. The SMB variable is a size factor portfolio. The HML variable is a Book-to-Market factor portfolio. The Mom variable is a momentum factor portfolio.

*** Significant at the 1 % level.
** Significant at the 5 % level.
* Significant at the 10 % level

Benchmark; Heterogeneity Portfolios

Table 9: Regression Results Robustness Test Benchmark; Subgroup Portfolios

Variables	ESG	Environmental	Religiously	Socially
4-factor-alpha	-0.083*	-0.263*	0.079	-0.117*
	(0.046)	(0.145)	(0.065)	(0.064)
MSCI Market Index	0.966***	1.117***	0.905***	0.991***
	(0.013)	(0.043)	(0.018)	(0.013)
SMB	0.185***	0.393***	0.189***	0.274***
	(0.028)	(0.073)	(0.031)	(0.039)
HML	-0.075***	-0.265***	-0.067*	-0.036**
	(0.019)	(0.058)	(0.035)	(0.017)
Mom	-0.042***	-0.008	-0.037***	-0.009
	(0.015)	(0.036)	(0.013)	(0.011)
Observations	121	121	121	121

Notes: Reported are estimates for the ESG, Environmental Friendly, Religiously Responsible and Socially Responsible subgroup portfolios containing of US ethical funds for the period January 2004 - January 2014. The betas are estimated by regressing monthly excess returns on the monthly factor returns. The returns are net of management fees. ESG is the portfolio containing ethical funds fulfilling Bloomberg´s ESG requirements. Environmental is the portfolio containing the ethical funds fulfilling Bloomberg´s Environmental Friendly requirements. Religiously is the portfolio containing the ethical funds fulfilling Bloomberg´s Religiously Responsible requirements. Socially is the portfolio containing the ethical funds fulfilling Bloomberg´s Socially Responsible requirements. Newey-West standard errors are in parentheses, correcting for serial correlation and heteroskedasticity. Regression is made using OLS on equation:

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}Mom_t + \varepsilon_{it}$$

The 4-factor alpha is the risk-adjusted return. The Market variable is the MSCI Broad Market US Index. The SMB variable is a size factor portfolio. The HML variable is a Book-to-Market factor portfolio. The Mom variable is a momentum factor portfolio.

*** Significant at the 1 % level.
** Significant at the 5 % level.
* Significant at the 10 % level.

Benchmark; Heterogeneity Difference Portfolios

Table 10: Regression Results for Robustness Test Benchmark; Subgroup Difference Portfolios

	Difference Portfolios			
Variables	ESG	Environmental	Religiously	Socially
4-factor alpha	-0.105*	-0.255*	0.132**	0.019
	(0.062)	(0.136)	(0.056)	(0.053)
MSCI Market Index	-0.020	0.062	-0.118***	-0.067***
	(0.020)	(0.041)	(0.019)	(0.009)
SMB	-0.006	0.082	-0.080**	-0.061
	(0.040)	(0.067)	(0.033)	(0.038)
HML	-0.036	-0.078	0.005	0.085***
	(0.024)	(0.062)	(0.031)	(0.020)
Mom	-0.018	0.005	-0.029**	-0.021**
	(0.015)	(0.024)	(0.012)	(0.010)
Observations	121	121	121	121

Notes: Reported are estimates from regressing monthly excess returns net of management fees on monthly factor returns. The regression is done on the difference portfolios during the period January 2004 - January 2014. The Difference Portfolios are constructed as followed: The *Difference Portfolio ESG* is created by subtracting the returns of the matched conventional portfolio from the returns of the ethical portfolio consisting of only ESG responsible funds. The *Difference Portfolio Environmental* is constructed by subtracting the returns of the matched conventional portfolio from the returns of the ethical portfolio consisting of only environmental responsible funds. The *Difference Portfolio Religiously* is created the same way, subtracting the returns from the matched conventional portfolio from the returns of the ethical portfolio consisting of only religiously responsible funds. The *Difference Portfolio Socially* is constructed by subtracted the returns of the matched conventional portfolio from the returns of the ethical portfolio consisting of only socially responsible funds. Newey-West standard errors are in parentheses, correcting for serial correlation and heteroskedasticity. Regression is made using OLS on equation:

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}Mom_t + \varepsilon_{it}$$

The 4-factor alpha is the risk-adjusted return. The Market variable is MSCI Market Index. The SMB variable is a size factor portfolio. The HML variable is a Book-to-Market factor portfolio. The Mom variable is a momentum factor portfolio.

*** Significant at the 1 % level.
** Significant at the 5 % level.
* Significant at the 10 % level.

Model Specification; Baseline Regressions

Table 11: Regression Results for Robustness Test model specification; Baseline Regression

	Pooled Ethical Portfolio			Conventional Portfolio			Difference Portfolio		
Variables	CAPM	Fama-French	**Carhart**	CAPM	Fama-French	**Carhart**	CAPM	Fama-French	**Carhart**
Market	1.043***	1.001***	**0.993*** **	1.086***	1.035***	**1.032*** **	-0.043***	-0.034***	**-0.039*** **
	(0.019)	(0.016)	**(0.016)**	(0.021)	(0.019)	**(0.020)**	(0.008)	(0.008)	**(0.009)**
SMB		0.226***	**0.231*** **		0.257***	**0.259*** **		-0.031	**-0.029**
		(0.026)	**(0.026)**		(0.027)	**(0.027)**		(0.025)	**(0.025)**
HML		-0.056***	**-0.068*** **		-0.050*	**-0.055** **		-0.005	**-0.013**
		(0.021)	**(0.016)**		(0.026)	**(0.024)**		(0.016)	**(0.016)**
Mom			**-0.025***			**-0.010**			**-0.015***
			(0.015)			**(0.014)**			**(0.008)**
Alpha	-0.089	-0.107**	**-0.100** **	-0.036	-0.057	**-0.055**	-0.052	-0.050	**-0.046**
	(0.065)	(0.050)	**(0.049)**	(0.065)	(0.046)	**(0.047)**	(0.038)	(0.037)	**(0.037)**
Observations	121	121	**121**	121	121	**121**	121	121	**121**

Notes: Reported are estimates from the pooled ethical portfolio and the conventional portfolio for the period January 2004 - January 2014. The difference portfolio is created by subtracting the conventional portfolio's return from the ethical portfolio's return. Newey-West standard errors are in parentheses, correcting for serial correlation and heteroskedasticity. Regression is made using OLS on three different equations:

$$CAPM: R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \varepsilon_{it}$$

$$Fama - French: R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \varepsilon_{it}$$

$$Carhart: R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}Mom_t + \varepsilon_{it}$$

The Carhart model is the model used in this thesis. Alpha is the risk-adjusted return. The Market variable is the Kenneth. R. French market index. The SMB variable is a size factor portfolio. The HML variable is a Book-to-Market factor portfolio. The Mom variable is a momentum factor portfolio.

*** Significant at the 1 % level.
** Significant at the 5 % level.
* Significant at the 10 % level

Model Specification; Heterogeneity Difference Portfolios

Table 12: Regression Results for Robustness Test model specification; Subgroup Portfolios

	Difference Portfolios											
	ESG			Environmental			Religiously			Socially		
Variables	CAPM	Fama-French	**Carhart**	CAPM	Fama-French	**Carhart**	CAPM	Fama-French	**Carhart**	CAPM	Fama-French	**Carhart**
Alpha	-0.112*	-0.111*	**-0.106***	-0.249*	-0.254*	**-0.255***	0.118**	0.125**	**0.132****	0.009	0.013	**0.0185**
	(0.061)	(0.061)	**(0.063)**	(0.137)	(0.136)	**(0.136)**	(0.057)	(0.057)	**(0.057)**	(0.062)	(0.054)	**(0.053)**
Market	-0.020	-0.012	**-0.017**	0.065**	0.061	**0.063**	-0.126***	-0.109***	**-0.118*****	-0.058***	-0.060***	**-0.067*****
	(0.016)	(0.021)	**(0.020)**	(0.033)	(0.040)	**(0.041)**	(0.013)	(0.018)	**(0.019)**	(0.014)	(0.009)	**(0.009)**
SMB		-0.011	**-0.008**		0.082	**0.081**		-0.084**	**-0.079****		-0.065	**-0.061**
		(0.040)	**(0.040)**		(0.066)	**(0.067)**		(0.034)	**(0.033)**		(0.039)	**(0.039)**
HML		-0.029	**-0.038**		-0.080	**-0.078**		0.017	**0.003**		0.094***	**0.084*****
		(0.023)	**(0.024)**		(0.061)	**(0.062)**		(0.032)	**(0.031)**		(0.019)	**(0.020)**
Mom			**-0.017**			**0.006**			**-0.028****			**-0.021****
			(0.015)			**(0.024)**			**(0.012)**			**(0.010)**
Observations	121	121	**121**	121	121	**121**	121	121	**121**	121	121	**121**

Notes: Reported are estimates from regressing monthly excess returns net of management fees on monthly factor returns. The regression is done on the difference portfolios during the period January 2004 - January 2014. The Difference Portfolios are constructed as followed: The *Difference Portfolio ESG* is created by subtracting the returns of the matched conventional portfolio from the returns of the ethical portfolio consisting of only ESG responsible funds. The *Difference Portfolio Environmental* is constructed by subtracting the returns of the matched conventional portfolio from the returns of the ethical portfolio consisting of only environmental responsible funds. The *Difference Portfolio Religiously* is created the same way, subtracting the returns from the matched conventional portfolio from the returns of the ethical portfolio consisting of only religiously responsible funds. The *Difference Portfolio Socially* is constructed by subtracted the returns of the matched conventional portfolio from the returns of the ethical portfolio consisting of only socially responsible funds. Newey-West standard errors are in parentheses, correcting for serial correlation and heteroskedasticity. Regression is made using OLS on the following three equations:

$$CAPM: R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \varepsilon_{it}$$

$$Fama - French: R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \varepsilon_{it}$$

$$Carhart: R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}Mom_t + \varepsilon_{it}$$

The Carhart model is the model used in this thesis. Alpha is the risk-adjusted return. The Market variable is the Kenneth. R. French market index. The SMB variable is a size factor portfolio. The HML variable is a Book-to-Market factor portfolio. The Mom variable is a momentum factor portfolio.
*** Significant at the 1 % level.
** Significant at the 5 % level.
* Significant at the 10 % level.

Low Attrition Portfolios

Table 13: Regression Results for Robustness Test Attrition; Baseline Regression

	Portfolios with less Attrition		
Variables	Pooled Ethical Portfolio	Conventional Portfolio	Difference Portfolio
4-factor alpha	-0.160**	-0.158*	-0.001
	(0.068)	(0.084)	(0.063)
Market	0.985***	1.024***	-0.039*
	(0.012)	(0.025)	(0.020)
SMB	0.264***	0.279***	-0.015
	(0.032)	(0.046)	(0.040)
HML	0.004	-0.037	0.041
	(0.033)	(0.055)	(0.042)
Mom	-0.044**	-0.015	-0.029
	(0.017)	(0.024)	(0.021)
Observations	34	34	34

Notes: Reported are estimates from the Pooled Ethical portfolio and the matched Conventional portfolio for the period April 2011 - January 2014. The sample period suffer less from attrition compared to the full time period. The betas are estimated by regressing monthly excess returns on the monthly factor returns. The returns are net of management fees. The difference portfolio is created by subtracting the returns of the conventional portfolio from the returns of the ethical portfolio. Newey-West standard errors are in parentheses, correcting for serial correlation and heteroskedasticity. Regression is made using OLS on equation:

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}Mom_t + \varepsilon_{it}$$

The 4-factor alpha is the risk-adjusted return. The Market variable is the Kenneth. R. French market index. The SMB variable is a size factor portfolio. The HML variable is a Book-to-Market factor portfolio. The Mom variable is a momentum factor portfolio.

*** Significant at the 1 % level.
** Significant at the 5 % level.
* Significant at the 10 % level.