# THE PERFORMANCE OF SOCIALLY RESPONSIBLE INVESTMENT PORTFOLIOS

By

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*A Thesis Submitted in Partial Fulfilment of the Requirements for the Degree of Doctor of Philosophy of Cardiff University*

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Submitted to the Department of Accounting and Finance on the 20th of March 2015 in partial fulfilment of the requirements for the degree of Doctor of Philosophy

## Abstract

A recent trends report estimates that the total value of US-domiciled assets under management using socially responsible investment (SRI) strategies is $6.57 trillion. This represents more than one out of every six dollars under professional management in the United States (Forum for Sustainable and Responsible Investment, 2014). In Europe, a recent report by the European Sustainable Investment Forum reports that the total value of European assets under management using SRI strategies is in excess of €6.9 trillion (Eurosif, 2014). Consequently, the importance of SRI to financial practitioners and academics is considerable. This thesis examines the performance, risk and exposures of US SRI indices, UK SRI equity funds (domestic and global) and US SRI funds (large cap, mid-small cap, balanced and bond) to investigate a number of issues relating to the performance of SRI portfolios. The work highlights the potential psychological returns which may be related to investing in SRI funds through shareholder activism and discusses the relationship between the potential risks and returns that are associated with this form of investing. The study finds that the requirement to screen can detrimentally affect the performance of SRI portfolios, but that these effects are more pronounced for UK funds which predominately employ negative screening techniques, than US SRI portfolios (indices and funds) which principally employ positive and restricted screening methodologies. The investigation also discovers that SRI portfolios with smaller investment choice, such as those that can only invest in the UK stock market are more affected by SRI screening than those with large investment universes such as global or US equity funds. This finding is consistent with the smaller investment universe of an SRI fund, making it more likely SRI screening will affect the fund's performance and risk. Post screening, a fund manager may find it more difficult to purchase assets with the potential to provide a good return or to diversify risk effectively. SRI screening also affects the sector exposures, industry exposures, systematic risk and idiosyncratic risks of UK SRI funds, indicating that screening can result in SRI portfolios holding significantly different assets from conventional funds. In addition, the intensity with which a UK SRI fund screens is shown to significantly affect risk-adjusted performance. Importantly, this study also finds that US SRI funds are more likely to vote affirmatively with shareholder proposals which relate to social and environmental issues than their conventional counterparts and are more likely to vote against company management on these issues. This finding is consistent with SRI investors receiving a psychological return through the shareholder activism of SRI funds.

Thesis Supervisor: Dr. Kevin Evans, Senior Lecturer

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# Chapter 1: Introduction

## 1.1 Introduction to Socially Responsible Investing and Contribution of the Thesis

The origins of ethical finance can be traced to the genesis of the Judeo-Christian and Islamic civilisations, in which religious moral dispositions provided the impetus for the original development of many social financial practices. Principally, these practices focused on the adoption of Old Testament and Koran derived values into an assortment of loan and investment restrictions within the ancient European and Asian peninsulas (Renneboog et al., 2008b). Subsequently, the geographical spread of these religions catalysed the prevalent adoption of their fundamental moral principles, including those that affected economic paradigms. As a result, there is a diverse and consistent history of groups associating financial activities with moral responsibilities. Prominent historical examples include the 17$^{th}$ century Quakers who restricted investments in armament manufacturers, and the 1908 adoption by the US Federal Council of Churches of a 'Social Creed' which essentially constituted a set of moral investment restrictions for their members including the non-investment in alcohol and gambling companies (Michael Jantzi Research Associates, 2003).

Neoclassical financial economics dictates that investment decisions are made solely on the basis of expected return and risk. However, this theorem derives from the assumption that these investment characteristics represent an individual's entire spectrum of interest within investment decisions. In the 20$^{th}$ century the growth in socially responsible investing forced contemporary financial theory to encompass psychological return as an additional potential driver within investment decisions (Cummings, 2000). Ethical investors can capture psychological return in two ways. The first is the psychological benefit they receive through selecting their investments on the basis of ethical criteria as well as financial criteria. For example, an ethical investor may receive a psychological return by only investing in mutual funds that do not hold the stock of tobacco companies, if the ethical investor does not wish to support tobacco companies and benefit from their success. The second form of psychological return is captured through the shareholder voting of SRI mutual funds. Many SRI funds actively promote their proxy voting strategies within their prospectuses and claim through their proxy voting to support shareholder proposals that promote environmental and social actions by firms. An ethical investor may receive a psychological return if they invest in SRI

funds with proxy voting strategies that promote environmental and social actions, if they value the SRI fund's promotion of these actions.

The Forum for Sustainable and Responsible Investment, which is a US membership association for professionals, firms, institutions and organisations engaged in sustainable and responsible investing, defines socially responsible investments as assets under professional management that use at least one of three socially responsible investment strategies. These are the incorporation of environmental, social and governance (ESG) factors into investment analysis and portfolio construction; the filing or co-filing of shareholder resolutions on ESG issues; and deposits or investments in banks, credit unions, venture capital funds and loan funds that have a specific mission of community investing.

The majority of academic research to date has focused on investigating the effect that the incorporation of environmental, social and governance (ESG) factors into the construction of investment portfolios has on their performance. Portfolios constructed using these factors are referred to as SRI portfolios and they are typically constructed through a combination of ethical and financial screening. Specifically, assets are included or excluded on the basis of both their ethical standing and potential to provide financial return. Where these portfolios are actively managed, they are termed SRI mutual funds (US and Canada), or ethical funds (UK and Europe) and where they are passively managed or used solely as benchmarks they are called SRI tracker funds or SRI indices (Cummings, 2000).

The contemporary SRI fund sector is in many ways the 20$^{th}$ century embodiment of ancient religious values within an increasingly secularised world, in which investors can empower their political and moral ideologies through secular funds, or through religious funds, depending on their spiritual convictions. The origins of the modern SRI sector can be traced back to the establishment of 'The Pioneer Fund' in 1928 (US). The managers of this fund refused to invest in companies that were involved with the tobacco or alcohol industries. By the 1960's US public objection to the Vietnam War and the contribution of US armament manufacturers to this conflict, resulted in the establishment of a number of additional SRI funds. Subsequently, the SRI sector has grown consistently, principally as a result of a prevalent increase in ethical activism, corporate information and private share ownership during the past sixty years (Michael Jantzi Research Associates, 2003).

SRI funds share a common aspiration to provide investors with psychological return in addition to conventional investment return. However, due to the subjective nature of human morality, SRI encompasses an assortment of definitions of psychological return and individual investment goals. This has resulted in the SRI fund sector encompassing a range of asset portfolios, constructed through a diverse range of screening techniques. The Forum for Sustainable and Responsible Investment defines three broad forms of SRI screening: "negative"; "positive"; and "restricted". Negative screening involves excluding investments in the stock or bonds of companies engaged in a particular activity or industry; positive screening involves seeking investments in the stock or bonds of companies with a positive impact in a specific industry or area; and restricted screening involves avoiding investment in the stock or bonds of poorer ethical performers in a particular industry or area, but including the stocks and bonds of firms whose social performance ranks high within a particular industry or area. Typically, the managers of SRI portfolios utilise a combination of positive, restricted and negative screening to guide the inclusion or exclusion of companies within a portfolio on the basis of their perceived ethical standing. For example, the Calvert Social Investment Fund excludes companies within the armament and nuclear power industries (negative screening), while proactively favouring corporations with strong environmental and employee relation credentials (positive screening) (Hamilton et al., 1993).

The growth in SRI has been an important factor in increasing the prominence of corporate social responsibility in the US and socially responsible investors are now key stakeholders and shareholders in many of the largest companies. Through screening, socially responsible investors are able to affect the market value of corporations by choosing to include their stock or exclude their stock from investment portfolios. Socially responsible investors are also able to directly affect the behaviour of corporate management through the purchase of shareholdings which enable them to make shareholder proposals and vote on the proposals made by others. This practice is known as shareholder activism. Where SRI shareholdings are considerable, SRI fund managers may also seek seats on company boards.

SRI investors aim to promote good corporate behaviour, maximise firms' social values (which can be defined as the sum of the value generated for all stakeholders) and maximise shareholder value. Classical economics states that there need not be any conflict between these goals in perfectly competitive markets, because resource allocation is pareto-optimal and all firms can maximize their profits (value), in unison with their social welfare

(Renneboog et al., 2008b). However, companies do not operate in perfectly competitive markets and modern economic theory states that in these circumstances, where the assumptions of the welfare theorems do not hold, profit-maximizing behaviour does not necessarily lead to social welfare maximizing outcomes. Instead, practically, the maximization of shareholder value can potentially conflict with the interests of a firm's stakeholders (Renneboog et al., 2008b).

In 1972, Moskowitz introduced the academic community to the growth of SRI with his seminal article: 'Choosing socially responsible stocks', in which he presented a number of criteria by which corporations could be assessed for social performance and the potential for this performance to affect their financial performance (Moskowitz, 1972, Cochran and Wood, 1984). Subsequently, a number of academics have advocated Corporate Social Responsibility (CSR) and the stakeholder model, while others have stated that companies should exclusively focus on profit maximisation and that shareholder satisfaction should be the exclusive focus of corporate management (Baumol and Blackman, 1991, Bagnoli and Watts, 2003, Heal, 2005, Besley and Ghatak, 2007, Friedman, 1970). As socially responsible investing focuses on those companies which employ the stakeholder model, researchers have measured the financial performance of socially responsible investments in order to establish whether this model is associated with financial benefits or costs, relative to the shareholder profit maximization approach.

Principally, these studies have investigated the performance of SRI portfolios, although there are a number of studies which have investigated individual stock performance[1]. Studies at portfolio level, which analyse the performance of SRI portfolios, benefit from the aggregation of any socially responsible performance effects at stock level and this aggregation can aid in the identification of any such effects. However, they also suffer from additional complications associated with SRI screening practices, which may not directly relate to the costs and benefits of the stakeholder model at firm level. These include the explicit costs associated with SRI screening and the effects of SRI screening on portfolio diversification. Prior studies which have analysed the performance of SRI portfolios can be divided into two groups, those analysing the performance of SRI mutual funds and those

[1] Diltz (1995), Guerard (1996), Statman (2009), Edmans (2011).

which have analysed the performance of SRI indices (Gregory et al. 1997, Statman, 2000, Renneboog et al. 2008a, Statman, 2006, Schröder, 2007, Managi et al. 2012).

Chapters 3, 4 and 5 of this thesis are intended to contribute to the literature on the performance of SRI portfolios. Chapter 3 is an analysis of the performance of 14 US socially responsible indices, relative to their conventional benchmark indices. This chapter makes a number of contributions to the literature on the performance of SRI indices. A first contribution is the use of asymmetric models which incorporate US economic and stock market indicators in order to investigate the risk-adjusted performance of SRI and conventional indices across different economic and stock market cycles. The study finds little evidence of statistically significant performance differentials between the two types of indices even across different US stock market and economic cycles, but that the systematic risk levels of the SRI indices and their benchmarks differ. A second contribution of this work is the use of the three and four factor models and three and four factor asymmetric models to study the risk-adjusted performance of SRI indices relative to their benchmark indices over whole and subperiods. The use of these models which incorporate Fama and French's (1993) size (SMB) and value (HML) factors, and Carhart's (1997) momentum (MOM) factor, allow for a more accurate measurement of the risk-adjusted returns of the SRI and conventional indices. A third contribution of the work is an analysis of the idiosyncratic volatility levels of the SRI indices and their benchmarks. This examines whether the practice of SRI screening creates any significant differences in the idiosyncratic risk and diversification levels of the SRI indices relative to their conventional benchmarks. Consistent with the practice of SRI screening limiting the potential stock universes of SRI indices, the results show that SRI indices can have more idiosyncratic volatility than their benchmarks and also they may be less diversified. Another contribution of the work in Chapter 3 is an analysis of the SRI indices' levels of sector and industry exposure relative to their conventional benchmark indices. The findings indicate that the SRI screening practices used in the construction of the SRI indices do not significantly affect their sector or industry weightings. This important finding suggests that the screening methods allow ethical portfolios to be constructed without effecting sector and industry exposures which drive returns and help diversification. This may explain the lack of statistically significant difference between the risk-adjusted performance of the SRI indices and their conventional benchmarks found in this work and in previous studies.

Chapter 4 is an analysis of the performance and risk levels of the socially responsible equity funds that are available to UK retail investors. It uses two samples of SRI funds: the first contains SRI funds which can only invest in stocks listed on the UK stock market (domestic), while the second sample contains funds which can invest in stocks listed on any global stock market (global). These two samples are important because they allow for an analysis of the relationship between the effects of screening on SRI funds and the size of the fund's investment choice. The results show that the requirement to screen affects domestic and global SRI funds significantly differently. A contribution of the work is the use of asymmetric models which investigate the risk-adjusted performance of the domestic and global SRI funds across different stock market cycles. The results indicate that the practice of ethical screening affects the performance and risk exposures of both types of SRI fund, but that these effects are more pronounced for domestic funds which have a smaller potential investment choice. A second contribution of the work is the analysis of the idiosyncratic volatility levels of SRI and conventional funds. The study finds that domestic SRI funds have different levels of idiosyncratic risk than their conventional counterparts and that these differences may be significant factors in explaining the differences between their risk-adjusted performances. With respect to the global SRI funds there is little evidence of any significantly different levels of idiosyncratic risk. The analysis of the sector and industry exposures of the funds presents a third contribution. The findings indicate that the sector and industry exposures of domestic SRI funds differ from their conventional counterparts significantly. However, there is little evidence that SRI screening significantly affects the sector or industry exposures of the global SRI funds. This is important since it suggests that when the potential investment universe of a fund is small, the requirement to screen ethically can significantly affect the holdings of an SRI fund and therefore influence its risk, sector exposure and performance. In addition, this chapter also investigates whether the areas in which an SRI fund screens and its screening intensity significantly affect performance. The results show that the specific areas in which UK SRI funds screen does not affect their performance, while the intensity with which they screen does.

Chapter 5 examines the performance of US Socially Responsible Investment (SRI) funds. The work uses four samples of US SRI funds: large cap equity funds, mid-small cap equity funds, balanced funds and bond funds. This study makes a number of contributions to the literature on the performance of US SRI funds. A contribution of the work is the use of asymmetric models which incorporate stock market and economic indicators to investigate

the performance of the funds across US stock market and economic cycles. The results indicate that there is little evidence of statistically significant performance differentials between the SRI funds and matched conventional funds. A second contribution investigates whether SRI screening results in US SRI funds having different levels of sector exposure than their conventional counterparts. The results show that there are a few significant differences between the US SRI fund's sector exposures and those of their conventional counterparts, indicating that the SRI fund practice of screening can significantly affect their sector exposures. However, with respect to the majority of sectors the SRI and conventional funds do not have significantly different exposures. A third contribution is an analysis of the shareholder activism of US SRI funds in order to establish whether they provide a psychological return to their investors. The results find that the large cap, mid-small cap and balanced SRI funds are more likely to vote affirmatively with shareholder proposals which relate to social and environmental issues than their conventional counterparts and that they are more likely to vote against company management on these issues than conventional funds. These findings are consistent with US SRI funds, monitoring and influencing the firms they invest in, thereby providing a potential psychological return to their investors. The results from the analysis within this chapter indicate that this psychological return provided by the US SRI funds activism does not come at a financial cost and may compensate for any lack of outperformance documented in this and earlier work.

This thesis highlights and examines a number of key issues relating to SRI portfolio construction and performance. The work explores the existence of a number of risks that are associated with screening portfolios. In addition, the work examines the potential psychological returns which may be related to investing in SRI funds and discusses the relationship between the potential risks and returns that are associated with this form of investing.

With respect to the analysis within this thesis which investigates the performance of SRI portfolios, the findings presented within Chapter 3 show that SRI screening does not in general significantly affect the performance of US SRI indices. However, the results show that SRI screening does result in significant differences in the factor sensitivities of US SRI indices relative to their conventional counterparts and some differences in industry exposures. Similarly, the results presented in Chapter 5 with respect to the performance of the US SRI funds show that their risk-adjusted performance is not significantly affected by their

requirement to screen in general. The results presented in Chapter 4 in contrast show that the practice of screening affects the performance and composition of UK SRI funds. These effects are shown to be more pronounced for those funds that can only invest in the UK stock market than they are for those that can invest globally. There is also considerable evidence that the sector and industry exposures of domestic UK SRI funds differ from their conventional counterparts significantly, while at both the sector and industry level there is little evidence that SRI screening significantly affects the sector or industry exposures of global UK SRI funds.

With respect to the analysis within this thesis which investigates the significance of a number of risks which are associated with SRI portfolios, the risks analysed and findings are as follows:

A) The screening areas that different screening methods are applied to
B) The intensity of screening
C) The type of screening or the combination of types being used by an SRI portfolio
D) The size of the investment universe of the portfolio
E) The type of assets held within the portfolio

With regard to whether the specific areas in which a portfolio screens is a significant factor, the work in Chapter 4 finds little evidence that this is a significant factor that should be considered when appraising the potential risk of an SRI portfolios screening methodology. In relation to whether the intensity of a portfolios SRI screening is a significant factor, the work in Chapter 4 finds that more screening intensity is associated with worse risk-adjusted performance and that this is particularly the case for portfolios that have a small investment universe such as those that can only invest in the UK stock market. With regard to whether the type of screening or the combination of types being used by an SRI portfolio is a significant factor with respect to its performance, a comparison of the results presented in Chapters 3, 4 and 5 of this thesis indicates that it is likely that negative screening methodologies carry a greater risk than positive and restricted screening strategies and consequently the findings presented within this thesis indicate that the type of screening or the combination of types being used by an SRI portfolio is a significant factor with respect to its performance.

With regard to whether the size of the investment universe of an SRI portfolio is a significant factor with respect to its performance, the analysis in Chapter 4 finds that the smaller the investment choice available to an SRI portfolio manager the more likely it is that portfolio performance will be detrimentally affected by its requirement to screen. In addition, the findings presented in Chapter 5 indicate that no particular type of asset portfolio is more affected by SRI screening and therefore that this is not a factor that needs to be considered when analysing the potential risks associated with SRI screening. The work in this thesis also analyses the extent to which SRI funds provide a psychological return through their proxy voting and the results presented in Chapter 5 indicate that they do.

The findings presented within this thesis significantly contribute to this area of academia and enhance the body of academic knowledge which relates to the performance and risks of socially responsible investing. Importantly, these findings also have practical implications for SRI fund managers and those investors who invest in their funds. For example, the findings indicate that SRI fund managers should be aware that the more intensely they screen their portfolios the more likely that portfolio performance will be detrimentally affected by the screening. While, investors in SRI funds should be aware that SRI funds vote differently on shareholder resolutions than conventional funds and specifically that they use proxy votes to promote environmental and social agendas. Interestingly, if investors value these voting strategies and view them as an additional psychological return, an SRI fund can provide a higher total return than a matched conventional fund even if the financial performance is the same.

The remainder of this thesis is organised as follows: Chapter 2 reviews the important studies of the performance of SRI portfolios and presents the theoretical framework and hypotheses which are the basis for the analytical work within this thesis; Chapter 3 analyses the performance of US SRI indices; Chapter 4 investigates the performance of UK SRI funds; Chapter 5 examines the performance of US SRI funds; and Chapter 6 concludes.

# Chapter 2: Literature Review, Theoretical Framework and Hypotheses

## 2.1 Introduction to Chapter 2

The following literature review provides a synopsis of the important studies on SRI portfolio performance analysis, and explains the differences between the analysis of SRI funds and SRI indices. The existing studies that have analysed the performance of socially responsible portfolios, both SRI mutual funds and SRI indices, have focused on the testing of three alternative hypotheses. These were first outlined by Hamilton et al. (1993) and they address the extent to which the risk-adjusted returns of SRI portfolios and conventional portfolios may differ.

### Hypothesis 1: "Doing Good but Not Well"

The first hypothesis asserts that the risk-adjusted returns of SRI portfolios are lower than the risk adjusted returns of conventional portfolios. Theoretical explanations for findings of this nature are outlined below and these are not mutually exclusive. Using the Jensen (1968) alpha measure this can be expressed as below.

$$\alpha_{sri} < \alpha_{con} \tag{1}$$

where:

$$R_{sri,t} - \left[ R_{f,t} + \beta_{sri} * \left( R_{m,t} - R_{f,t} \right) \right] = \alpha_{sri} \tag{2}$$

$$R_{con,t} - \left[ R_{f,t} + \beta_{con} * \left( R_{m,t} - R_{f,t} \right) \right] = \alpha_{con} \tag{3}$$

$\alpha_{sri}$ is the alpha on the SRI portfolio, $\alpha_{con}$ is the alpha on the conventional portfolio, $R_{sri}$ and $R_{con}$ are the returns of SRI and conventional portfolios, $R_f$ is the risk-free rate, $R_m$ is the return on the market portfolio and $\beta_{sri}$ and $\beta_{con}$ are the sensitivity of the SRI and conventional portfolios excess returns to the excess return of the market portfolio. The $\alpha_{sri}$ is the excess return of the SRI portfolio relative to the market portfolio and therefore selecting an appropriate market portfolio is extremely important for the performance analysis to be robust. There are a number of theories that support the intuitive validity of Hypothesis 1 and these are discussed below and are not mutually exclusive.

A portfolio's performance is defined by its alpha. Alpha represents the abnormal return of a portfolio above or below its expected return. Expected return is determined by an asset pricing model, typically the simple CAPM. Positive alpha represents excess return above that expected, while negative alpha represents excess return below that expected. The systematic risk of the portfolio is defined as its beta, which is the sensitivity of the portfolios excess return to the excess return of the market portfolio.

Overwhelming Costs of CSR Actions

This theory suggests that the benefits of actions that move a company towards social responsibility do not match the financial costs of these actions, damaging the long-term performance and the returns available from investing in socially responsible companies. For instance, Abowd (1989) finds that increases in employee pay come at the expense of shareholder returns, while Barnea and Rubin (2006) find that company management engages in socially responsible actions despite their financial costs exceeding their financial benefits to shareholders because company management obtain personal benefits such as improved reputations. Therefore, SRI funds that are skewed towards socially responsible companies underperform.

Investment Constraints

The practice of socially responsible screening could significantly affect SRI portfolio performance by limiting SRI portfolios potential investment universes and their ability to diversify effectively. For instance, Rudd (1981) argues that each time a portfolio is constrained, its performance suffers and that socially responsible investing introduces biases into a portfolio, with consequent deterioration in long-run performance. Grossman and Sharpe (1986) support this notion by arguing that any constraint placed on the construction of an investment portfolio can only lower, or leave unchanged, the maximum utility that can be obtained by that portfolio. They find some empirical support for their argument by discovering that the exclusion of South African related stocks from portfolios during the apartheid hurt portfolio performance, on average.

Missing Out On Profit Maiximising

Profit maximising unethical companies do better financially than companies which invest in CSR because they focus their resources solely on profit maximization. Consequently, over time, portfolios which exclude unethical but profitable stocks underperform those which include unethical stocks on a risk-adjusted basis. Unethical companies are likely to have more focus on meeting the needs of shareholders than ethical companies, which are likely to have more focus on meeting the needs of all stakeholders.

**Hypothesis 2: "Doing Good and Doing Well"**

A second alternative hypothesis is that the risk-adjusted returns of SRI portfolios are higher than conventional portfolios. Using similar notation this can be expressed as below. In addition there are a number of theories that support the intuitive validity of Hypothesis 2 and these are disused below and are not mutually exclusive.

$$\alpha_{\text{sri}} > \alpha_{con} \tag{4}$$

Ethical Companies Perform Better in the Long-Term

The ethical investor's practice of socially responsible screening can significantly and positively affect SRI portfolio performance positively by skewing portfolios towards stocks which are likely to outperform in the long-term. For instance, Moskowitz (1972) noted that socially responsible companies may develop competitive advantages relative to conventional stocks such as a focus on long-term sustainable profits (Cummings, 2000). A number of papers have provided empirical support for this notion, including Kempf and Osthoff (2007) who found that stocks of companies that ranked high overall on a number of socially responsible criteria, outperformed stocks which ranked low on the same criteria. Ghoul et al. (2011) find that firms with better CSR scores exhibit cheaper equity financing and in particular that investment in improving responsible employee relations, environmental policies, and product strategies contributes substantially to reducing a firm's cost of equity. Edmans (2011) finds empirical evidence that stocks of companies with highly satisfied employees outperform in the long-term and Derwall et al, (2005) find similar evidence for

stocks of companies with good environmental credentials. If this is the case, these stocks and portfolios skewed towards these stocks are likely to outperform in the long-term.

Public Relations Effect

Investors may underestimate the probability that negative news will be released about companies that are not socially responsible. As a consequence, when the news is released, the returns of portfolios holding those stocks are significantly negatively affected, while the returns of SRI portfolios which do not include those stocks are not. For instance, Hamilton et al. (1993) note the example of oil spills, the likelihood of which may be greatly underestimated by a large proportion of investors, but when they do occur they can significantly affect the performance of oil stocks and portfolios that hold those stocks.

Good Companies Have Slack Resources

Firms which are performing well have the spare resources to invest in ESG activities and therefore firms with high levels of ESG activity are those that are likely to be the best investments. Therefore, portfolios such as SRI funds which are skewed towards companies with high levels of ESG outperform their conventional counterparts (Brzeszczyński and McIntosh, 2011).

**Hypothesis 3: "No Effect."**

A third hypothesis asserts that the risk-adjusted returns of socially responsible portfolios are not statistically significantly different from the risk-adjusted returns of conventional portfolios. This represents the null hypothesis throughout. Theoretical explanations for findings of this nature are detailed below. This can be expressed as:

$$\alpha_{sri} = \alpha_{con} \tag{5}$$

No Significant Associated Costs

Company actions towards increasing corporate social responsibility do not have significant associated costs or benefits and therefore the practice of ethically screening and

weighting portfolios towards companies with high levels of CSR does not significantly affect portfolio risk-adjusted performance.

Non Pricing of Investment in ESG

Company's investment in ESG activities carry associated costs and benefits, but they are not priced by the market. For example, Hamilton et al. (1993) note that this would be the case if socially responsible and conventional investors were both equally happy to purchase socially responsible stocks at a given price. A potential reason for this scenario would be if investors, in general, do not associate the costs and benefits of corporate social responsibility with long-term changes in profitability. Aupperle et al. (1985) find that the majority of Forbes CEO's do not associate corporate investment in social responsibility with a significant effect on the actual profitability of their companies.

Counterbalanced Costs and Benefits of ESG at Firm Level

Company's investment in ESG activities carry associated costs, but those costs are counterbalanced by the associated benefits. For instance, Statman (2009) provides an example whereby the extra costs of higher employee pay may be equal to the extra productivity of more satisfied employees. Therefore, the practice of ethically screening and weighting portfolios towards companies with high levels of ESG does not significantly affect the risk-adjusted performance of portfolios.

Counterbalanced Costs and Benefits of Screening at Portfolio Level

The costs and benefits of skewing portfolios towards socially responsible stocks may counterbalance each other. As evidenced by Statman (2009), gains from skewing portfolios towards companies with high social responsibility scores may be largely offset by relative losses from the exclusion of the stocks of shunned, low social responsibility score companies.

Impotent Screening Methodologies

Socially responsible screening may not significantly affect portfolio performance. For example, the types of screening used may not significantly affect the industry weightings or diversification levels of SRI portfolios compared to conventional portfolios and therefore

their performance. Goldreyer and Diltz (1999) suggest that the added constraint of augmenting portfolio decisions with socio-political information within socially screening may not significantly affect SRI portfolio performance because of the large number of publicly traded firms available to purchase, the low transactions costs associated with equity trading and the rapid flow of information through equity markets. As a result, the risk-adjusted performance of SRI and conventional portfolios may be similar in the long-term.

In summary, there are three broad hypotheses which address the extent to which the returns of SRI portfolios and conventional portfolios may differ. These are that the risk-adjusted returns of SRI portfolios are lower than, more than, or not significantly different from conventional portfolios. What follows is a review of the empirical studies which have analysed the validity of the three hypotheses and investigated the financial performance of SRI portfolios.

### 2.2 Early Studies of the Performance of SRI Funds

Luther et al. (1992) performed the first evaluation of the financial performance of SRI funds. This was a Jensen alpha and Sharpe ratio based analysis of the performance of 15 UK SRI funds relative to two UK market proxies between 1984 and 1990. The results identified weak, but not statistically significant evidence that the SRI funds had outperformed the market proxies (Jensen alpha 0.01% and 0.03% and Sharpe Ratio 0.06 and 0.08 respectively). In addition, Luther et al. (1992) theorise that the requirement for ethical funds to select investments that comply with ethical criteria constrains the managed portfolios to being biased towards smaller companies, and their findings provide support for this theory because they establish that the SRI fund returns are heavily skewed towards small capitalisation stocks. As a consequence, they conclude that their findings cannot be separated from the 'small cap affect' that small capitalisation stocks achieve abnormal returns.

The study of Luther et al. (1992) was superseded by Hamilton et al. (1993) who examined the relative performance of 32 US SRI funds and 320 matched US conventional funds between 1985 and 1990. Hamilton et al. (1993) outline three hypotheses about the relative returns of socially responsible portfolios and conventional portfolios. The first hypothesis is that the (risk-adjusted) expected returns of socially responsible portfolios are equal to the (risk-adjusted) expected returns of conventional portfolios. They state that this is

consistent with a world where the social responsibility feature of stocks is not priced, and where socially responsible investors who sell stocks find enough conventional investors ready to buy that the prices of the stocks do not drop. Hamilton et al. (1993) argue that this hypothesis is closest in spirit to the standard framework of finance, where factors that are not proxies for risk do not affect expected returns and that, because expected returns to investors are also the cost of capital to the company, this hypothesis implies that socially responsible investors do not reduce the relative cost of capital to socially responsible companies by favouring their stocks. The second hypothesis outlined and tested by Hamilton et al. (1993) is that the expected returns of socially responsible portfolios are lower than the expected returns of conventional portfolios. They state that this hypothesis implies that socially responsible investors have an impact on stock prices. In particular, that they increase the value of socially responsible companies relative to the value of conventional companies by driving down the expected returns and the cost of capital of socially responsible companies. In addition, they state that this also implies, contrary to the first hypothesis, that the market prices the social responsibility characteristic. The third and final hypothesis presented by Hamilton et al. (1993) is that the expected returns of stocks of socially responsible portfolios are higher than the expected returns of conventional portfolios. They state that this might be possible if a sufficiently large number of investors consistently underestimate the probability that negative information will be released about companies that are not socially responsible. Hamilton et al. (1993) provide the example of conventional investors consistently underestimating the probability that oil companies will find themselves in trouble because of oil spills and they argue that declines in the prices of oil company stocks following oil spills will lower the returns on conventional portfolios holding oil company stocks, but the portfolios of socially responsible investors who shun oil stocks will not be affected.

The funds used in the study were matched by the date of fund inception to control for the ‘new fund affect’ that newer funds perform badly relative to older funds due to start-up costs, which was identified as being important due to the relative infancy of SRI funds. The matching process entailed splitting the funds into two subsamples of 17 SRI and 150 non-SRI funds established in or by 1985 and 15 SRI funds and 170 non-SRI funds established after this date. The study which used the Jensen alpha method of performance analysis did not find statistically significant differences between the performance of the SRI and conventional funds in either of the subsamples (-0.63% to -0.1420% monthly mean alphas for the older funds and 0.2772% to -0.0416% monthly mean alphas for the younger funds). The analysis

failed to control for the small cap effect, and therefore its findings, like those of Luther et al. (1992), cannot be separated from this effect.

Hamilton et al. (1993) conclude that their findings support the theory that the market does not price socially responsibility characteristics and state that investors can expect to lose nothing by investing in socially responsible mutual funds because social responsibility factors have no effect on expected stock returns or companies' cost of capital. They also suggest that their results might disappoint socially responsible investors who hope to do well while doing good, and might also disappoint socially responsible investors who are willing to receive low returns as fair exchange for changing the world.

The next significant study of SRI mutual fund performance was performed by Luther and Matatko (1994). This analysis attempted to overcome any small cap bias by analysing the performance of 9 SRI funds against three indices: a conventional index; a small cap index (Hoare Govett Smaller Companies index) and a combined index (Financial Times Actuaries All-Share Index) between 1985 and 1992. Using the Jensen alpha performance measure, none of the performance differentials were found to be statistically significant (the average monthly alphas for the SRI funds against the three benchmarks were as follows: combined index, 0.94% HGSC Index, 0.38% and Financial Times Actuaries All-Share Index, -0.37%). The R-squared from the respective regressions provided further evidence for the small cap bias as the SRI funds had a higher average correlation with the combined and small cap indices than the conventional index (0.88, 0.79 and 0.78 average across funds, respectively). However, the analysis failed to take account of the new fund effect, as indicated in Hamilton et al. (1993), and consequently the findings cannot be separated from this effect.

Mallin et al. (1995) incorporated the findings of the aforementioned UK and US research by introducing an innovative methodology which integrated controls for the 'small cap effect' (Luther et al., 1992), 'new fund effect' (Hamilton et al., 1993), and 'fund size effects' (economies of scale), to test the performance of 29 UK SRI funds, relative to 29 UK non SRI funds (1986-1993). The paper used a 'matched pair approach', in which the SRI and conventional funds were directly matched into pairs according to both their age (establishment date) and size (capitalisation), and compared against a small cap market proxy (Financial Times All Share Actuaries Index). Using the Jensen alpha, Treynor and Sharpe performance measures, the study found that the SRI funds tended to outperform the

conventional funds on a matched pair basis, but not significantly in a statistical sense, in the vast majority of cases. These findings again cannot be divorced from the small cap effect because there is a fundamental error in the methodology utilised. This is the assumption that matching funds of similar size and age, while using a small cap index, effectively controls for the 'small cap affect'. This supposition is misguided because the size and age of funds may have no or limited correlation with the market capitalisation of the stocks they hold.

The methodological issue of how to effectively control for the 'small cap effect' in SRI fund performance analysis was resolved by Gregory et al. (1997). Gregory et al. (1997), state that the financial performance of socially constrained investment vehicles is of interest in a narrow sense to existing and potential investors. More broadly, they suggest that it is of interest in that inferior returns may be seen to indicate the cost of socially responsible corporate behaviour. Furthermore, they state that ethical constraints are a particular case of limitations that might be imposed upon portfolio selection from the investment universe, and the development of appropriate multi-factor benchmarks thus has relevance beyond the issue of ethicality. This study incorporated Fama and French's (1993) 'size premium' factor (SMB) in order to use a size adjusted Jensen model in the analysis of the performance of 18 UK SRI funds and 18 matched UK conventional funds (1986-1994). The inclusion of this factor enables the Jensen alpha model to account for the spread in returns between small and large-sized firms. The funds were matched by fund age, size criteria (Mallin et al., 1995), fund type (growth or income), and investment area (UK only or international) criteria. The R-squared measures which relate to the use of the adjusted Jensen model, are higher than those which relate to the use of the conventional model, indicating that the inclusion of the 'size premium' factor improved the accuracy of the analysis. The study found that both forms of funds tended to underperform the market, but in the majority of cases not significantly in a statistical sense. This underperformance tended to be worse in the case of the SRI funds, but again this was not statistically significant in the majority of cases.

The work of Gregory et al. (1997) was followed by that of Goldreyer and Diltz (1999). Goldreyer and Diltz (1999) state that incorporating socio political information in portfolio decisions may affect returns in several ways, and that the conventional wisdom of the investment community suggests that imposing additional constraints on the investor's portfolio selection problem will likely lead to lower returns than would be the case if socio political information were not factored into the decision. Goldreyer and Diltz (1999) also

state that, in contrast, social activists have argued that over the long run, firms with good social records will be more valuable for two reasons. Firstly, socially responsible firms will have a lower frequency of litigation and worker turn over, thus reducing operating costs. Secondly, as socio political information becomes more readily available to organisations, more investors will factor the information in their portfolio decisions.

In addition, Goldreyer and Diltz (1999) suggest that many academics, argue that while factoring socio political information into portfolio selection represents an added constraint in an optimization process, the added constraint is not likely to affect the overall return to investors and that with the large number of publicly traded firms available, the low transaction costs associated with equities trading, and the rapid flow of information through equities markets, the added socio political constraint is not usually binding. Thus, the effect of augmenting portfolio decisions with socio political information is an empirical issue.

This study examined the performance of 49 US SRI funds (29 equity funds, 9 bond funds and 11 balanced funds, 1990–1997) each relative to 20 US conventional funds (matched by investment objective or asset size/beta combination) and used three benchmark indices (the Wilshire 5000 Equity Index, the Lehman Corporate and Government Bond Index and the Lipper Balanced Fund Index). The study employed the Jensen alpha, Sharpe ratio and Treynor ratio performance measures and found little evidence of statistically significant performance differentials between the risk-adjusted performance of the SRI and conventional funds using any of the measures. Interestingly, this study also found that SRI equity funds using positive screening techniques, (which are screening techniques whereby fund managers actively seek investments in the stocks of companies which have a positive social impact in a specific industry or area), outperformed those that did not use positive screening techniques at statistically significant levels (with and without positive screens the average monthly alphas are -0.11% and -0.804% respectively, with a t-statistic of 3.36 for the difference). This was the first study in this area to introduce analysis of the relative effects of different types of SRI screening on fund performance, and as a result, provided the first indication that SRI screening could significantly affect fund performance.

In summary, the early studies of SRI fund performance found that these funds did not perform significantly worse in a statistical sense than their conventional counterparts. The principal importance of the aforementioned studies is therefore the role they each played

within the methodological development which eventually facilitated a more robust generalised conclusion, that any effects from ethical screening on the performance of SRI funds, were either counteracting each other, or were not substantial enough to affect performance significantly. From the perspective of the investor these findings indicate that investors are able to invest through ethically screened portfolios without this practice detrimentally affecting the risk adjusted performance of their investments.

### 2.3 Recent Studies of the Performance of SRI Funds

The majority of more recent studies which have analysed the performance of SRI funds use more advanced performance measures. An important study was conducted by Statman (2000). Statman (2000) states that socially responsible investors who want to change the world can use political actions or investment actions to potentially change company activities. He states that political actions include laws, regulations, taxes, and consumer boycotts, while investment actions such as not investing in specific socially irresponsible companies can result in an increase in the cost of capital to companies. For example, tobacco companies evaluate investment projects ranging from the introduction of cigarette brands to the construction of manufacturing facilities. Their demand for capital depends on the profitability of investment projects and on the cost of capital. When socially responsible investors sell or refrain from buying shares in a tobacco company, they shift the company's capital supply function and this withdrawal of capital raises the cost of capital. This could result in manufacturing project, for example having to be abandoned because it is no longer profitable. However, Statman (2000) states that socially responsible investors can only raise the cost of capital of socially irresponsible firms and damage their profitability in the absence of numerous conventional investors who stand ready to provide substitute capital at the same cost.

Statman (2000) analysed the performance of 31 US SRI funds relative to 62 conventional funds between 1990 and 1998 (1:2 ratio, only matched by asset size), in order to establish whether socially responsible investors are damaging the profitability of socially irresponsible firms. He used the S&P 500 Index and Domini 400 Social Index (SRI index) as benchmarks for the risk adjusted Jensen alpha and Sharpe ratio based tests. The results indicate that the average monthly alphas are different for the SRI and conventional funds over the period analysed, but that the differences are not statistically significant. Specifically, the

average monthly alphas for the SRI funds and conventional funds were -0.52% for the SRI funds relative to -0.75% for the conventional funds when the S&P 500 Index was the benchmark and -0.67% for the SRI funds relative to -0.78% for the conventional funds when the Domini 400 Social Index was the benchmark.

Statman's (2000) study was followed by that of Kreander et al. (2005) who investigated the performance of 60 SRI funds including 8 from Germany, 4 from the Netherlands, 14 from Sweden and 34 from the UK between 1995 and 2001. The performance of the SRI funds was compared to a matched sample of 30 conventional funds (matched by nationality, fund age, size and investment universe) using the matched pair methodology. Kreander et al. (2005) state that one might expect that conventional funds outperform their ethical counterparts since they operate without the same investment constraints. The results from Jensen alpha based measures are consistent with previous findings and the analysis finds no statistically significant difference between the risk-adjusted performance of the SRI and conventional funds. Importantly, the paper also finds, using the Henriksson and Merton (1981) model that the timing coefficients of the SRI and conventional funds are very similar (-0.29% and -0.28% respectively, both significant at the 5% level), which indicates that there is little difference between the market timing ability of the two types of fund managers. This is important because it indicates that there is unlikely to be significant differences in the timing ability (fund manager skill) of SRI fund managers relative to their conventional counterparts and therefore that this factor is unlikely to be significant within analysis of the relative performance of SRI and conventional funds. Kreander et al. (2005) acknowledge that their study suffers from survivorship bias because it doesn't include dead funds, however they assert that this bias affects both the ethical and the non-ethical funds and should therefore not have distorted the findings from their matched pair analysis. They state that this bias could overstate the performance of all funds on average, but that previous analysis of mutual fund performance such as Grinblatt and Titman (1989) and Brown and Goetzmann (1995) estimated that the survivorship bias was not substantial in their investigations of mutual fund performance.

The work of Kreander et al. (2005) was followed by Bauer et al. (2005), who analysed the performance of UK, German and US SRI funds. In total, the performance of 103 SRI funds is compared to the performance of 4384 conventional funds (114 German SRI funds, 396 UK funds and 3874 US funds, 1990–2001). The analysis uses the multi-factor Carhart

(1997) model in order to overcome potential benchmarking problems and investment style differences between the two types of funds. The study finds no evidence of significant differences in the risk-adjusted returns between the SRI and conventional funds. Interestingly, the paper also provides evidence that the German and US SRI fund sectors went through a learning phase which saw significant underperformance in the beginning of the 1990s, but that after this period they performed as well as the conventional funds. In addition, the study reaffirms previous findings that UK and German SRI funds are typically skewed towards small cap stocks, but finds that this was far less applicable to US SRI funds. Finally, the paper also provides evidence that there are significant differences between the risk exposures associated with the stocks held within SRI and conventional funds, particularly in relation to older SRI funds and the levels of their exposures to market risk, size and book-to-market factors. These findings are important because they indicate that while the SRI funds practice of screening does not significantly affect their risk-adjusted performance they do affect the nature of the stocks held within SRI funds relative to those within conventional portfolios and consequently the risk exposures of SRI funds relative to those of conventional funds.

Following Bauer et al. (2005), Barnett and Salomon (2006) take a different focus on the analysis of SRI fund performance and build on the findings of Goldreyer and Diltz (1999) by analysing the relative effects of the use of different screening practices on SRI fund performance. Barnett and Salomon (2006) state that a firm's socially responsibility may detract from a firm's financial performance because any discretionary expenditures on social betterment may unnecessarily raise a firm's costs, thereby putting it at an economic disadvantage in a competitive market, but that they may also help a firm to better attract resources, obtain quality employees, market its products and services, and even create unforeseen opportunities. Thus, social responsibility may be a source of competitive advantage.

The paper analyses the effect of varying levels and types of screening on the financial performance of 61 US SRI funds between 1972 and 2000. The analysis provides consistent findings to those reported in Goldreyer and Diltz (1999) because the results indicate that the financial performance of SRI funds can be affected by the types of social screens used. For example, in Barnett and Salomon (2006), the findings indicate that screening based on community relations criteria is associated with increased financial performance, while

screening based on environmental and labour relations criteria is associated with lower financial performance. Importantly, the study also identifies a curvilinear relationship between the intensity of SRI screening and the financial performance of SRI funds and provides evidence that as the number of social screens used by an SRI fund increases, financial returns decline at first, but then rebound as the number of screens reach a maximum. Barnett and Salomon (2006) combine modern portfolio and stakeholder theories in order to explain these findings and hypothesise that the financial loss borne by an SRI funds due to the requirement to screen stocks (limiting the potential investment universe of SRI funds) is offset as social screening intensifies because better managed and better performing firms are selected into SRI portfolios. Barnett and Salomon (2006) state that one implication of their findings is that SRI fund managers need to more carefully consider the effects that their chosen screening strategies are likely to have on the performance of their funds. The choice is not as simple as either being an SRI fund or not, but rather, just how socially responsible to be. The prescription is that managers should either wholeheartedly commit to broadly screening socially irresponsible firms from their funds, or exclude very few firms such that they do not interfere with their ability to diversify.

The work of Barnett and Salomon (2006) was followed by Gregory and Whittaker (2007). This paper is an analysis of the performance and performance persistence of the UK Ethical Fund Sector. The work builds on the methodology used by Bauer et al. (2005) and examines the performance of 32 UK SRI funds between 1989 and 2002. The performance of the UK SRI funds is compared to the performance of a control group of conventional funds matched on a 1 to 5 basis, by fund age and fund style but not fund size. Portfolios are created from the SRI funds and the performance of these portfolios is compared to the performance of portfolios created from the matched conventional funds. Gregory and Whittaker (2007) assert that using a portfolio of funds rather than the matched pairs analysis of Mallin et al. (1995), Gregory et al. (1997) and Kreander et al. (2005) overcomes the inherent problem of survivorship bias implied in a matched pairs sample because dead funds can be included in the portfolios. The 32 UK SRI funds are split into two style portfolios, those with domestic investment styles of which there are 20 funds and those with international investment styles of which there were 12 funds. The analysis finds using the Four Factor Jensen Alpha model that in general UK SRI funds have less exposure to the Fama French (1993) HML factor, but greater exposure to the Fama French (1993) SMB and Carhart (1997) momentum factor, than their conventional counterparts. The analysis indicates that the differences in risk exposures

are more severe between the domestic style UK SRI funds and their conventional counterparts, than for the international style UK SRI funds.

The work also finds that neither the SRI nor conventional funds exhibit significant under performance on a risk and style adjusted basis compared to matched market benchmarks, and therefore the authors conclude that there is little evidence of significant performance differentials between the two types of funds. In relation to the analysis of the persistence of the performance of the SRI funds, the analysis finds evidence to support persistence and evidence that there may be differences in performance persistence between the SRI and conventional funds, but these conclusions appear to depend on the performance metric chosen. Nonetheless, the authors conclude that it is unambiguously the case that domestic past 'winner' SRI funds outperform 'loser' SRI funds at 36 month horizons on a risk-adjusted basis.

The study by Gregory and Whittaker (2007) was superseded by that of Renneboog et al. (2008a). This comprehensive and influential work is an analysis of the performance and risk characteristics using a variety of Jensen alpha based models of 440 SRI mutual funds from the US, UK, Continental Europe and Asia-Pacific, matched with 16,036 conventional funds from 17 different countries globally (sample represented almost all known SRI-funds, 1991-2003). Renneboog et al. (2008a) state that if investors derive non-financial utility from investing in SRI funds, or in companies meeting high standards of corporate social responsibility (CSR), then they care less about financial performance than 'conventional' (non-SRI) investors.

Interestingly, the paper provides evidence consistent with investors paying a price for ethics, as they found that SRI Funds in the US, the UK, and in many continental European and Asia-Pacific countries underperformed their domestic benchmarks with alpha ranging from − 2.2% to − 6.5%. However, with the exception of some countries such as France, Japan and Sweden, the risk-adjusted returns of the SRI funds are not statistically different from the performance of conventional funds. Importantly, the paper provides little evidence of statistically significant performance differentials between the SRI funds and their conventional benchmarks in the more developed UK and US sectors, which is consistent with the results of previous research.

Significantly, the work of Renneboog et al. (2008a) also builds on that of Goldreyer and Diltz (1999) and Barnett and Salomon (2006) in relation to the analysis of the performance effects of different SRI screening practices. Renneboog et al. (2008a) provide further evidence that the specific screening activities of the SRI funds affect their risk-adjusted performance. For example, their study found that the SRI funds which focused on screening for companies with high levels of 'community involvement' performed around 30 basis points a month better than those which did not (3.6 % per year relative to a matched sample of conventional funds), while the SRI funds which focused on excluding 'sin stocks' (alcohol and tobacco companies) performed considerably worse than those which did not exclude this form of 'unethical' stock. These findings are important because they identify the differences which can exist between SRI fund screening practices and the effect these differences can have on performance.

A more recent investigation which analyses the performance of SRI funds is by Derwall and Koedijk (2009). Derwall and Koedijk (2009) state that there exists uncertainty as to whether adding an ethical dimension to the stock selection process adds or hurts value to investors, and that standard investment theory predicts that imposing constraints on the investment opportunity set, translates into sub-optimal investment decisions. However, they also present an alternative theory about SRI, which is that the social and environmental awareness expressed by a firm are sources of financial benefits that are overlooked by mainstream investment criteria, implying that social investors might enjoy an informational advantage. For example, strong corporate social responsibility policies have been associated with strong corporate management, reputational benefits, and a forward-looking business style, all of which could be (intangible) sources of superior firm performance.

The work investigates the performance of 28 US SRI funds, 17 of which are fixed-income funds and 11 are balanced funds, using a variety of Jensen alpha based measures (between 1987 and 2003). The funds are matched by fund age, end-of period fund size, and investment objective against an equally weighted portfolio of five conventional funds. Derwall and Koedijk (2009) state that by concentrating on SRI fixed-income portfolio performance, new insights are added that are relevant for making such allocation decisions and that studying socially responsible bond funds is relevant because these vehicles allow investors to purchase a stake in companies that are not publicly traded on financial markets

(i.e. owned through private equity). Through fixed-income funds, investors are thus indirectly able to participate in socially responsible companies they cannot access directly.

The study finds that a portfolio of US SRI bond funds earned a benchmark-adjusted return similar to that of its conventional counterpart during the period analysed, but that a portfolio of SRI balanced funds outperformed at a statistically significant level a matched portfolio of conventional balanced funds by 1.3% per year. The paper provided the first evidence that any US SRI fund sample had outperformed a matched sample of US conventional funds at a statistically significant level. This study is important because it is the first to establish that the effect of SRI screening methodologies on mutual fund performance may depend on the types of assets included within the funds. In this case, the performance of the SRI bond funds was not significantly affected by SRI screening but the performance of the balanced funds was. The majority of the research in this area has focused solely on equity funds.

Following the work of Derwall and Koedijk (2009), Cortez (2012) analyses the performance of US and European SRI funds which invest globally and not in their home markets. The sample is composed of 39 funds for European markets (Austria, Belgium, France, Germany, Italy, Netherlands and the UK) and 7 US funds and the period analysed is from 1996 to 2008. The findings of the analysis suggest that global socially responsible funds in most European markets do not exhibit significant performance differences in comparison to both conventional benchmarks and socially responsible benchmarks. However, the analysis finds that US funds, and to a lesser extent, Austrian funds, show evidence of underperformance, particularly when the model controls for value and size effects and for home bias. Furthermore, results from the analysis which uses conditional models suggest evidence of time-varying betas, but not of time-varying alphas. Regarding the investment style of the funds, the study finds evidence that global socially responsible funds are strongly exposed to small cap and growth stocks.

The work of Cortez (2012) was followed by Abdelsalam et al. (2014). This is an analysis of the performance persistence of 138 Islamic mutual funds and 636 Socially Responsible Investment (SRI) mutual funds from across the globe. The analysis covers the period between December 2000 and March 2011. The authors adopt a multi-stage strategy in which, in the first stage, partial frontiers approaches are considered to measure the

performance of the different funds in the sample. In the second stage, the results yielded by the partial frontiers are plugged into different investment strategies based on a recursive estimation methodology whose performance persistence is evaluated in the third stage of the analysis. The study finds that, for both the Islamic and SRI funds, performance persistence actually exists, but only for the worst and, most notably, best funds. The persistence of SRI and Islamic funds represents an important result for investors and the market, since it provides information on which funds to invest in and which funds to avoid.

The final study of the performance of SRI funds reviewed in this Chapter is Nofsinger and Varma (2014). They investigate the performance of 240 US Domestic equity SRI funds during crisis and non-crisis periods between 2000 and 2011. Nofsinger and Varma (2014) specifically explore whether SRI fund managers add value by delivering superior performance during periods of economic crisis/stress. They test whether SRI funds limit downside risk, particularly during crisis periods. Controlling for various fund characteristics, they attempt to further understand the role of SRI fund foci (ESG and Product related) and screening strategies (positive vs. negative) in relation to performance of socially responsible funds during crisis and non-crisis periods. Nofsinger and Varma (2014) theorise that although SRI investing may generate negative abnormal returns over time, SRI funds hold up better during market crisis periods because SRI and ESG dampens the downside risk. They assert that companies that exhibit environment, social, and governance responsibility are less likely to suffer large, negative events in ESG areas during both bull and bear market periods. For example, disastrous pollution events are less likely in firms with strong environmental green programs and firms with high social concerns are less likely to undergo employee-related lawsuits.

The authors identify two crisis periods for the US stock market based on the peak and trough for the Standard & Poor's 500 Index: March 2000 to October 2002 and October 2007 to March 2009. The first crisis period (March 2000 to October 2002) happened after the technology bubble burst and during this period the S&P 500 fell from a high of 1534.63 on March 27, 2000 to a low of 768.63 on October 10, 2002. The second crisis period (October 2009) revolved around the global financial crisis and saw the S&P 500 fall from a high of 1576.09 on October 11, 2007 to a low of 666.79 on March 6, 2009. The analysis compares the performance of the SRI funds to matched conventional mutual funds using asymmetric models and find that socially responsible mutual funds outperform during periods of market

crises, but that this dampening of downside risk comes at the cost of underperformance during non-crisis periods. The authors find that this asymmetric return pattern is driven by the mutual funds that focus on environmental, social or governance (ESG) attributes and is especially pronounced in ESG funds that use positive screening techniques. Furthermore, they observe that these patterns are attributed to the funds' socially responsible attributes and not the differences in fund portfolio management, or the characteristics of the companies in fund portfolios.

However, there are three issues with the methodology used in this analysis and the existence of these issues may result in the findings not being robust. The first of these issues relates to the sample of SRI funds used by Nofsinger and Varma (2014). The analysis uses 240 US SRI funds, located from a number of different sources. The sample includes funds with different structures, including open ended funds, close ended funds, ETFs as well as retail and institutional funds. In addition, the sample also includes SRI funds with different asset types and investment universes (Large Cap, Mid cap, whole of market, special equity). These funds are placed into one SRI fund portfolio for the analysis. By placing all of the funds into one SRI portfolio and not separating the funds by structure, asset type and investment universe, the analysis may be subject to performance biases resulting from differences in the performance of the different types of SRI fund. A more robust method of analysis is to separate out the different types of SRI fund and compare their performance with matched conventional funds of the same type.

The second issue with the methodology used in Nofsinger and Varma (2014) is in relation to the matching criteria employed. The authors match each SRI fund to three peer conventional funds with similar Lipper fund objectives, years in existence and total net assets. However, the analysis in Nofsinger and Varma (2014) includes dead funds, and it is unlikely that each dead SRI fund could be closely matched with three conventional funds using this criteria because it would mean that for each dead SRI fund the authors were able to obtain data for three dead conventional funds which not only shared the same fund objectives and total net asset value as the dead SRI fund, but also were created and died at roughly the same time as the dead SRI fund. As this is unlikely, there may be biases in the analysis which result from the inclusion of the dead SRI funds.

The final issue with the methodology used in Nofsinger and Varma (2014) is in relation to the use of the screening data in the analysis. The analysis looks at the effect which different SRI screening practices have on performance. The data for the funds screening practices is not taken from an independent third party but from each fund's prospectus (historical or current) made publicly available on SEC Edgar and from company websites. This is problematic because the funds descriptions of their screening practices were not validated or categorised by an independent third party. In addition, the screening analysis in Nofsinger and Varma (2014) has a key flaw which renders its results, and those reported in previous papers, open to critique. SRI funds tend to screen in a number of different areas (tobacco, alcohol etc.) and often screen using different techniques in relation to different areas (positive, restricted etc.). In addition, different funds often have different definitions of what constitutes screening in a specific area and what constitutes a specific screening technique. Therefore, isolating the effect of screening in one area, or the effect of screening using a particular technique across a group funds, cannot be done robustly. Chapters 4 and 5 provide more information on the screening practices of UK and US SRI funds.

In summary, research that analysed the performance of SRI mutual funds has produced a number of significant findings in relation to the effects that SRI screening practices have on investment portfolios. For example, studies have found that SRI screening can significantly impact SRI fund exposures to market risk and size and book-to-market factors, relative to conventional funds. The overwhelming consensus of the early research in this area has provided evidence to support the conclusion that these differences to do not result in statistically significant performance differentials between the risk-adjusted performance of SRI funds and conventional funds. However, more recent analysis has suggested that performance differences may exist. The work in Chapters 4 and 5 of this thesis builds on the work to further analyse the performance of SRI funds.

### 2.4 The Performance of SRI Indices

While the findings from studies of SRI mutual fund performance are valuable they are limited in their ability to explain the relative returns of socially responsible companies because mutual fund performance is susceptible to the influence of fund fees, costs associated with screening practices and fund manager skill (Schröder, 2007, Statman et al., 2008). Consequently, analysing the performance of SRI indices relative to their conventional

benchmark indices is purported to be an alternative method for investigating the performance of socially responsible companies because these influences do not have to be considered.

The first important study of SRI indices was by Luck and Pilotte (1993), which analyses the performance of the Domini Social Index (DSI) against the Standard and Poor's 500 index (S&P 500) between 1990 and 1992, and finds that the DSI significantly outperformed the S&P 500 during this period. The study of Luck and Pilotte (1993) was followed by that of Kurtz and Di Bartolomeo (1996) which also analysed the performance of the DSI against the S&P 500, but over a slightly longer period (1990-1993). This paper also provides evidence of a statistically significant difference in the performance of these indices (19 basis points). The paper concludes that some of the performance differential is attributable to volatility differences between the two indices.

The next important study to analyse the performance of SRI indices was by Sauer (1997). This study analyses the performance of the DSI relative to two conventional indices: the S&P 500 and the Chicago Center for Research in Security Prices (CRSP) Value Weighted Market Index, using the Jensen alpha performance measure and Sharpe measure (1986-1994). The paper finds little evidence of statistically significant differences between the performance and volatility of the SRI and conventional indices. The work of Sauer (1997) was followed by that of Statman (2000), which is an investigation of the performance of the DSI relative to the S&P 500 and 31 SRI mutual funds relative to both indices. As stated earlier, the results with respect to the fund analysis indicate that the average monthly alphas are different for the SRI compared to the conventional funds over the period analysed, but that the differences are not statistically significant. With respect to the indices, the paper finds evidence that there is no significant difference in the performance of the DSI and S&P 500 for a slightly longer time period (1990-1998) than that used in Sauer (1997).

A more comprehensive study of the performance of SRI indices was performed by Statman (2006). This study compared the performance of the DSI, the Calvert Social Index, the Citizens Index, and the US portion of the Dow Jones Sustainability Index, with the S&P 500, between 1994 and 2004. The paper finds that the returns of the socially responsible indices generally exceeded the returns of the conventional indices, but that the alphas were not statistically significant. The paper also provides evidence that the correlations between the returns of the socially responsible indexes and the S&P 500 were high, but that the

tracking errors were often considerable. For example, the mean difference between the returns of the DSI and the S&P 500 in 12-month periods was 2.49 percentage points, and the maximum difference was 8.01 percentage points. This is important because it indicates that the practice of SRI screening may result in SRI portfolios (indices and funds) having performance head winds or lags relative to their conventional counterparts that may affect their short-term performance but not their average long-term performance. Overall, the paper concludes that the findings provide little evidence that investors pay a price for investing in socially responsible stocks because the performance of the indices was not significantly different.

The next study of the performance of SRI indices is by Schröder (2007). This is an investigation of the performance of 29 international SRI equity indices, using single and multi-factor models between 1992 and 2003. Of the indices used in the analysis, seven have a global investment universe and ten cover European stocks, four of which concentrate on the Euro area. The other 12 indices contain stocks of single countries only, Australia (1), Canada (1), Sweden (1), the United Kingdom (2), and the United States (7). The paper finds that while many SRI indices have a higher systematic risk relative to their benchmarks indices (betas higher than 1), the SRI stock indices do not exhibit a different level of risk-adjusted return. Schröder (2007) states that the performance tests confirm the results of most of the earlier studies: the SRI screens for equities neither lead to a significant out-performance nor an underperformance compared to the benchmarks. The latter is particularly interesting as the SRI screening process reduces the investment universe which should, according to optimal portfolio theory, lead to a reduction in the risk-adjusted return. As this is not the case, an investment in SRI equity indices does not impose additional costs in terms of lower returns to the investor.

Following the work of Schröder (2007), Managi et al. (2012) also perform an analysis of the performance of SRI indices. Managi et al. (2012) state that firms CSR strategies may facilitate company efforts to improve their individual social credibility and presence, to enhance competitiveness, and to minimise potential liability compensations and that, therefore, it is possible to rationalise CSR as a means to signal a firm's trustworthiness in providing quality products or to soften competition in product markets. In addition, they state that if this argument is true, socially responsible firms might have the benefit of higher financial performance than conventional firms and that SRI indices may outperform

accordingly. However, Managi et al. (2012) additionally argue that socially responsible firms focus on stakeholder value (including the environment) may be a second-best optimum because managerial incentive problems such as agency costs are incorporated in a stakeholder's framework, and that when competition in a product market is intense, CSR may sacrifice profits, resulting in socially responsible firms and indices underperforming.

The analysis of Managi et al. (2012) is far less robust than that of Schröder (2007) and therefore its contribution is contentious. Managi et al. (2012) investigated the performance of US, UK and Japanese SRI Indices over the period 2001 to 2008 for the US and UK SRI indices and 2003 to 2008 for the Japanese indices. Managi et al. (2012) estimate first and second moments of the indices performance distributions based on the Markov switching model and find no statistical difference between the mean returns and volatilities of the SRI and conventional indices. In addition, they find evidence of strong co-movements between the SRI and conventional indices. A Markov switching model is used in order to find bull and bear periods in the international equity markets (volatility regimes), and to compare the performance of the SRI indices and their conventional benchmarks over these two distinct periods.

The analysis in Managi et al. (2012) has a significant methodological flaw which renders the robustness of the study's findings questionable. This is that the conventional benchmarks used in the analysis are not appropriate. The performance analysis uses an aggregate approach in which all of the SRI indices for each geographical area are grouped into one portfolio for that geographical area. Then, the performance of these aggregated portfolios is compared to the performance of one large cap conventional index with respect to each geographical area; the S&P 500, the FTSE 100 and the Tokyo Stock Price Index (TOPIX). These benchmarks are inappropriate because they are all large cap indices and many of the SRI indices used are not. For this analysis to be robust the performance of the SRI indices should have been ideally compared to those of their official benchmark indices or at least conventional indices with similar market cap and investment styles to the SRI indices.

In summary, studies of SRI mutual fund performance are potentially biased because the performance of mutual funds is susceptible to the influence of factors such as fund manager skill on performance. Analysing the relative performance of SRI indices and their conventional benchmark indices is purported to be a more robust method of investigating the

relationship between the returns of stocks of socially responsible companies and the returns of stocks of conventional companies because these influences do not have to be considered (Schröder, 2007, Statman and Glushkov, 2009). Research that has analysed the performance of SRI indices has principally found that while SRI screening can affect some characteristics of the stocks held in SRI indices, there is little evidence that SRI screening significantly affects performance in a statistical sense. On a risk-adjusted basis these findings support those found in research on the performance of SRI mutual funds.

While the majority of research to date has found that the risk-adjusted returns of SRI portfolios are not significantly different from conventional portfolios, this research has not yet explained why SRI screening does not result in a significant difference in risk-adjusted performance. The work in this thesis contributes by addressing this issue. In addition, this study uses asymmetric models in the analysis of the performance of SRI portfolios against their benchmarks[2]. The use of these models which incorporate economic and stock market indicators, allow for the risk-adjusted performance of the SRI and conventional portfolios to be analysed across different stages of stock market and economic cycles. There are a number of reasons why performance may differ during these periods, and possible theoretical explanations for findings of this nature are outlined below and are not mutually exclusive.

**Hypothesis 4: "SRI Portfolio Performance is Different in Different Conditions"**

SRI Portfolios Limited Stock Universes

It is possible that SRI portfolios may perform worse than conventional portfolios during market downturns, or upturns, because their screening practices create relatively smaller potential stock universes. For example, during downturns this may significantly affect performance by limiting the ability of SRI portfolios to include particular cyclical defensive stock industries such as tobacco stocks. Alternatively, during upturns, this constraint may negatively affect the risk-adjusted performance of SRI portfolios because they may be unable to include some types of cyclical (sin) stocks such as gambling stocks.

[2] The use of asymmetric models to analyse the effects of market cycles on asset performance has a distinguished history, see Fabozzi and Francis (1977), Kim and Zumwalt (1979), Wiggins (1992), McQueen and Thorley (1993), Pedersen and Satchell (2000, 2002) for examples. None of these studies analyse the asymmetric performance of SRI indices or SRI portfolios specifically.

SRI Portfolio Performance May Be Less Volatile

As noted by Moskowitz (1972), socially responsible companies may develop competitive advantages relative to conventional companies, such as better management and a focus on long-term sustainability. If this is the case, these advantages may be particularly relevant to SRI portfolio performance during market downturns, or upturns, because socially responsible stocks may be less volatile, and consequently the performance of SRI portfolios may be less volatile. During a market downturn, for example, this could be positive for SRI portfolio performance, while during an upturn SRI portfolios may underperform their conventional counterparts.

The alternative of Hypothesis 4 also has intuitive appeal.

**Hypothesis 5: "Changing Conditions Effect SRI Portfolio Performance Similarly"**

There are interesting reasons why market and economic cycles may have little effect on the relative performance of SRI and conventional portfolios and these possible theoretical explanations are outlined below.

Similar Industry Weightings and Diversification Levels

Socially responsible screening may not significantly affect portfolio performance because the screening practices used in the construction of the portfolios may not significantly affect their industry weightings or diversification levels compared to those of conventional portfolios. For example, restricted and positive screening result in specific stocks being included in or excluded from portfolios on the basis of ESG rankings and corporate practices, but they do not necessarily result in whole industries or types of companies being excluded. SRI portfolios that are constructed using these forms of screening may therefore have very similar industry weightings to those of their conventional counterparts, representing similar diversification levels, while having different stock holdings. As a result, the performance of the SRI and conventional portfolios may be similar even over market and economic cycles because sector weightings and diversification levels are likely to be the primary drivers of risk-adjusted portfolio performance. In other words, the screening methods do not impose

significant constraints on portfolios allowing them to meet ethical screening requirements whilst not sacrificing performance over different stages of market and economic cycles.

In addition, the work in this thesis also contributes to this area of academia by analysing the shareholder activism of US SRI funds in order to establish whether they provide a psychological return to their investors. The following section provides a review of the important papers which have analysed the shareholder activism levels of mutual funds.

### 2.5 Studies of the Shareholder Activism By Mutual Funds

The mutual fund industry owns large stakes in many US public companies. This awards the industry considerable power to influence companies. However, the role mutual funds actively play as monitors of managerial actions is not clear. Besides private negotiations and selling shares, voting is the most direct and probably most cost effective act that mutual funds can take to influence the actions of management and their corporate governance. As a result, academics have examined mutual fund voting decisions in order to establish the influence of mutual funds on companies (Morgan et al., 2011).

In 2002, Harvey Pitt, the chairman of the SEC stated that US mutual fund managers have a fiduciary duty to vote on funds proxies in the best interests of their investors, and introduced a legal obligation for mutual funds to make information on their voting decisions available to investors. The SEC began requiring the disclosure of fund voting decisions on Form N-PXs in 2004 (Lubin, 2002, Morgan et al., 2011). Form N-PXs are forms which are completed by investment companies and filed with the SEC in order to report the investment management company's proxy voting record for each year. Subsequent to this data becoming publically available there has been a number of studies which have investigated proxy voting by mutual funds.

Rothberg and Lilien (2006) analyse the proxy-voting policy disclosures of the top ten mutual fund families in the US based on equity assets. They find that the mutual funds vote in general accordance with the policies laid out in their proxy policy disclosures for their investors. In particular, the funds often vote against management recommendations on issues of executive compensation, board independence, and possible takeovers. In contrast, they generally vote with management recommendations on operational or capital-structure issues.

The authors conclude that this pattern of voting is what would be expected in a principal-agent form of corporate governance, and that the funds within their sample operate from this model.

Following the work of Rothberg and Lilien (2006), Davis and Kim (2007) analyse the magnitude of mutual funds' business ties with their portfolio firms and the links between these ties and mutual funds proxy votes at specific firms. The specific business ties they analyse are the mutual fund company's management of corporate pension schemes. The sample consists of Fortune 1000 firms in 2001. They find that aggregate votes at the fund family level indicate a positive relationship between business ties and the propensity of a fund family to vote with management. Votes at specific firms, however, reveal that funds are no more likely to vote with the management of client firms than of non-clients. Davis and Kim (2007) theorise that because the votes took place when the mutual fund managers may have been aware that their votes would be publicly scrutinised, fund families with a larger client base may have adopted voting policies that led to less frequent opposition to the management of all firms and not just those with ties.

The next significant study of mutual fund voting is Matvos and Ostrovsky (2008). They analyse the relationship between the mutual fund ownership of firms involved in corporate acquisitions, the effect the acquisitions have on mutual fund value and the mutual fund voting patterns around the acquisitions. For the value analysis, the sample analysed is from 1981 to 2003. For the mutual fund voting analysis, the sample of votes are those between 2003 and 2006. Matvos and Ostrovsky (2008) find that institutional shareholders of acquiring companies, on average, do not lose money around public merger announcements because they hold substantial stakes in the target companies and make up for the losses from the acquirers with the gains from the targets. Depending on their holdings in the target, acquirer shareholders generally realise different returns from the same merger, some losing money and others gaining money. Acquirer-only shareholders, who do not hold shares of the target company bear the full loss, while cross-owners, are compensated by the gains in the target. In addition, they find that this conflict of interest is reflected in the mutual fund voting behaviour and find that in mergers with negative acquirer announcement returns, cross-owners are significantly more likely to vote for the merger. They find that the incentives for many shareholders of acquiring firms to block negative-return mergers are often blunted or even reversed.

Following Matvos and Ostrovsky (2008), Butler and Gurun (2008) analyse the relationship between the social ties of firm executives and mutual fund managers, and total CEO compensation at connected firms (those with relatively high levels of socially connected ownership). Using Execucomp data from 1992 to 2006 and hand-collected data on social ties between firm executives and mutual fund managers, they find that for each percentage point of a firm's ownership that is connected ownership, total executive compensation is 2.5% higher, controlling for other determinants of compensation. They also find evidence that funds that have social connections are more likely to vote against shareholder initiated proposals to limit executive compensation, thereby protecting CEOs from the discipline of corporate governance. This voting propensity is especially strong when a fund goes against the voting of other funds in the same fund family. Butler and Gurun (2008) interpret the findings as consistent with higher compensation and favourable voting being a quid pro quo for information flow from firm to the fund.

The study by Matvos and Ostrovsky (2008) was superseded by that of Ng et al. (2009). Ng et al. (2009) use data from the voting records database provided by Institutional Shareholder Services (ISS), covering all of the mutual funds within the top 146 mutual fund families that report their votes in Form N-PX's filed with the SEC, as of August 2004, 2005, and 2006 (these were the voting seasons between July 2003 and June 2006). They use this data to investigate whether mutual funds consider prior firm performance when they vote on a diverse range of management and shareholder sponsored proposals relating to governance, compensation, and director election. They theorise that prior firm performance plays a role in the monitoring effort of mutual funds as they fulfil their fiduciary duties. Ng et al. (2009) find that voting is related to prior firm performance for selected management and shareholder proposals and that it is consistent with Institutional Shareholder Services' recommendations. Mutual funds support management (shareholder) proposals less (more) when prior firm performance has been weak. Furthermore, even when mutual funds deviate from their fund family's voting policies, they attach importance to prior firm performance, and their voting is, to a certain degree, affected by business ties.

The work of Ng et al. (2009) was followed by Matvos and Ostrovsky (2010). Matvos and Ostrovsky (2010) analyse the importance of mutual fund voting in the elections of corporate boards and do so by constructing a comprehensive dataset of 2,058,788 mutual fund votes in

corporate board elections that took place between 2003 and 2005. They find systematic heterogeneity in fund voting patterns, and that some mutual funds are consistently more management friendly than others. They also establish the presence of peer effects and that a fund is more likely to oppose management when other funds are more likely to oppose it, all else being equal. To overcome the endogeneity problem in identifying peer effects caused by unobserved director quality, they rely on fund heterogeneity to instrument for expected fund votes. They then construct and estimate a model of voting that incorporates these two features. The supermodular structure of the model allows them to compute the social multiplier due to peer effects. They find that heterogeneity and peer effects among funds are economically as important in shaping the voting outcome as firm and director characteristics.

A more recent study which has analysed mutual fund voting was Morgan et al. (2011). Morgan et al. (2011) address how mutual funds vote on shareholder proposals and identify factors that help determine support of wealth-increasing shareholder proposals. They examine 213,579 voting decisions made by 1799 mutual funds from 94 fund families for 1047 shareholder proposals voted on between 2003 and 2005. In an analysis of voting across funds within the same fund family, they find significant divergence in voting within families, emphasizing the importance of focusing on voting by individual funds. They also find that, in general, mutual funds vote more affirmatively for potentially wealth-increasing proposals and that funds' voting approval rates for these beneficial resolutions are significantly higher than those of other investors. The findings of Morgan et al. (2011) suggest that funds tend to support proposals targeting firms with weaker governance. They also find that funds with lower turnover ratios and social funds are more likely to support shareholder proposals. In addition, they find that fund voting approval rates significantly impact whether a proposal passes and whether one is implemented. Specifically, with regard to the social funds in the sample, Morgan et al. (2011) find that social funds are more likely than other funds to vote for proposals, consistent with their voting in line with their social agendas.

The work of Morgan et al. (2011) was followed by Ashraf et al. (2012). Ashraf et al. (2012) examine the relationship between mutual fund votes on shareholder executive compensation proposals and pension-related business ties between fund families and firms. They analyse 340 shareholder sponsored executive compensation proposals over the period 2004 to 2006. Their analysis includes nearly 18,000 votes cast by 143 fund families, 67 with pension-related business ties and 76 without ties. They theorise that executive compensation

proposals provide a sharply delineated test of conflicts of interest, since such proposals directly influence the economic welfare of the executives who determine which institutions manage their pension funds. Ashraf et al. (2012) find, in unconditional tests, that fund families support management when they have pension ties to the firm. They find no relation when they stratify by fund family in conditional tests, which suggests that fund families with pension ties vote with management at both client and non-client firms and confirm this result in an analysis of non-client firms. The results suggest that pension-related business ties influence fund families to vote with management at all firms.

The final study of mutual fund voting reviewed in this chapter is Butler and Gurun (2012). Butler and Gurun (2012) examine the relationship between mutual funds whose managers and CEO's are in the same educational network. They use Riskmetrics' Governance Analytics database to obtain voting records of individual mutual funds between 2004 and 2007. They analyse the voting of mutual funds on shareholder-initiated compensation proposals and their sample includes 253,903 fund voting decisions made for 610 shareholder resolutions proposed at 257 firms. In their data set, there are 358 mutual fund families and 8,023 individual mutual funds. Butler and Gurun (2012) find that fund managers who are in the same educational networks as CEO's are more likely to vote against shareholder-initiated proposals to limit executive compensation than out-of-network funds. This voting propensity is stronger when voting among the funds if a family is not unanimous. Furthermore, CEOs of firms who have relatively high levels of educationally connected mutual fund ownership have higher levels of compensation than their unconnected counterparts. This aspect of executive compensation is related to both the abnormal trading performance of the connected investors in the firm and the perceived quality of firm management by the connected investors.

In summary, research which has analysed the proxy voting of mutual funds has produced a number of significant findings. A number of the studies have found that mutual funds act as good corporate monitors while a number of the studies have found that they do not. Morgan et al. (2011) outline the two broad hypothesis which are tested within these studies and which are also investigated within the voting analysis work in this thesis. These hypotheses are outlined in the following below.

**Hypothesis 6: "Mutual Funds Use Their Proxy Votes Effectively as Corporate Monitors".**

Large shareholders such as mutual funds have significant incentives to be active and responsible corporate monitors and so they perform this role effectively (Berle and Gardiner, 1932, Shleifer and Vishny, 1986, Morgan et al., 2011). If mutual funds are unhappy with the corporate management of a firm, selling shares in the firm may be a less attractive option than changing firm actions through proxy voting. Selling large holdings in firms can depress their share prices and damage the investment performance of mutual funds. Large shareholders such as mutual funds can potentially increase the value of their portfolios by not selling their holdings but by using proxy voting to improve the performance of the firms they hold (Shleifer and Vishny, 1986, Ashraf et al., 2012). There is some evidence in the literature reviewed in this chapter that mutual funds act as good corporate monitors. For example, Rothberg and Lilien (2006) find that mutual funds vote in general accordance with the policies laid out in their proxy policy disclosures and often vote against management recommendations on issues of executive compensation, board independence, and possible takeovers. Morgan et al. (2011) find that, in general, mutual funds vote more affirmatively for potentially wealth-increasing proposals and that funds' voting approval rates for these beneficial resolutions are significantly higher than those of other investors.

**Hypothesis 7: "Mutual Funds Do Not Use Their Proxy Votes Effectively as Corporate Monitors"**

Mutual funds are not effective corporate monitors. When mutual funds do not agree with corporate actions, rather than voting against them through proxy voting and attempting to change corporate behaviour, they may find it more effective to vote with their feet and sell shares in the company (Roe, 1990, Parrino et al., 2003, Ashraf et al., 2012). In addition, there is the potential that mutual funds will not act as good corporate monitors where potential conflicts of interest exist. There is significant evidence in the literature reviewed in this chapter that this may be the case for many mutual funds. Davis and Kim (2007), Butler and Gurun (2008), Ashraf et al. (2012) and Butler and Gurun (2012) find that mutual funds do not act as good corporate monitors when they have ties with firms which create a conflict of interest. Davis and Kim (2007) and Ashraf et al. (2012) find this when mutual funds have business ties with firms such as the management of their pension schemes. Butler and Gurun

(2008) find this when there are social ties between firm executives and mutual fund managers and Butler and Gurun (2012) find that this when firm CEO's and mutual fund managers are in the same educational network.

In summary, research which has analysed the effectiveness of mutual funds as corporate monitors has found that they can act as good corporate monitors but may not when it is easier, or more desirable, for them to sell holdings than change company's actions through voting. Research has also found that mutual funds may not act as good corporate monitors where conflicts of interest exist. The work in Chapter 5 of this thesis tests whether US SRI funds act as good corporate monitors. In addition, the work analyses whether SRI funds use their proxy voting differently to conventional funds and specifically whether they promote social and environmental agendas to a greater extent than conventional funds.

# Chapter 3: Investigating the Performance of US SRI Indices

## 3.1 Introduction and Contribution of Chapter 3

Chapter 3 is an analysis of the performance of 14 US Socially Responsible Investment (SRI) indices, relative to their conventional benchmark indices. This chapter makes a number of contributions to the literature on the performance of SRI indices. These contributions are designed to examine and explain the risk-adjusted performance of US SRI indices. Work of this nature is extremely important for SRI investors as it helps to establish whether there are any costs associated with the ethical benefits they receive through investing in ethically screened portfolios. It is important to study the performance of SRI indices, in addition to SRI funds, because while the findings from studies of SRI fund performance are valuable, they are limited in their ability to explain the relative returns of socially responsible companies because mutual fund performance is susceptible to the influence of fund fees, costs associated with screening practices, and fund manager skill (Schröder, 2007, Statman et al., 2008). Consequently, analysing the performance of SRI indices relative to their conventional benchmark indices is purported to be an alternative method for investigating the performance of socially responsible companies because these influences do not have to be considered.

The work in this chapter makes a number of important contributions to this area of academia. The chapter analyses the performance and exposures of all of the 14 major US SRI indices relative to carefully selected conventional benchmarks. Previous work uses a mixture of official and unofficial conventional benchmarks. Official benchmarks are those that the index companies believe to be most accurate and are the benchmark the index company's measure index performance against. The unofficial benchmarks used in previous work such as Schröder (2007) are selected by the respected authors and are used because data for the official benchmarks was not available. The use of official benchmarks within the work ensures that the analysis is accurate.

In addition, there is considerable need for analysis of SRI indices performance which uses an updated sample period. The most recent robust study of the performance of US SRI indices was by Schröder (2007) with a sample period between 1992 and 2003. Many US SRI

indices only came into existence in the early 2000's, the majority of their performance has not yet been rigorously analysed and conclusions of their performance has not yet been possible. A contribution of the work in this chapter is that the analysis employs a sample period which ends in 2012 are so is the first work which has the potential to provide any such conclusions. Managi et al. (2012) uses a sample period between 2001 and 2008 to investigate the performance of US, UK and Japanese SRI indices. However, this analysis has a number of fundamental methodological flaws as aforementioned in the literature review.

Another contribution of the work in this chapter is the use of asymmetric models to analyse the performance of the US SRI indices across different stages of the US economic and market cycles. Three studies have analysed the performance of SRI portfolios in different investment conditions. Two of them have analysed the performance of SRI mutual funds and may therefore be susceptible to influences such as fund costs and fund manager skill. Renneboog et al. (2008a) perform an analysis of the effects of changes in publicly available macroeconomic information on the performance of SRI mutual funds and find little evidence of any significant effect. Nofsinger and Varma (2014) analyse the performance of SRI funds during normal and market crisis periods using asymmetric models. They find that socially responsible mutual funds outperform during periods of market crises, but that this dampening of downside risk comes at the cost of underperformance during non-crisis periods. One weakness of this methodology is that it only allows for the performance of SRI funds to be analysed during normal and extreme market crisis conditions and not during general market expansion and contraction periods. The methodology used in this chapter allows for the analysis of SRI indices performance across general market expansion and contraction periods.

To date, there has only been one study which has analysed the performance of SRI indices during different investment conditions, and this study is Managi et al. (2012). Managi et al. (2012) is an investigation of the performance of US, UK and Japanese SRI indices in which a Markov switching model is used in order to find bull and bear periods in the international equity markets (volatility regimes) and to compare the performance of the SRI indices and their conventional benchmarks over these periods. This chapter uses asymmetric models in the analysis of the performance of SRI indices against their benchmarks. These models, which incorporate economic and stock market indicators, allow for the risk-adjusted performance of the SRI and conventional indices to be analysed across different stages of the

US stock market and economic cycle. Unlike the Markov switching model used in Managi et al. (2012), which uses market volatility as a stock market cycle indicator in order to define bull and bear market periods (volatility regimes), this study uses data provided by expert third parties to define economic cycle indicators. In addition, the sample period used in Managi et al. (2012), 2001 to 2008 has too few separate market periods for their analysis to be effective. The data period used in this study is 1998 to 2012 and therefore allows for a more accurate analysis of the performance of SRI indices across different market conditions.

Another contribution of the work in this chapter is the use of three and four factor models to study the risk-adjusted performance of SRI indices relative to their benchmark indices. These models, which incorporate Fama and French's (1993) small minus big (SMB) and value minus growth (HML) factors, and Carhart's (1997) momentum factor, allow for a more accurate measurement of the risk-adjusted returns of the SRI and conventional portfolios. The use of these models has become standard within this field and Statman (2009) uses these factors as two additional performance benchmarks over the "market factor" of the CAPM, to analyse of the performance of socially responsible stocks. To date, no other study of the performance of US SRI indices have used three and four factor models to study their performance.

Bauer et al. (2005) and Renneboog et al. (2008a) use these models in an analysis of the risk-adjusted performance of SRI mutual funds to unveil interesting differences in investment styles between SRI funds and their conventional benchmarks and discover significant differences between the exposures of SRI and conventional funds to market risk, size and book-to-market factors. For example, Renneboog et al. (2008a) find that SRI funds in the US invest relatively more in large capitalization stocks than their conventional peers, while UK SRI funds invest more in small cap stocks as shown by their greater sensitivity to the SMB factor.

It must be noted, however, that the use of these additional benchmarks is not without criticism and there are a number of papers which question their intuitive validity and whether they are in fact proxies for other risk factors. For example, Petkova (2006) advocates that the Fama and French (1993) factors proxy for innovations in variables that describe investment opportunities, and Liew and Vassalou (2000) suggest that they are proxies for predictors of economic growth (GDP).

In addition, the work in this chapter contributes to this area of academia because it is the first work to analyse SRI indices' levels of sector and industry exposure relative to conventional indices. This is important because if the sector and industry exposure levels of the SRI indices and conventional indices are similar, this would indicate that SRI screening practices do not significantly affect sector or industry weightings relative to conventional benchmark indices. This would support the case that the similar levels of risk-adjusted performance between the two types of indices may be explained by this lack of difference in allocations.

This sector and industry analysis follows the approach of Sharpe (1992) who analysed the sector exposure of a group of mutual funds and Benson et al. (2006) who analysed the sector exposure of a group of SRI mutual funds relative to a group of conventional mutual funds. Benson et al. (2006) use sector exposure analysis to investigate whether US SRI funds exhibit different sector exposures than their conventional counterparts. They find that there appears to be no consistent appearance of specific industries in which SRI funds take a higher weight than their conventional counterparts as the result of SRI screening. The sector exposure analysis within this chapter uses a similar methodology to test whether US SRI indices exhibit different sector exposures from their conventional counterparts. The industry exposure analysis tests whether SRI screening has any significant effects on the industry exposure of the SRI indices. The use of industry level data in addition to sector level data allows for a more comprehensive examination on the effect SRI screening has on the exposures of SRI indices. Importantly, the methodology used in this study allows for analysis as to whether different forms of SRI screening have different impacts on SRI portfolios sector and industry exposures. This analysis is important because the findings may enhance SRI investors' understanding of the effect different types of SRI screening can have on the exposures of their investment portfolios.

The final contribution of the work in this chapter is the use of idiosyncratic volatility analysis to analyse the levels of idiosyncratic risk of the SRI indices, relative to their conventional benchmarks. If the levels of idiosyncratic volatility of the two types of indices are similar, the results will indicate that the SRI indices screening practices do not significantly affect their diversification levels relative to their benchmarks. This may contribute to the explanation of similar performance levels of SRI and conventional portfolios. Bello (2005) uses residual variance analysis to show that US SRI funds have

similar levels of diversification to their conventional counterparts. Idiosyncratic volatility analysis is used in this chapter to establish whether this is also the case with SRI indices. Ang et al. (2006) use idiosyncratic volatility analysis in order to analyse the idiosyncratic volatility levels of US stocks.

In summary, the work makes a number of contributions to this area of research. These are designed to enable the discovery of novel information in relation to the risk-adjusted performance, risk exposures, asset allocations and performance styles of SRI indices. These contributions are also designed to establish whether there are any significant differences between the characteristics of SRI and conventional indices as a result of the SRI indices screening methodologies. The findings from this study have the potential to enhance SRI investors', such as SRI fund managers, understanding of the effect SRI screening can have on their investment portfolios.

## 3.2 Description of Data

### 3.2.1 Indices Data

This chapter analyses the performance of all of the 14 major US SRI indices against their official conventional benchmarks using monthly data. Each US SRI index has an official conventional benchmark index and details of the official benchmarks were provided by the companies that create the SRI indices[3]. This work is the first to analyse the performance and exposures of all of the 14 major US SRI indices relative to their official conventional benchmarks. Previous work in this area such as Schröder (2007) uses a mixture of official and unofficial conventional benchmarks. The use of official benchmarks within this work ensures that the analysis is more robust. For many of the SRI indices their potential investment universe is the same as their conventional benchmark, with the exception of the requirement for the SRI index's constituents to be screened. Therefore, the conventional benchmark indices hold more stocks and the SRI indices hold fewer stocks from the same principle investment universe.

In each case the benchmark indices provided were the same as the principal benchmark indices on the respective indices' factsheets. This data was obtained from the

[3] The official benchmark index is the principle benchmark index on the respective US SRI index's factsheet.

three companies that construct the respective SRI indices: Calvert; FTSE; and Dow Jones. Monthly data for the conventional benchmark indices was obtained from Dow Jones, FTSE and the Russell Group. All of the indices used are total return indices and, therefore, they express the total return from each of the constituent stocks (changes in stock value include all payments to the investors including dividend payments). A full list of the SRI indices and their benchmark indices is presented in Table 3.1 below. The sample period is January 1998 to January 2012 and the indices that were created during this period are included from their inception date.

**Table 3.1: The SRI Indices and their Benchmarks**

| US SRI Indices | Code | Approx. Number of constituents | Start Date | Benchmark Indices | Approx. Number of constituents | Code |
|---|---|---|---|---|---|---|
| Dow Jones Sustainability US Index | SRI1 | 100 | September 2005 | Dow Jones Total Stock Market US Large Cap TR Index | 750 | BM1 |
| Dow Jones Sustainability US 40 Index | SRI2 | 40 | August 2008 | Dow Jones Total Stock Market US Large Cap TR Index | 750 | BM2 |
| FTSE For Good US Index | SRI3 | 150 | July 2001 | FTSE All World US Index | 4000 | BM3 |
| FTSE For Good US 100 Index | SRI4 | 100 | July 2001 | FTSE All World US Index | 4000 | BM4 |
| FTSE KLD 400 Social Index | SRI5 | 400 | May 1990 | FTSE All World US Index | 4000 | BM5 |
| FTSE KLD Catholic Values 400 Index | SRI6 | 400 | May 1998 | FTSE ALL World US Index | 4000 | BM6 |
| FTSE KLD Small Cap Sustainability Index | SRI7 | 1,200 | January 2001 | FTSE US Small Cap Index | 2000 | BM7 |
| FTSE KLD US Mid Cap Sustainability Index | SRI8 | 350 | January 2001 | FTSE US Mid Cap Index | 4500 | BM8 |
| FTSE KLD US Large Cap Sustainability Index | SRI9 | 250 | January 2001 | FTSE US Large Cap Index | 300 | BM9 |
| FTSE KLD Small-Mid Cap Sustainability Index | SRI10 | 1,600 | January 2001 | FTSE US MID Cap Index | 4500 | BM10 |
| FTSE KLD US All Cap Sustainability Index | SRI11 | 1,800 | January 2001 | FTSE US All Cap Index | 2000 | BM11 |
| FTSE KLD US Large-Mid Cap Sustainability Index | SRI12 | 600 | January 2001 | FTSE US Large Mid-Cap Index | 1000 | BM12 |
| FTSE KLD Select Social Index | SRI13 | 250 | June 2004 | FTSE US 500 Index | 500 | BM13 |
| FTSE Calvert Social Index | SRI14 | 650 | April 2000 | Russell 1000 Index | 1000 | BM14 |

Table 3.6 reports the names of the indices used in the work, the date of the inception of each index and the approximate number of constituents of each index.

The Forum for Sustainable and Responsible Investment defines three forms of SRI screening: “negative”; “positive”; and “restricted”. Negative screening involves excluding investments in stocks engaged in a particular activity or industry; positive screening involves seeking investments in stocks with a positive impact in a specific industry or area; and,

restricted screening involves seeking to avoid poorer ethical performers in a particular industry or area, but including those whose social performance ranks high within specific areas, relative to its industry or sector peers.

All of the SRI indices used in this paper use both positive and restricted screening in order to include or exclude stocks and do so with the use of environmental, social and governance (ESG) data which is produced through social audits. The index suppliers use this data in order to include stocks with positive impact in specific industries or areas and to exclude stocks with poor ESG ratings. The index suppliers use a variety of ESG data within their screening and the data used is dependent on each index's criteria. For example, in order to construct the FTSEForGood US Index, FTSE uses data in relation to companies' community relations, diversity, employee relations, human rights, product quality, safety, environment and corporate governance. Alternatively, for the Dow Jones Sustainability US Index, Dow Jones use a different assortment of company ESG rankings which include data in relation to companies' climate change strategies, energy consumption, human resources development, knowledge management, stakeholder relations and corporate governance.

Table 3.2 displays the screening criteria used in the construction of each of the SRI indices. It can be clearly seen that the index providers use a wide variety of criteria within their positive and restricted screening. As a result, the intensity of the positive and restricted screening varies between the indices, as does the level to which the use of these screening methods impacts on the potential investment universes of the respective indices. Importantly, in all cases, the use of positive and restricted screening does not necessarily result in entire industries being screened out and consequently these methods of screening may not necessarily affect the industry weightings or diversification levels of SRI indices. It is important to recognise that the results for the individual indices may differ due to their specific screening criteria. As a result, the analysis in this chapter also analyses the performance of a portfolio of the indices. This portfolio based analysis can control for the effects of each SRI indices' specific screening criteria and allow for a general analysis of the SRI index sector.

Table 3.2 shows that 5 of the indices use forms of negative screening in addition to positive and restricted screening techniques. These are the FTSEForGood US Index, FTSEForGood US 100 Index, FTSE KLD 400 Social Index, FTSE KLD Catholic Values

Index and Calvert Social Index. Of these, all but the FTSE KLD 400 Social Index uses negative screening to exclude entire industries. The FTSE 400 Social index uses negative screening to exclude companies that derive significant revenues from a number of industries including Alcohol and Tobacco and all stocks within these industries are therefore screened out. The FTSE KLD Catholic Values Index uses a mixture, screening out entire industries and screening out companies which derive significant revenues from certain industries. The industries screened out by these indices vary greatly. As these industries are partly constructed through negative screening they may have the most potential to perform significantly differently from their benchmarks on a risk-adjusted basis because they may be the most likely to have significantly different levels of industry exposure, idiosyncratic risk and diversification relative to their benchmark indices.

In summary, while all 14 SRI indices potential investment universes are limited by their SRI screening practices, only the five indices which use negative screening are unable to include stocks from specific industries, and even in the case of those indices, the negative screening criteria only excludes a handful of industries. The consequence of this is that it is feasible for the SRI indices to include stocks from the majority of the same industries as their conventional benchmarks, despite their requirements to screen.

## Table 3.2: The Screening Practices Used in the Construction of the SRI Indices

| US SRI Indices | Positive + Restricted Screening Criteria | Industries Totally Negatively Screened Out | Industries Partially Negatively Screened Out |
|---|---|---|---|
| SRI1: Dow Jones Sustainability US Index | Sustainability-driven criteria including climate change strategies, energy consumption, human resources development, knowledge management, stakeholder relations and corporate governance. | | |
| SRI2: Dow Jones Sustainability US 40 Index | Sustainability-driven criteria including climate change strategies, energy consumption, human resources development, knowledge management, stakeholder relations and corporate governance. | | |
| SRI3: FTSE For Good US Index | Working towards Environmental Stability, Up-holding and supporting universal human rights, Ensuring good supply chain labour standards, Countering bribery, Mitigating and adapting to Climate change. | Tobacco Producers, Companies manufacturing either whole, strategic parts, or platforms for nuclear weapon systems, Companies manufacturing whole weapons systems. | |
| SRI4: FTSE For Good US 100 Index | Working towards Environmental Stability, Up-holding and supporting universal human rights, Ensuring good supply chain labour standards, Countering bribery, Mitigating and adapting to Climate change. | Tobacco Producers, Companies manufacturing either whole, strategic parts, or platforms for nuclear weapon systems, Companies manufacturing whole weapons systems. | |
| SRI5: FTSE KLD 400 Social Index | Community relations, diversity, employee relations, human rights, product quality and safety, and environment and corporate governance | | Alcohol, tobacco, firearms, gambling, nuclear power and military weapons. |
| SRI6: FTSE KLD Catholic Values | Provide access to health care and pharmaceuticals. Establish corporate policies on equal pay/promotion opportunities. Avoid the use of sweatshops in the manufacture . Provide affordable housing or lending for of goods such housing. Establish adequate work safety guidelines Provide generous wage and benefit policies. Institute programs and policies to protect Report on social and environmental performance, the common environment corporate citizenship or sustainability. Publish corporate Social Responsibility (CSR) Guidelines. | Direct participation in or support of abortion; Manufacture of tobacco products; Use of embryonic stem cell or fetal tissue for research or in a project; Manufacture of anti-personnel landmines. | Pornography; Manufacture of contraceptive products and weapons or firearms. |
| SRI7: FTSE KLD Small Cap Sustainability Index | Strong stewards of the environment; Devoted to serving local communities and society generally; Committed to high labour standards for their own employees and those in their supply chain; Dedicated to producing high quality and safe products. | | |
| SRI8: FTSE KLD US Mid Cap Index | Strong stewards of the environment; Devoted to serving local communities and society generally; Committed to high labour standards for their own employees and those in their supply chain; Dedicated to producing high quality and safe products. | | |

| | | | |
|---|---|---|---|
| SRI9: FTSE KLD US Large Cap Index | Strong stewards of the environment; Devoted to serving local communities and society generally; Committed to high labour standards for their own employees and those in their supply chain; Dedicated to producing high quality and safe products; Managing their company in an exemplary and ethical manner. | | |
| SRI10: FTSE KLD Small-Mid Cap Index | Strong stewards of the environment; Devoted to serving local communities and society generally; Committed to high labor standards for their own employees and those in their supply chain; Dedicated to producing high quality and safe products; Managing their company in an exemplary and ethical manner. | | |
| SRI11: FTSE KLD US All Cap Sustainability Index | Strong stewards of the environment; Devoted to serving local communities and society generally; Committed to high labor standards for their own employees and those in their supply chain; Dedicated to producing high quality and safe products; Managing their company in an exemplary and ethical manner. | | |
| SRI12: FTSE KLD US Large-Mid Cap Sustainability Index | Strong stewards of the environment; Devoted to serving local communities and society generally; Committed to high labour standards for their own employees and those in their supply chain; Dedicated to producing high quality and safe products . | | |
| SRI13: FTSE KLD Select Social Index | Community relations, diversity, employee relations, human rights, product quality and safety, environment and corporate governance. | | |
| SRI14: Calvert Social Index | Governance and ethics, Environment, Workplace, Product safety and impact, Community relations, International operations and human rights, Indigenous Peoples' rights. | Are the subject of serious labour related actions by federal, state or local regulatory agencies. Have recent significant environmental fines or violations; are significantly responsible for environmental accidents; or own or operate nuclear power plants or have substantial contracts to supply key components in the nuclear power process. Have serious and persistent human rights problems or directly support governments that systematically deny human rights .Have a pattern and practice of violating the rights of indigenous peoples. Develop genetically-modified organisms for environmental release without countervailing social benefits such as demonstrating leadership in promoting safety, protection of indigenous rights, the interests of organic farmers and the interests of developing countries generally.<br>Abuse animals, cause unnecessary suffering and death of animals, or whose operations involve the exploitation or mistreatment of animals. Manufacture tobacco products. Manufacture, design, or sell weapons or the critical components of weapons that violate international humanitarian law; or manufacture, design, or sell inherently offensive weapons, as defined by the Treaty on Conventional Armed Forces in Europe and the UN Register on Conventional Arms, or the munitions designed for use in such inherently offensive weapons. Manufacture or sell firearms and/or ammunition. Are significantly involved in the manufacture of alcoholic beverages. | |

Table 3.2 reports the screening practices used in the construction of the SRI Indices. It shows whether the indices are constructed using positive, restrictive and negative screening.

### 3.2.2 US Market and Economic Cycle Data

The US stock market cycle is measured by the Standard and Poors 500 index. Economic cycles are indicated by two coincident indices. Data for the Economic Coincident Indices were obtained from the Economic Cycle Research Institute and the Conference Board. The Economic Cycle Research Institute (ECRI) is an independent institute dedicated to economic cycle research, with a mission to advance the tradition of business cycle research established at the National Bureau of Economic Research (NBER) and Center for International Business Cycle Research (CIBCR). The Conference Board is a global, independent business membership and research association working in the public interest. Their mission is to provide the world's leading organizations with the practical knowledge they need to improve their performance and better serve society. Both organisations are considered authorities on the construction of economic indices. Data for the US risk free rate (One Month Treasury Bill rate), Fama and French's (1993) "size" (SMB) and "book-to-market" (HML) factors and Carhart' (1997) "momentum" (MOM) factor were obtained from the Center for Research in Security Prices (CRSP).

### 3.2.3 Descriptive Statistics

Table 3.3 summarizes the descriptive statistics of the excess returns on the SRI indices and their benchmark indices. The results illustrate that overall there is little difference between the monthly mean excess returns of the SRI indices and their conventional benchmarks (0.0011 and 0.0012 mean excess returns respectively). Interestingly, the results also indicate that the mean standard deviations of the monthly average excess returns of the SRI indices are larger than that of the conventional benchmarks (0.0500 and 0.0470 respectively). The findings shown in Table 3.3 illustrate the high level of similarity between the monthly excess returns of the SRI indices and those of their benchmark indices.

Table 3.4 shows results from paired sample t-tests between the excess returns on the SRI indices and the conventional indices and Mann-Whitney tests between their medians. These tests show there are no statistically significant differences between the monthly mean or median excess returns. The p-values fail to reject the hypothesis that the monthly mean and

median excess returns of the SRI indices and their benchmarks are the same (none of the coefficients are bold). These t-tests and Mann-Whitney tests therefore indicate that there were no significant differences between the average financial performance of the SRI indices and their conventional benchmarks over the period analysed. However, this analysis does not take risk into account because the excess returns of the indices are not risk-adjusted.

**Table 3.3: Descriptive Statistics for SRI Indices and their Benchmark Indices**

| Pair | Index | Mean Return | Median | Std. Deviation | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| Pair 1 | SRI1 | 0.0001 | 0.0019 | 0.0518 | 0.3099 | 5.3585 |
| | BM1 | 0.0000 | 0.0068 | 0.0464 | -0.6051 | 3.6847 |
| Pair 2 | SRI2 | -0.0002 | 0.0076 | 0.0501 | -1.0335 | 5.1324 |
| | BM2 | 0.0002 | 0.0098 | 0.0490 | -0.9721 | 4.7119 |
| Pair 3 | SRI3 | -0.0018 | 0.0043 | 0.0496 | -0.4992 | 3.7389 |
| | BM3 | -0.0010 | 0.0077 | 0.0456 | -0.7603 | 4.3507 |
| Pair 4 | SRI4 | -0.0023 | 0.0036 | 0.0497 | -0.5833 | 3.8630 |
| | BM4 | -0.0010 | 0.0077 | 0.0456 | -0.7603 | 4.3507 |
| Pair 5 | SRI5 | -0.0017 | 0.0006 | 0.0472 | -0.3588 | 3.3694 |
| | BM5 | -0.0018 | 0.0050 | 0.0462 | -0.5556 | 3.7924 |
| Pair 6 | SRI6 | -0.0006 | 0.0033 | 0.0487 | -0.6773 | 4.4654 |
| | BM6 | -0.0008 | 0.0077 | 0.0470 | -1.0179 | 5.1126 |
| Pair 7 | SR7 | 0.0026 | 0.0101 | 0.0608 | -0.5671 | 4.0887 |
| | BM7 | 0.0018 | 0.0066 | 0.0542 | -0.7834 | 5.0282 |
| Pair 8 | SRI8 | 0.0068 | 0.0128 | 0.0522 | -0.8353 | 5.8240 |
| | BM8 | 0.0064 | 0.0142 | 0.0518 | -1.0622 | 6.7295 |
| Pair 9 | SRI9 | 0.0024 | 0.0045 | 0.0432 | -0.9097 | 5.7240 |
| | BM9 | 0.0018 | 0.0079 | 0.0406 | -1.0238 | 5.7665 |
| Pair 10 | SRI10 | 0.0062 | 0.0115 | 0.0587 | -0.6326 | 4.8533 |
| | BM10 | 0.0064 | 0.0142 | 0.0518 | -1.0622 | 6.7295 |
| Pair 11 | SRI11 | 0.0034 | 0.0093 | 0.0457 | -0.9466 | 5.7911 |
| | BM11 | 0.0033 | 0.0116 | 0.0436 | -1.0634 | 5.9331 |
| Pair 12 | SRI12 | 0.0028 | 0.0065 | 0.0470 | -0.7870 | 5.0241 |
| | BM12 | 0.0022 | 0.0089 | 0.0447 | -0.9564 | 5.1668 |
| Pair 13 | SRI13 | -0.0002 | 0.0037 | 0.0437 | -0.9789 | -1.0632 |
| | BM13 | -0.0002 | 0.0080 | 0.0441 | 5.9201 | 5.5126 |
| Pair 14 | SRI14 | -0.0021 | 0.0036 | 0.0520 | -0.4415 | -0.6625 |
| | BM14 | -0.001 | 0.0071 | 0.0471 | 3.4812 | 3.9137 |
| Mean | SRI | 0.0011 | 0.0060 | 0.0500 | -0.6386 | 3.9648 |
| Mean | Benchmarks | 0.0012 | 0.0088 | 0.0470 | -0.0872 | 5.0559 |

Table 3.3 show the means, medians, standard deviation, skewness and kurtosis of the excess returns of the SRI and conventional indices.

In summary, the simple statistics indicate that the returns of the SRI indices and their benchmarks were similar over the period analysed. However, this measure for performance is not risk-adjusted and is therefore of limited use for an investor.

**Table 3.4: Paired Sample T-tests Between the Mean Excess Returns of the SRI Indices and the Conventional Indices and Mann-Whitney Tests Between the Medians**

| Pair | Indices | T-tests between the means | Mann-Whitney Test between Medians |
|---|---|---|---|
| Pair 1 | SRI1 - BM1 | 0.0188 | 0.2650 |
| Pair 2 | SRI2 - BM2 | -0.0401 | 0.1321 |
| Pair 3 | SRI3 - BM3 | -0.1318 | 0.1340 |
| Pair 4 | SRI4 - BM4 | -0.2058 | 0.1476 |
| Pair 5 | SRI5 - BM5 | 0.0246 | 0.0137 |
| Pair 6 | SRI6 - BM6 | 0.0241 | 0.0184 |
| Pair 7 | SRI7 - BM7 | 0.1014 | 0.1748 |
| Pair 8 | SRI8 - BM8 | 0.0465 | 0.1354 |
| Pair 9 | SRI9 - BM9 | 0.0801 | 0.1114 |
| Pair 10 | SRI10 - BM10 | -0.0252 | 0.0151 |
| Pair 11 | SRI11 - BM11 | 0.0200 | 0.0120 |
| Pair 12 | SRI12 - BM12 | 0.0882 | 0.0535 |
| Pair 13 | SRI13 - BM13 | 0.0052 | 0.1563 |
| Pair 14 | SRI14 - BM14 | -0.1643 | 0.1262 |

Table 3.4 shows the results from Paired Sample T-tests between the mean Excess Returns of the SRI Indices and the conventional indices and Mann-Whitney Tests between the medians. Where the t-statistics or z-statistics are significant they are in bold.

## 3.3 Performance Evaluation: Symmetric Models

### 3.3.1 Single Factor Model

The results from the single factor Jensen alpha estimations which cover the whole sample period (1998-2012), are presented in Panel A of Table 3.5. They show that none of the SRI indices' alphas are statistically significantly different from zero (at the 1, 5 or 10% levels). This indicates that there is no significant difference between the risk-adjusted returns of the SRI indices and their benchmarks. On quick glance, the majority of the betas are close to 1 and this indicates a strong similarity between the excess returns on the SRI indices and the excess returns on their benchmarks, and implies that there is likely to be considerable correlation in the compilation of the stocks in each SRI index and its benchmark index, despite the SRI indices being constructed using socially responsible screening. However, the majority of the betas are also shown to be statistically significantly different from 1 in formal t-tests, indicating that there are statistically significant differences in the levels of systematic risk between the SRI indices and their benchmarks. The majority of the R squared measures are just below 1, indicating that the excess returns on the benchmark portfolios explain the excess returns on the SRI indices well. In Panel A of Table 3.5, there is little evidence to suggest that there is any difference in risk-adjusted performance from socially responsible screening or the skewing of portfolios towards socially responsible stocks. These results are consistent with those found in Statman (2006) and Schröder (2007)[4]. The difference in the betas between the SRI indices and their benchmark indices suggests that the screening of the SRI indices does have some effect on the stocks that they hold. But this effect was not significant enough to cause their risk-adjusted performances to be significantly different. The results from the single factor Jensen alpha tests which analyse an earlier subsample period (January 1998 to January 2005) are presented in Panel B of Table 3.5. This period was chosen because it is a similar period to those analysed in Statman (2006) and Schröder (2007), which are the most recent robust studies in this area. In addition, this period represents half of the total period analysed in this chapter. There are no results for the Dow Jones Sustainability Index (SRI1) or the Dow Jones Suitability Index (SRI2) for this period because these indices were not created until September 2005. The results presented in Table 5 show that none of the SRI indices' alphas are statistically significantly different from zero (at the 1, 5 or 10% levels). This indicates that there was no significant difference between the

[4] These findings are also consistent with those from Sharpe Ratio tests which were performed but not reported in this chapter.

risk-adjusted returns of the SRI indices and their benchmarks during the earlier subsample period. These results are consistent with those of the whole sample period and are consistent with studies such as Statman (2006) and Schröder (2007).

The results from the single factor Jensen alpha tests which analyse a later subsample period (February 2005 to January 2012) are presented in Panel C of Table 3.5. This period represents the latter half of the total period analysed in this chapter. The latest methodologically robust study of the performance of US SRI indices was by Schröder (2007) and the sample period used in this study was between 1992 and 2003. The performance of US SRI indices has therefore not been analysed robustly during this later subsample period and it is therefore important that this performance is analysed in order to establish whether the performance of the SRI indices has improved, worsened or stayed the same as the SRI index sector has become more mature. The results in Panel C show that none of the SRI indices' alphas are statistically significantly different from zero (at the 1, 5 or 10% levels). This indicates that there was no significant difference between the risk-adjusted returns of the SRI indices and their benchmarks during the later subsample period. Consistent with the whole sample period and the earlier sample period, the majority of the betas are close to 1 and this indicates a strong similarity between the excess returns of the SRI indices and the excess returns of their benchmarks, but the vast majority of the betas are also shown to be statistically significantly different from 1, indicating that there are differences in the levels of systematic risk between the SRI indices and their benchmarks. This indicates that the practice of SRI screening did have some effect on the holdings within the SRI indices relative to those within their benchmark indices, but these did not have a significant effect on the SRI indices risk-adjusted performance relative to their benchmarks.

## Table 3.5: Single Factor Jensen Alpha Tests

| Panel A | Whole Period | | | | Panel B | 1998-2005 | | | | Panel C | 2005-2012 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SRI Index | Benchmark | α | β | $R^2$ | SRI Index | Benchmark | α | β | $R^2$ | SRI Index | Benchmark | α | β | $R^2$ |
| SRI1 | BM1 | 0.0002 | 1.024 | 0.9763 | SRI1 | BM1 | | | | SRI1 | BM1 | 0.0002 | 1.0242 | 0.9762 |
| SRI2 | BM2 | -0.0004 | 1.0045 | 0.9663 | SRI2 | BM2 | | | | SRI2 | BM2 | -0.0003 | 1.0045 | 0.966 |
| SRI3 | BM3 | -0.0008 | **1.0696*** ** | 0.9654 | SRI3 | BM3 | -0.0013 | **1.0661*** ** | 0.9757 | SRI3 | BM3 | -0.0005 | **1.0701*** ** | 0.9579 |
| SRI4 | BM4 | -0.0016 | **0.7540*** ** | 0.4772 | SRI4 | BM4 | -0.0026 | **0.4803** ** | 0.2045 | SRI4 | BM4 | -0.0016 | **0.9256** ** | 0.6914 |
| SRI5 | BM5 | -0.0003 | **0.7733*** ** | 0.5715 | SRI5 | BM5 | -0.0001 | **1.0195*** ** | 0.9664 | SRI5 | BM5 | -0.0001 | **0.4915*** ** | 0.2392 |
| SRI6 | BM6 | 0.0001 | 0.9883 | 0.7813 | SRI6 | BM6 | 0.0007 | 1.0561 | 0.896 | SRI6 | BM6 | -0.0012 | **0.9001*** | 0.6445 |
| SRI7 | BM7 | 0.0007 | **1.0606*** | 0.8918 | SRI7 | BM7 | 0.0017 | **1.0681*** | 0.8685 | SRI7 | BM7 | -0.0004 | **1.0528** ** | 0.9066 |
| SRI8 | BM8 | 0.0004 | 0.9947 | 0.9758 | SRI8 | BM8 | -0.0016 | **1.1074*** | 0.966 | SRI8 | BM8 | 0.0002 | 0.9764 | 0.9787 |
| SRI9 | BM9 | 0.0004 | **1.0498** ** | 0.9725 | SRI9 | BM9 | -0.0001 | **1.0593** ** | 0.9332 | SRI9 | BM9 | 0.0004 | **1.0478** ** | 0.9769 |
| SRI10 | BM10 | -0.0007 | **1.0806** ** | 0.9094 | SRI10 | BM10 | -0.0054 | **1.2682** ** | 0.9306 | SRI10 | BM10 | -0.0004 | **1.0529** ** | 0.9066 |
| SRI11 | BM11 | 0.0006 | **1.0405*** ** | 0.9849 | SRI11 | BM11 | -0.0011 | **1.0732*** ** | 0.9673 | SRI11 | BM11 | 0.0001 | **1.0358** ** | 0.9867 |
| SRI12 | BM12 | 0.0005 | **1.0412*** ** | 0.9808 | SRI12 | BM12 | 0.0003 | **1.0553*** ** | 0.9756 | SRI12 | BM12 | 0.0003 | **1.0342*** ** | 0.9812 |
| SRI13 | BM13 | 0.0005 | 0.9664 | 0.9525 | SRI13 | BM13 | -0.0024 | 1.1105 | 0.957 | SRI13 | BM13 | 0.0001 | 0.9604* | 0.9518 |
| SRI14 | BM14 | -0.0013 | **1.0849*** ** | 0.9682 | SRI14 | BM14 | -0.0018 | **1.1350*** ** | 0.9718 | SRI14 | BM14 | -0.0002 | **1.0349*** ** | 0.9668 |

Table 3.5 reports the results of estimations of the Jensen alpha performance measure. For each of the SRI indices the estimations of the alphas are in monthly percentage terms. S.e. are calculated according to Newey-West so they are robust to autocorrelation and heteroscedasticity. *, ** and *** stand for significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

### 3.3.2 Three Factor Model

The results from the three factor Jensen alpha tests are presented in Table 7. This model incorporates Fama and French's (1993) "size" (SMB) and "book-to-market" (HML) factors. Fama and French (1993) introduced the "size" (SMB) factor in order to control for the 'small cap effect' (on average small firms earn higher returns than large firms after controlling for their respective betas) and the "book-to-market" (HML) factor to control for the value effect (firms with high book-to-market ratios earn higher returns on average over long horizons than those with low book-to market ratios, after controlling for size and for the market factor).

The work is the first to use the three and four factor models to study the risk-adjusted performance of SRI indices relative to their benchmark indices. The use of these models, allows for a more accurate measurement of the risk-adjusted returns of the SRI and conventional portfolios. The inclusion of the three and four factor models also enables the analysis of the risk exposures of the SRI indices and those of their benchmarks. In addition, size, value and momentum exposures represent alpha for the naive, average investor and, therefore, it is important to investigate whether SRI and conventional portfolios have different styles. The use of these models has become standard within this field and Statman (2009) uses these factors to create two additional performance benchmarks to the "market factor" of the CAPM to analyse the performance of socially responsible stocks. Bauer et al. (2005) and Renneboog et al. (2008a) also use these models in an analysis of the risk-adjusted performance of SRI mutual funds, to unveil interesting differences in investment styles between SRI and conventional funds and discover significant differences between the exposures of SRI and conventional funds to market risk, size and book-to-market factors. For example, Renneboog et al. (2008a) found that SRI funds in the US invest relatively more in large capitalization stocks than their conventional peers, while UK SRI funds invest more in small cap stocks than their conventional peers shown by their greater sensitivity to the SMB factor.

The three factor Jensen alpha is expressed as:

$$R_{sri,t} - \left[ R_{f,t} + \beta * \left( R_{m,t} - R_{f,t} \right) + \beta_{SMB} SMB_t + \beta_{HML} HML_t = \alpha_{sri} \right. \quad (6)$$

The three factor $\beta$ is analogous to the classical CAPM $\beta$ but not equal to it, as there are two additional factors. Beta is the estimated coefficient on the market risk factor or benchmark portfolios access returns.

The results in Panel A of Table 3.6 show findings from three-factor Jensen alpha tests of the performance of the SRI indices during the whole sample period. These results indicate that the introduction of Fama and French's (1993) "size" (SMB) and "book-to-market" (HML) factors to the model show some interesting new findings. After controlling for these factors, significant performance differentials as indicated by significant alphas are shown for two of the SRI indices: the FTSE KLD Small Cap Sustainability Index (SRI7) and the FTSE US MID Cap Index (BM10). These significant alphas are negative and this indicates that better risk adjustment in the tests shows the performance of some of the SRI indices to be worse. However, the alphas are only significant at the 5% and 10% levels respectively. None of the other SRI indices show alphas that are statistically significant. Therefore, for the majority of SRI indices, even after these factors are included, the findings indicate that they have not performed significantly differently than their conventional benchmarks on a risk-adjusted basis. The Fama and French (1993) factors are shown to be significant factors in a number of the tests. Their inclusion has little effect on the beta coefficients, but slightly increases the majority of the R-Squared statistics. There are 9 of the 14 SRI indices shown to be significantly exposed to the SMB factor and 8 of the 14 indices are significantly exposed to the HML factor.

The results in Panel B of Table 3.6 show findings from three-factor Jensen alpha tests of the performance of the SRI indices during the early subsample period (1998-2005). The results indicate that in this period three of the SRI indices alphas were statistically significant. This is one more than was the case over the whole period (Panel A). These are the FTSE KLD Small Cap Sustainability Index (SRI7), the FTSE US MID Cap Index (BM10) and the FTSE KLD Catholic Values Index (SRI6). In the case of the FTSE KLD Catholic Values Index, the performance differential between the index and its benchmark is only statistically significant at the 10% level. Interestingly, both of the Fama and French (1993) factors are shown to be significant for fewer of the SRI indices in Panel B than in Panel A. In both

Panels A and B the majority of the R-squared measures are all very close to one which indicates that through the whole period and the early period, the three factor Jensen alpha model explains the vast majority of the excess returns of the SRI indices.

The results in Panel C of Table 3.6 show findings from three factor Jensen alpha tests of the performance of the SRI indices during the late period (2005-2011). The results indicate that in the late period none of the SRI indices alphas were statistically significant. These results differ from those in relation to the whole period and the early period where the three factor model was used. This indicates that the performance differentials reported in the whole period analysis are likely to be the result of the SRI indices performance being significantly different than their benchmarks in the early period. In Panel C, 3.6 of the SRI indices are shown to have significant exposures to the SMB factor and 8 to the HML factor, which is slightly more than was reported in Panel B. The results show that in the later period more of the indices were significantly exposed to SMB and HML and that, after adjusting for this, there is less abnormal return (performance) in general.

**Table 3.6: Three Factor Jensen Alpha Tests**

| Panel A | Whole Period | | | | | |
|---|---|---|---|---|---|---|
| SRI Index | Benchmark | α | β | $\beta_{smb}$ | $\beta_{hml}$ | $R^2$ |
| SRI1 | BM1 | 0.0002 | 1.0063 | **0.1004**** | 0.0011 | 0.9784 |
| SRI2 | BM2 | -0.0003 | 0.9926 | -0.0925 | **0.0972**** | 0.9696 |
| SRI3 | BM3 | -0.0012 | **1.0645***** | 0.0235 | 0.0146 | 0.9656 |
| SRI4 | BM4 | -0.0045 | **0.6777***** | 0.1869 | **0.4962**** | 0.5594 |
| SRI5 | BM5 | 0.0023 | **0.7608***** | **-0.1554**** | **-0.3038***** | 0.6246 |
| SRI6 | BM6 | 0.0007 | 0.9823 | -0.0419 | -0.0857 | 0.7848 |
| SRI7 | BM7 | **-0.0027**** | **0.9173***** | **0.6462***** | **0.0914**** | 0.9619 |
| SRI8 | BM8 | 0.0001 | **0.9665*** | **0.1455***** | -0.0308 | 0.9793 |
| SRI9 | BM9 | 0 | **1.0425**** | **0.1677***** | **-0.0952***** | 0.9824 |
| SRI10 | BM10 | **-0.0027*** | **0.9027***** | **0.6439***** | **0.1422*** | 0.9615 |
| SRI11 | BM11 | -0.0004 | 1.0183 | **0.1397***** | -0.0383 | 0.9897 |
| SRI12 | BM12 | 0.0002 | **1.0332**** | **0.1421***** | **-0.0933***** | 0.9872 |
| SRI13 | BM13 | 0.0001 | 0.9723 | 0.0216 | -0.0402 | 0.9531 |
| SRI14 | BM14 | -0.0008 | **1.0602***** | **0.0888***** | **-0.0929***** | 0.9757 |

## Table 3.6 continued

| Panel B | 1998-2005 | | | | | |
|---|---|---|---|---|---|---|
| SRI Index | Benchmark | α | β | $\beta_{smb}$ | $\beta_{hml}$ | $R^2$ |
| SRI1 | BM1 | | | | | |
| SRI2 | BM2 | | | | | |
| SRI3 | BM3 | -0.0013 | **1.0600*** ** | -0.0038 | **-0.038** | 0.976 |
| SRI4 | BM4 | -0.0104 | **0.5340*** ** | **0.4159** | **0.6394** ** | 0.3651 |
| SRI5 | BM5 | 0 | **1.0022*** ** | 0.011 | **-0.0424** | 0.9685 |
| SRI6 | BM6 | **0.0029*** | **0.9761** | **-0.1046** ** | **-0.1963*** ** | 0.9117 |
| SRI7 | BM7 | **-0.0037** ** | **0.9252*** ** | **0.6500** ** | 0.0511 | 0.9688 |
| SRI8 | BM8 | -0.0006 | **1.0608*** ** | 0.1101 | **-0.1703** ** | 0.9766 |
| SRI9 | BM9 | -0.0007 | **1.0012*** ** | **0.2178** ** | **-0.1215** ** | 0.9719 |
| SRI10 | BM10 | **-0.0055*** ** | **1.0319*** ** | **0.5384** ** | -0.0352 | 0.9796 |
| SRI11 | BM11 | -0.0008 | 1.0203 | **0.1443** ** | **-0.1406*** ** | 0.9861 |
| SRI12 | BM12 | 0.0002 | **1.010*** ** | **0.1562** ** | **-0.1816*** ** | 0.99 |
| SRI13 | BM13 | 0 | **1.0198** | 0.0494 | **-0.1281** | 0.9623 |
| SRI14 | BM14 | -0.0002 | **1.0570** ** | 0.0336 | **-0.1584*** ** | 0.9845 |
| Panel C | 2005-2012 | | | | | |
| SRI Index | Benchmark | α | β | $\beta_{smb}$ | $\beta_{hml}$ | $R^2$ |
| SRI1 | BM1 | -0.0015 | 0.8496 | -0.0064 | 0.1965 | 0.6535 |
| SRI2 | BM2 | -0.0002 | 0.9925 | -0.0924 | **0.0972*** | 0.9695 |
| SRI3 | BM3 | -0.0008 | **1.0484*** ** | 0.061 | 0.041 | 0.9591 |
| SRI4 | BM4 | -0.0022 | **0.8518*** ** | -0.0402 | **0.2990*** ** | 0.7123 |
| SRI5 | BM5 | 0.0011 | **0.6354*** ** | -0.2135 | **-0.3952*** | 0.3003 |
| SRI6 | BM6 | 0 | 1.0062 | **0.1004** ** | 0.001 | 0.9784 |
| SRI6 | BM6 | -0.0018 | **0.8873*** ** | **0.6487*** ** | **0.1730*** | 0.9591 |
| SRI8 | BM8 | 0 | **0.9521*** ** | **0.1240*** ** | -0.0003 | 0.9808 |
| SRI9 | BM9 | 0.0003 | **1.0491*** ** | **0.1546*** ** | **-0.0928*** ** | 0.9837 |
| SRI10 | BM10 | -0.0018 | **0.8874*** ** | **0.6487*** ** | **0.1731*** | 0.9591 |
| SRI11 | BM11 | 0 | 1.0167 | **0.1351*** ** | -0.0246 | 0.9901 |
| SRI12 | BM12 | 0.0002 | **1.0305*** ** | **0.1371*** ** | **-0.0746** ** | 0.986 |
| SRI13 | BM13 | 0 | 0.9666 | 0.0125 | -0.0311 | 0.9521 |
| SRI14 | BM14 | -0.0005 | **1.0021*** ** | **0.158*** ** | 0.0197 | 0.9724 |

Table 3.6 reports the results of estimations using the three factor Jensen alpha performance measure. For each of the SRI indices the estimations of the alphas are in monthly percentage terms. S.e are calculated according to Newey-West and so they are robust to heteroscedasticity and autocorrelation. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

### 3.3.3 Four Factor Model

The four factor model incorporates Fama French's (1993) "size" (SMB) and "book-to-market" (HMB) factors and Carhart's (1997) "momentum" (MOM) factor into the traditional CAPM. The "momentum" factor is added to the model in order to control for the momentum effect (in general equities which have recently outperformed/underperformed continue to outperform/underperform in the short to medium term). The momentum factor is calculated by subtracting the equal weighted average of the highest performing firms in the US stocks market from the equal weighed average of the lowest performing firms in the US stock market, lagged one month (Carhart, 1997, Grinblatt et al., 1995). The use of the four factor model is standard within investment portfolio performance analysis and allows for a more accurate performance measurement.

The four factor Jensen alpha model is expressed as:

$$R_{sri,t} - \left[ R_{f,t} + \beta * \left(R_{m,t} - R_{f,t}\right) + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \beta_{MOM} MOM_t \right] = \alpha_{sri} \quad (7)$$

The results in Panel A of Table 3.7 indicate that momentum is a significant factor as it is shown to be significant for 8 of the SRI indices over the whole sample period. However, the addition of this factor to the three factor model has little effect on the R-Squared measures and importantly does not create any new evidence of statistically significant risk-adjusted performance differentials between the SRI and conventional indices. The same numbers of indices are shown to have significant alphas as in Panel A of Table 3.6. The t-tests of the betas show that fewer of the betas are statistically equal to 1 than is the case when the single and three factor models are used. This indicates that the introduction of the momentum factor and the use of the four factor model allows for a more detailed measurement of the risk factors to which the SRI indices are exposed. In both Panel A of Table 3.6 and Panel A of Table 3.7, the two alphas which are statistically significant are negative. These are for the FTSE KLD Catholic Values 400 Index (SRI7) and the FTSE KLD Small-Mid Cap Sustainability Index (SRI10).

The results in Panel B of Table 3.7 indicate that the momentum factor was less significant over the early period than during the whole period as only three of the SRI indices are shown to have significant exposures to the momentum factor over this period. However,

over the early period, 4 of the SRI indices are shown to have statistically significant alphas. Of the 4 alphas which are significant, 3 are negative and only 1 is positive.

The results in Panel C of Table 3.7 show that the momentum factor was a more significant factor for the SRI indices over the late period. Therefore, the indication is that for the majority of SRI indices which are shown to have statistically significant exposures to the momentum factor over the whole period, the significance comes from the later period. Interestingly, the results in Panel C indicate that in the later period none of the SRI indices performed statistically significantly differently from their benchmarks and this suggests that the statistically significant performance differentials reported over the whole period are likely to be the result of the performance of the SRI indices over the early period as opposed to the late period.

In summary, the results from the single, three and four-factor tests generally support Hypothesis 3 ("no effect"), and suggest that the risk-adjusted returns of socially responsible indices are not statistically significantly different from their benchmark indices in the majority of cases. However, there are a few cases were the alphas are statistically significant and these alphas are mostly negative. In general, these results are consistent with other studies which have also used symmetric risk-adjusted performance analysis methodologies to analyse the performance of SRI indices[5]. When the three and four factor models are used, there is some evidence of statistically significant alphas during the early analysis period (1998-2005) but less in the latter period. This would suggest that the practice of SRI screening had less of an effect on the performance of the SRI indices as the US SRI sector became more mature. This may be the result of more companies introducing CSR and ethical strategies over time and therefore there being more potential for the SRI and conventional indices to contain more of the same stocks.

[5] See Statman (2000), Statman (2006) and Schröder (2007).

## Table 3.7: Four Factor Model

| Panel A | Whole Period | | | | | | |
|---|---|---|---|---|---|---|---|
| SRI Index | Benchmark | α | β | $\beta_{smb}$ | $\beta_{hml}$ | $\beta_{mom}$ | $R^2$ |
| SRI1 | BM1 | -0.0002 | 0.9849 | **0.0971*** ** | -0.0326 | **-0.0493*** ** | 0.9814 |
| SRI2 | BM2 | -0.0003 | 0.9905 | -0.0931 | **0.0935*** | -0.005 | 0.9696 |
| SRI3 | BM3 | -0.0016 | 1.0405 | 0.0206 | 0.0142 | **-0.0329*** | 0.9667 |
| SRI4 | BM4 | -0.0046 | **0.5763*** ** | 0.1746 | **0.4948*** ** | **-0.1388** ** | 0.5786 |
| SRI5 | BM5 | 0.0022 | **0.7766*** ** | **-0.1594** ** | **-0.2967*** ** | 0.0228 | 0.6254 |
| SRI6 | BM6 | 0.0012 | **0.9022** ** | -0.0173 | **-0.1279** ** | **-0.1240*** ** | 0.8048 |
| SRI7 | BM7 | **-0.0027** ** | **0.9038*** ** | **0.6495*** ** | **0.0955*** | -0.0195 | 0.9621 |
| SRI8 | BM8 | 0.0001 | **0.9580*** | **0.1503*** ** | -0.04073 | -0.0191 | 0.9796 |
| SRI9 | BM9 | 0 | 1.0321 | **0.1683*** ** | **-0.1079*** ** | **-0.0247*** | 0.9831 |
| SRI10 | BM10 | **-0.0027*** | **0.8968*** ** | **0.6472*** ** | **0.1352** ** | -0.0134 | 0.9616 |
| SRI11 | BM11 | -0.0004 | 1.0089 | **0.1420*** ** | -0.0485 | -0.0194 | 0.9901 |
| SRI12 | BM12 | 0.0001 | 1.0199 | **0.1434*** ** | **-0.0995*** ** | **-0.0206*** | 0.9877 |
| SRI13 | BM13 | 0.0001 | 0.9539 | 0.0222 | -0.0658 | **-0.0416*** | 0.9555 |
| SRI14 | BM14 | -0.0008 | **1.0323*** | **0.0936*** ** | **-0.0951*** ** | **-0.0391*** ** | 0.9776 |
| Panel B | 1998-2005 | | | | | | |
| SRI Index | Benchmark | α | β | $\beta_{smb}$ | $\beta_{hml}$ | $\beta_{mom}$ | $R^2$ |
| SRI1 | BM1 | | | | | | |
| SRI2 | BM2 | | | | | | |
| SRI3 | BM3 | -0.001 | 1.064 | -0.0038 | -0.0412 | 0.0048 | 0.976 |
| SRI4 | BM4 | **-0.0106*** ** | **0.1553*** ** | **0.4103*** | **0.9475*** ** | **-0.4670*** ** | 0.4842 |
| SRI5 | BM5 | 0 | **1.0070*** ** | 0.0096 | -0.0408 | 0.0062 | 0.9686 |
| SRI6 | BM6 | **0.0033** ** | **0.9324*** ** | **-0.086*** ** | **-0.2117*** ** | **-0.0646** ** | 0.9178 |
| SRI7 | BM7 | **-0.0037** ** | **0.9219*** ** | **0.651*** ** | 0.0544 | -0.0044 | 0.9688 |
| SRI8 | BM8 | -0.0008 | **1.0328*** ** | **0.1511** ** | -0.1396 | -0.037 | 0.9776 |
| SRI9 | BM9 | -0.0027 | **0.8976** | **-0.2595*** | **-0.2471** ** | -0.0485 | 0.9005 |
| SRI10 | BM10 | **-0.0057*** ** | **1.0080*** ** | **0.5734*** ** | -0.009 | -0.0316 | 0.9801 |
| SRI11 | BM11 | -0.0007 | 1.0332 | **0.1306*** ** | **-0.1525*** ** | 0.0157 | 0.9864 |
| SRI12 | BM12 | 0.0003 | 1.0325 | **0.1475*** ** | **-0.1952*** ** | 0.0285 | 0.9907 |
| SRI13 | BM13 | 0 | 0.8695 | **0.3701*** ** | 0.0402 | **-0.2404*** ** | 0.9906 |
| SRI14 | BM14 | -0.0002 | **1.0516*** ** | 0.0361 | **-0.1568*** ** | -0.0073 | 0.9846 |

## Table 3.7 continued

| Panel C | 2005-2012 | | | | | | |
|---|---|---|---|---|---|---|---|
| SRI Index | Benchmark | α | β | $\beta_{smb}$ | $\beta_{hml}$ | $\beta_{mom}$ | $R^2$ |
| SRI1 | BM1 | -0.0001 | 0.9849 | **0.0970**** | -0.0325 | **-0.0493***** | 0.9813 |
| SRI2 | BM2 | -0.0003 | 0.9905 | -0.0931 | 0.0935 | -0.005 | 0.9696 |
| SRI3 | BM3 | -0.0008 | 1.0301 | 0.0565 | 0.0141 | -0.0423 | 0.9611 |
| SRI4 | BM4 | -0.0024 | **0.7914***** | -0.055 | **0.2101*** | **-0.1398*** | 0.7331 |
| SRI5 | BM5 | 0.0012 | **0.6579***** | -0.208 | -0.362 | 0.0522 | 0.3039 |
| SRI6 | BM6 | -0.0017 | **0.7618***** | -0.0296 | 0.0576 | **-0.2117*** | 0.7009 |
| SRI7 | BM7 | -0.0018 | **0.8858***** | 0.6489 | **0.1705*** | -0.0039 | 0.9591 |
| SRI8 | BM8 | 0 | **0.9461***** | **0.1249***** | -0.0099 | -0.0151 | 0.981 |
| SRI9 | BM9 | 0.0002 | 1.0339* | **0.1495***** | **-0.1149***** | **-0.0347***** | 0.9853 |
| SRI10 | BM10 | -0.0018 | **0.8858***** | **0.6489***** | **0.1705*** | -0.0039 | 0.9591 |
| SRI11 | BM11 | -0.0001 | **1.0065*** | **0.1335***** | -0.04 | **-0.0241**** | 0.9908 |
| SRI12 | BM12 | 0.0001 | 1.0162 | **0.1336***** | **-0.0957***** | **-0.0331***** | 0.9874 |
| SRI13 | BM13 | 0 | 0.948 | 0.0073 | -0.0591 | **-0.0436**** | 0.9548 |
| SRI14 | BM14 | -0.0006 | **0.9792***** | **0.1532***** | -0.0149 | **-0.0540**** | 0.9753 |

Table 3.7 reports the results of estimations using the four factor Jensen alpha performance measure. For each of the SRI indices the estimations of the alphas are in monthly percentage terms. S.e are calculated according to Newey-West and so they are robust to heteroscedasticity and autocorrelation. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

## 3.4 Asymmetric Models

The work uses asymmetric models in the analysis of the performance of SRI indices. These models incorporate economic and stock market indicators, to analyse the risk-adjusted performance of the SRI and conventional indices across different stages of the US stock market and economic cycle. There are a number of reasons why performance may differ during these periods and possible theoretical explanations for findings of this nature are outlined earlier in this thesis. Evidence from the subsample analysis in this chapter, which indicates that the performance of the SRI indices may differ in different time periods, also helps to motivate the asymmetric analysis in this section. Three asymmetric models are used: the single, three and four factor asymmetric model. These models capture one direction or asymmetric performance data. They are used to separate the performance of the SRI indices in periods of economic and market growth from their performance in periods of economic

and market decline. The use of the asymmetric models allows for the work to test the validity of Hypotheses 4 and 5. Hypothesis 4 states that SRI portfolio performance is different in different conditions than that of conventional portfolios as a result of screening and Hypothesis 5 states that changing conditions affect SRI portfolio performance similarly to conventional portfolios.

Throughout the work the US stock market cycle is measured by the Standard and Poors 500 Index. The US economic cycles are measured by two coincident indices and these are the Economic Cycle Research Institute's (ECRI) Coincident Index and the Conference Board's Coincident Index. A US stock market index is used so that the performance of the SRI indices and their conventional benchmarks can be compared across different stages of the US stock market cycle. US economic coincident indices are used so that the performance of the SRI indices and their conventional benchmarks can be compared across different stages of the US economic cycle. Two US economic cycle indices are used to provide the findings with robustness and to allow analysis as to whether the specific economic coincident index used affects the findings. The results from the single factor asymmetric Jensen alpha tests are presented in Table 3.8. The three cycle indicators utilised are the S&P 500 which is used as the proxy for the US market cycle, the Economic Cycle Research Institute's (ECRI) Coincident Index and the Conference Board's Coincident Index which are used as proxies for the US economic cycle. The single factor asymmetric Jensen alpha model is expressed as:

$$R_{sri,t} - \left[ R_{f,t} + \beta^{+} \left( R_{m,t} - R_{f,t} \right) * D^{+}_{ci,t} + \beta^{-} (R_{m,t} - R_{f,t}) * D^{-}_{ci,t} = \alpha^{+} D^{+}_{ci} + \alpha^{-} D^{-}_{ci} \right. \quad (8)$$

$\alpha^{+}$ is an index alpha when $D^{+}_{ci}$ is one and $D^{-}_{ci}$ is zero. $\alpha^{-}$ is the index alpha when $D^{+}_{ci}$ is zero and $D^{-}_{ci}$ is one. $D^{+}_{ci}$ and $D^{-}_{ci}$ are the cycle indicators measured by either the S&P 500, the ECRI's Coincident Index or the Conference Board's Coincident Index. $D^{+}_{ci}$ is one when the change in the cycle index is larger than zero in month $t$, and zero otherwise. $D^{-}_{ci}$ is one when the change in the cycle index is less than zero in month $t$, and zero otherwise. $\beta$ is interesting as it measures the sensitivity of the portfolios excess return to the excess return on the benchmark index, also segmented for different stock market and

economic conditions to investigate the systematic risk of the SRI indices during different conditions.

### 3.4.1 Single Factor Asymmetric Model

In Table 3.8, there is a mix of positive and negative alphas during the market and economic upturns and downturns. There is some evidence of a general underperformance by the SRI indices in both the market and economic upturns because the majority of the alphas are negative. However, more importantly, there is very little evidence that this underperformance is statistically significant as only 4 of the 84 alphas are statistically different from zero and only at the 10% level. The indices for which there are significant negative alphas reported in Panel A are the FTSE KLD US Mid Cap Sustainability Index (SRI8) and FTSE KLD Small-Mid Cap Sustainability Index (SRI10) where the S&P 500 is used as the cycle indicator and during the cycle contraction periods. The indices for which there are significant negative alphas reported in Panel B are the FTSE KLD Small-Mid Cap Sustainability Index (SRI10) and FTSE Calvert Social Index (SRI14) where the ECRI is used as the cycle indicator and in the expansion periods. The majority of the betas are close to 1 and this indicates a strong similarity between the excess returns on the SRI indices and the excess returns on their benchmarks and implies that there is likely to be considerable correlation between the stock constituents of the two types of indices, despite one type utilising socially responsible screening and the other not. The vast majority of the R-squares are close to 1, indicating that the excess returns on the benchmark portfolios explain the excess returns on the SRI indices well[6].

[6] Single factor asymmetric models were also estimated on the early period and late period subsamples. The findings from these tests are not presented in this chapter. The results from these tests were generally consistent with those presented with respect to the whole sample period.

## Table 3.8: Single Factor Asymmetric Jensen Alpha Tests

| SRI Index | Benchmark | α+ | α- | β+ | β- | $R^2$ |
|---|---|---|---|---|---|---|
| Panel A Cycle Indicator SP500 | | | | | | |
| SRI1 | BM1 | -0.0019 | -0.0029 | **1.1117**** | 0.9619 | 0.9785 |
| SRI2 | BM2 | -0.0019 | 0.0052 | 1.0201 | 1.0811 | 0.9684 |
| SRI3 | BM3 | -0.0022 | -0.0032 | **1.1269**** | 1.0223 | 0.9663 |
| SRI4 | BM4 | -0.0034 | 0.0104 | 0.7346 | 0.9526 | 0.4888 |
| SRI5 | BM5 | -0.0063 | -0.005 | 0.9604 | **0.6557**** | 0.5803 |
| SRI6 | BM6 | -0.0064 | 0.0058 | 1.1321 | 1.0605 | 0.7868 |
| SRI7 | BM7 | 0.0019 | -0.0054 | 1.0656 | 0.9713 | 0.8943 |
| SRI8 | BM8 | -0.0002 | -**0.0036*** | 1.0313 | **0.9274**** | 0.9777 |
| SRI9 | BM9 | 0.0002 | -0.0007 | 1.0632 | 1.0281 | 0.9727 |
| SRI10 | BM10 | 0.0001 | -**0.0082*** | 1.1028 | 0.9677 | 0.9135 |
| SRI11 | BM11 | -0.0009 | -0.0007 | **1.0722**** | 1.0207 | 0.9852 |
| SRI12 | BM12 | -0.0009 | -0.0012 | **1.0935**** | 1.0009 | 0.9816 |
| SRI13 | BM13 | -0.0038 | 0.0016 | 1.0866 | 0.9671 | 0.9557 |
| SRI14 | BM14 | -0.0029 | -0.0029 | **1.1518***** | 1.0403 | 0.9692 |
| Panel B Cycle Indicator ECRI Coincident Index | | | | | | |
| SRI1 | BM1 | -0.0008 | 0.0012 | 1.0585 | 1.0205 | 0.9768 |
| SRI2 | BM2 | 0.0008 | -0.0009 | 0.9402 | 1.0176 | 0.9671 |
| SRI3 | BM3 | -0.0011 | 0.0004 | 1.0431 | **1.0880***** | 0.9659 |
| SRI4 | BM4 | -0.0003 | -0.0021 | 0.6721 | **0.7842**** | 0.4793 |
| SRI5 | BM5 | -0.0001 | -0.0044 | 0.9153 | **0.6619***** | 0.5866 |
| SRI6 | BM6 | -0.0009 | 0.0022 | 0.9898 | 1.0014 | 0.7824 |
| SRI7 | BM7 | -0.0011 | 0.0007 | **1.1742***** | 1.0134 | 0.8961 |
| SRI8 | BM8 | -0.0009 | 0 | **1.0882***** | **0.9504**** | 0.9797 |
| SRI9 | BM9 | 0.0001 | 0.0014 | 1.0457 | **1.0585**** | 0.9728 |
| SRI10 | BM10 | -**0.0046*** | 0.0009 | **1.2720***** | 1.0008 | 0.9221 |
| SRI11 | BM11 | -0.0006 | 0.0014 | **1.0552**** | **1.0400**** | 0.9852 |
| SRI12 | BM12 | -0.0003 | 0.0016 | **1.0606**** | **1.0410**** | 0.9811 |
| SRI13 | BM13 | -0.0006 | 0.0005 | 0.9984 | 0.9594 | 0.9529 |
| SRI14 | BM14 | -**0.0019*** | 0.0003 | **1.0985***** | **1.0867***** | 0.9686 |

**Table 3.8 continued**

| Panel C Cycle Indicator CB Coincident Index | | | | | | |
|---|---|---|---|---|---|---|
| SRI1 | BM1 | -0.0011 | 0.0025 | 1.0617 | 1.0227 | 0.9346 |
| SRI2 | BM2 | 0.0001 | -0.0012 | 0.9593 | 1.0129 | 0.9294 |
| SRI3 | BM3 | -0.0012 | 0.0012 | 1.0455 | 1.0814 | 0.8557 |
| SRI4 | BM4 | -0.0012 | 0.0038 | 0.7806 | 0.8741 | 0.5217 |
| SRI5 | BM5 | -0.0016 | -0.0021 | 0.9328 | **0.6327*** ** | 0.4972 |
| SRI6 | BM6 | -0.0025 | 0.0022 | 1.0045 | 1.0012 | 0.6967 |
| SRI7 | BM7 | -0.0005 | 0.0013 | 1.1327 | 1.0198 | 0.8092 |
| SRI8 | BM8 | -0.0006 | 0.0000 | 1.0855 | 0.9484 | 0.9117 |
| SRI9 | BM9 | 0.0001 | 0.0021 | 1.0692 | 1.0572 | 0.9264 |
| SRI10 | BM10 | -0.0043 | 0.0018 | **1.2569*** ** | 1.0099 | 0.8528 |
| SRI11 | BM11 | -0.0006 | 0.0017 | 1.0671 | 1.0412 | 0.9345 |
| SRI12 | BM12 | -0.0001 | 0.0017 | 1.0767 | 1.0327 | 0.8901 |
| SRI13 | BM13 | -0.0008 | 0.0004 | 1.0096 | 0.9573 | 0.9139 |
| SRI14 | BM14 | -0.0025 | 0.0016 | 1.1123 | 1.0611 | 0.8269 |

Table 3.8 reports the results of estimations using the single factor asymmetric model. For each of the SRI indices the estimations of the alphas are in monthly percentage terms. S.e are calculated according to Newey-West and so they are robust to heteroscedasticity and autocorrelation. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

### 3.4.2 Three Factor Asymmetric Model

The results from the three factor asymmetric model are presented in Table 3.9. This model incorporates Fama and French's (1993) "size" (SMB) and "book-to-market" (HML) factors. The model is expressed as:

$$R_{sri,t} - \left[ R_{f,t} + \beta^{+}\left(R_{m,t} - R_{f,t}\right) * D^{+}_{ci,t} + \beta^{-}(R_{m,t} - R_{f,t}) * D^{-}_{ci,t} + \beta_{SMB} SMB_t + \beta_{HML} HML_t = \alpha^{+} D^{+}_{ci} + \alpha^{-} D^{-}_{ci} \right. \quad (9)$$

Table 3.9 shows evidence that Fama and French's (1993) "size" (SMB) and "book-to market" (HMB) factors are significant for the majority of the SRI indices. In general there is an indication that the SRI indices underperformed their benchmarks when the three factor asymmetric model is used to analyse their performance as the vast majority of the alphas are negative. However, few of the alphas are statistically significant. In Panel A, only 3 of the alphas during the expansion market periods are statistically significant and only 2 during the up market contraction periods. Similarly, in Panel B, only 2 of the alphas during the down economic expansion periods are statistically significant and only 2 during the economic

contraction periods. All of the significant alphas are negative and these results show more evidence of underperformance when making better risk adjustment for size and value portfolios[7].

**Table 3.9: Three Factor Asymmetric Model**

| SRI Index | Benchmark | α+ | α- | β+ | β- | $\beta_{smb}$ | $\beta_{hml}$ | $R^2$ |
|---|---|---|---|---|---|---|---|---|
| Panel A Cycle Indicator SP500 | | | | | | | | |
| SRI1 | BM1 | -0.0058 | 0.0065 | 1.1227 | 1.0565 | -0.0292 | -0.0867 | 0.7903 |
| SRI2 | BM2 | -0.0012 | 0.0046 | 0.9924 | 1.0631 | -0.0833 | **0.0920*** | 0.9714 |
| SRI3 | BM3 | -0.0025 | -0.0032 | **1.1241**** | 1.0166 | 0.0217 | 0.0203 | 0.9666 |
| SRI4 | BM4 | -0.0063 | 0.0047 | **0.6730*** | 0.8256 | **0.2168*** | **0.4667***** | 0.5658 |
| SRI5 | BM5 | -0.0032 | -0.0012 | 0.9292 | **0.6686***** | **-0.1370*** | **-0.2995***** | 0.6310 |
| SRI6 | BM6 | -0.0024 | -0.0026 | **1.1004*** | 0.9503 | **0.1001**** | 0.0002 | 0.9806 |
| SRI7 | BM7 | 0.0010 | **-0.0089***** | **0.8593***** | **0.8419***** | **0.6466***** | **0.1125***** | 0.9647 |
| SRI8 | BM8 | -0.0001 | **-0.0032*** | 0.9903 | **0.9152***** | **0.1326***** | -0.0255 | 0.9804 |
| SRI9 | BM9 | -0.0016 | 0.0010 | **1.0927**** | 1.0465 | **0.1778***** | **-0.1003***** | 0.9830 |
| SRI10 | BM10 | 0.0011 | **-0.0083***** | **0.8358***** | **0.8394***** | **0.6445***** | **0.1584***** | 0.9644 |
| SRI11 | BM11 | -0.0016 | -0.0001 | **1.0546**** | 1.0151 | **0.1407***** | **-0.0409*** | 0.9899 |
| SRI12 | BM12 | **-0.0020*** | 0.0002 | **1.0979***** | 1.0178 | **0.1484***** | **-0.0925***** | 0.9880 |
| SRI13 | BM13 | **-0.0042*** | 0.0025 | 1.1024 | 0.9844 | 0.0385 | -0.0566 | 0.9569 |
| SRI14 | BM14 | **-0.0042**** | -0.0009 | **1.1560***** | 1.0384 | **0.0981***** | **-0.0950***** | 0.9772 |
| Panel B Cycle Indicator ECRI Coincident Index | | | | | | | | |
| SRI1 | BM1 | 0.0000 | 0.0030 | 0.9629 | 1.0092 | -0.0472 | -0.0907 | 0.7858 |
| SRI2 | BM2 | 0.0005 | -0.0006 | 0.9477 | 1.0010 | -0.0809 | **0.0935*** | 0.9701 |
| SRI3 | BM3 | -0.0012 | 0.0003 | 1.0380 | **1.0832***** | 0.0256 | 0.0083 | 0.9661 |
| SRI4 | BM4 | -0.0033 | -0.0063 | **0.6470**** | **0.6788***** | 0.1884 | **0.4951***** | 0.5604 |
| SRI5 | BM5 | 0.0031 | -0.0019 | **0.8353*** | **0.6910***** | **-0.1418**** | **-0.2863***** | 0.6308 |
| SRI6 | BM6 | -0.0005 | 0.0004 | 1.0237 | 1.0053 | **0.0932**** | 0.0022 | 0.9785 |
| SRI7 | BM7 | **-0.0027*** | **-0.0035**** | 0.9503 | **0.9017***** | **0.6377***** | **0.0972**** | 0.9623 |
| SRI8 | BM8 | -0.0005 | -0.0008 | 1.0398 | **0.9382***** | **0.1074**** | -0.0165 | 0.9812 |
| SRI9 | BM9 | 0.0003 | 0.0007 | 1.0046 | **1.0665***** | **0.1716***** | **-0.1064***** | 0.9830 |
| SRI10 | BM10 | **-0.0028*** | **-0.0045**** | 0.9696 | **0.8702***** | **0.6131***** | **0.1582***** | 0.9632 |
| SRI11 | BM11 | -0.0003 | 0.0001 | 1.0013 | **1.0294*** | **0.1433***** | **-0.0437**** | 0.9898 |
| SRI12 | BM12 | 0.0002 | 0.001 | 1.0134 | **1.0456***** | **0.1464***** | **-0.0966***** | 0.9875 |
| SRI13 | BM13 | -0.0004 | 0.0007 | 0.9961 | 0.9695 | 0.0120 | -0.0373 | 0.9533 |
| SRI14 | BM14 | -0.0013 | 0.0006 | **1.0491*** | **1.0734***** | **0.0895***** | **-0.0946***** | 0.9761 |
| Panel C Cycle Indicator CB Coincident Index | | | | | | | | |
| SRI1 | BM1 | -0.0006 | 0.0032 | 0.9396 | 1.0308 | -0.0614 | **-0.1797**** | 0.7107 |
| SRI2 | BM2 | -0.0002 | -0.0014 | 0.9298 | 0.9705 | -0.0082 | **0.1573**** | 0.9363 |
| SRI3 | BM3 | -0.001 | 0.0015 | 1.0354 | 1.0887 | 0.0486 | -0.0772 | 0.8579 |
| SRI4 | BM4 | -0.0042 | 0.0008 | 0.7604 | **0.7642**** | 0.1648 | **0.4089***** | 0.5764 |
| SRI5 | BM5 | 0.0025 | 0.0004 | 0.8216 | **0.6999***** | **-0.1657**** | **-0.3416***** | 0.5581 |
| SRI6 | BM6 | -0.0011 | 0.0003 | 1.0010 | 0.9775 | **0.1690**** | 0.0622 | 0.9424 |
| SRI7 | BM7 | -0.0028 | -0.0041 | 0.8950 | **0.8812***** | **0.7696***** | 0.0908 | 0.9105 |
| SRI8 | BM8 | -0.0003 | -0.0021 | 0.9476 | **0.8838***** | **0.2721***** | **0.1228*** | 0.9255 |
| SRI9 | BM9 | -0.0003 | 0.0006 | 1.0099 | 1.0317 | **0.2001***** | -0.0222 | 0.9369 |
| SRI10 | BM10 | -0.0034 | -0.0042 | 0.8752 | **0.8424***** | **0.7672***** | **0.2734***** | 0.9314 |
| SRI11 | BM11 | -0.0008 | -0.0001 | 0.9718 | 0.9946 | **0.2121***** | 0.0485 | 0.9450 |
| SRI12 | BM12 | 0.0000 | 0.0010 | 1.0326 | 1.0395 | **0.1402*** | **-0.1169*** | 0.8971 |
| SRI13 | BM13 | -0.0007 | -0.0004 | 0.9767 | 0.9404 | 0.0918 | 0.0064 | 0.9161 |
| SRI14 | BM14 | -0.0005 | 0.0016 | 1.0095 | 1.0632 | **0.1200*** | -0.2166 | 0.8552 |

Table 3.9 reports the results of estimations using the three factor model. For each of the SRI indices the estimations of the alphas are in monthly percentage terms. S.e are calculated according to Newey-West and so they are robust to heteroscedasticity and autocorrelation. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

[7] The three factor asymmetric model was also estimated on the early period and late period subsamples. The findings from these tests are not presented in this chapter. The results from these tests were generally consistent with those presented with respect to the whole sample period.

### 3.4.3 Four Factor Asymmetric Model

The results from the four factor asymmetric Jensen alpha tests are presented in Table 3.10. This model incorporates Fama and French's (1993) "size" (SMB) and "book-to-market" (HML) factors and Carhart's (1997) "momentum" (MOM) factor as additions to the single factor model. The four factor asymmetric model is used because it includes the "momentum" factor and this is added to the model in order to control for the momentum effect. The inclusion of this factor allows for a more detailed performance analysis. The four factor asymmetric model is expressed as:

$$R_{sri,t} - \left[ R_{f,t} + \beta^{+}\left(R_{m,t} - R_{f,t}\right) * D^{+}_{ci,t} + \beta^{-}(R_{m,t} - R_{f,t}) * D^{-}_{ci,t} + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{MOM}MOM_t \right] = \alpha^{+}D^{+}_{ci} + \alpha^{-}D^{-}_{ci} \quad (10)$$

In Table 3.10, the addition of Carhart's (1997) momentum (MOM) factor resulted in a general decline in the risk-adjusted performance of the SRI indices as more of the alphas are negative than in Table 3.9. In Table 3.9, 53 out of 84 of the alphas are negative, while in Table 3.10, 64 are negative. This trend is particularly evident in market and economic downturn periods, during which in Table 3.9 20 of the alphas are negative and in Table 3.10, 34 are negative. However, this underperformance is often not statistically significant. Where the alphas are significant they are all negative, indicating statistically significant underperformance by the respective SRI index relative to its benchmark. For a number of indices the momentum factor is shown to be statistically significant. This finding indicates that that the introduction of the momentum factor and the use of the four factor model allow for a more detailed measurement of the risk factors that the SRI indices are exposed to[8].

In summary, the results from the standard and asymmetric tests indicate that there were some differences between the risk-adjusted performance of the SRI and conventional indices during the periods analysed, but that in the majority of cases these differences were not statistically significant. In general, the results therefore support Hypothesis 3, the "no effect" hypothesis, and indicate that the excess returns of the SRI indices are not statistically significantly different from the excess returns of their conventional benchmark indices. These

[8] The four factor asymmetric model was also estimated on the early period and late period subsamples. The results from these tests were generally consistent with those presented with respect to the whole sample period. Portfolio based analysis tests using equally weighted returns of the indices combined into one portfolio were also performed. The results from these tests were consistent with those presented in this chapter and did not indicate significant performance differences between the SRI indices and the conventional indices. The findings from these tests are not presented in this chapter.

results are consistent with previous studies[9]. The results also support Hypothesis 5 and reject Hypothesis 4 because they indicate that changing stock market and economic conditions affect US SRI and conventional portfolios similarly. For SRI investment managers and investors it is important to establish what effects, if any, SRI screening has of the performance of equity SRI indices over different stages of market and economic cycles because this data may potentially change their asset selection across the cycles and the implication from these findings is that SRI screening has little effect.

**Table 3.10: Four Factor Asymmetric Jensen Alpha Tests**

| SRI Index | Benchmark | α+ | α- | β+ | β- | $\beta_{smb}$ | $\beta_{hml}$ | $\beta_{mom}$ | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|
| Panel A Cycle Indicator SP500 | | | | | | | | | |
| SRI1 | BM1 | -0.0031 | 0.0072 | 0.9829 | 0.9952 | -0.0111 | **-0.1282**** | **-0.1202***** | 0.8086 |
| SRI2 | BM2 | -0.0010 | 0.0046 | 0.9820 | 1.0617 | -0.0847 | **0.0876*** | -0.0069 | 0.9715 |
| SRI3 | BM3 | -0.0017 | -0.0032 | 1.0805 | 1.0018 | 0.0171 | 0.0205 | -0.0274 | 0.9672 |
| SRI4 | BM4 | -0.0017 | 0.0048 | **0.4170***** | **0.7390*** | 0.1901 | **0.4679***** | **-0.1608***** | 0.5883 |
| SRI5 | BM5 | -0.0041 | -0.0013 | 0.9746 | **0.6897***** | **-0.1409*** | **-0.2882***** | 0.0359 | 0.6329 |
| SRI6 | BM6 | -0.0011 | -0.0026 | 1.0367 | 0.9438 | **0.0948**** | -0.0242 | **-0.0404**** | 0.9822 |
| SRI7 | BM7 | 0.0019 | **-0.0087***** | **0.8181***** | **0.8278***** | **0.6537***** | **0.1194***** | -0.0320 | 0.9653 |
| SRI8 | BM8 | 0.0004 | -0.0031* | 0.9712 | **0.9117***** | **0.1392***** | -0.0329 | -0.0155 | 0.9806 |
| SRI9 | BM9 | -0.0011 | 0.0010 | 1.0622 | 1.0416 | **0.1754***** | **-0.1096***** | -0.0198 | 0.9834 |
| SRI10 | BM10 | 0.0020 | **-0.0082***** | **0.7985***** | **0.8325***** | **0.6573***** | **0.1440**** | -0.0304 | 0.9650 |
| SRI11 | BM11 | -0.0011 | -0.0001 | 1.0305 | 1.0114 | **0.1425***** | **-0.0486**** | -0.0161 | 0.9902 |
| SRI12 | BM12 | -0.0016 | 0.0002 | **1.0795**** | 1.0130 | **0.1480***** | **-0.0961***** | -0.0114 | 0.9882 |
| SRI13 | BM13 | -0.0033 | 0.0026 | 1.0603 | 0.9802 | 0.0372 | -0.0714 | -0.0269 | 0.9577 |
| SRI14 | BM14 | **-0.0033**** | -0.0010 | **1.1078**** | 1.0200 | **0.0993***** | **-0.0962***** | **-0.0319**** | 0.9783 |
| Panel B Cycle Indicator ECRI Coincident Index | | | | | | | | | |
| SRI1 | BM1 | 0.0011 | 0.0006 | 0.9191 | **0.8841*** | -0.0137 | **-0.1244**** | **-0.1278***** | 0.8051 |
| SRI2 | BM2 | 0.0005 | -0.0006 | 0.9479 | 1.0005 | -0.0809 | **0.0931*** | -0.0006 | 0.9708 |
| SRI3 | BM3 | -0.0011 | -0.0002 | 1.0255 | **1.0559*** | 0.0224 | 0.0101 | -0.0289 | 0.9669 |
| SRI4 | BM4 | -0.0028 | -0.0085 | **0.5820***** | **0.5360***** | 0.1713 | **0.5044***** | **-0.1512**** | 0.5815 |
| SRI5 | BM5 | 0.0031 | -0.0018 | 0.8368 | **0.6949***** | **-0.1427**** | **-0.2854***** | 0.0038 | 0.6308 |
| SRI6 | BM6 | -0.0003 | -0.0012 | 1.0362 | 0.9567 | **0.0880**** | -0.0298 | **-0.0618***** | 0.9822 |
| SRI7 | BM7 | **-0.0026*** | **-0.0038*** | 0.9392 | **0.8774***** | **0.6404***** | **0.1047***** | -0.0283 | 0.9628 |
| SRI8 | BM8 | -0.0005 | -0.0015 | 1.0381 | **0.9114***** | **0.1109***** | -0.0326 | **-0.0395**** | 0.9824 |
| SRI9 | BM9 | 0.0003 | 0.0003 | 1.0013 | **1.0492*** | **0.1724***** | **-0.1137***** | -0.0202 | 0.9835 |
| SRI10 | BM10 | **-0.0028*** | **-0.0051**** | 0.9681 | **0.8459***** | **0.6163***** | 0.1436 | -0.0359 | 0.9644 |
| SRI11 | BM11 | -0.0003 | -0.0003 | 0.9991 | 1.0151 | **0.1447***** | -0.0502 | -0.0176 | 0.9902 |
| SRI12 | BM12 | 0.0001 | 0.0007 | 1.0087 | 1.0302 | **0.1460***** | **-0.1008***** | -0.0175 | 0.9878 |
| SRI13 | BM13 | -0.0002 | -0.0005 | 1.0052 | **0.9278*** | 0.0107 | -0.0600 | **-0.0520**** | 0.9564 |
| SRI14 | BM14 | -0.00100 | -0.0002 | 1.0317 | 1.0379 | **0.0935***** | **-0.0953***** | **-0.0370***** | 0.9776 |
| Panel C Cycle Indicator CB | | | | | | | | | |
| SRI1 | BM1 | 0.0007 | -0.0014 | 0.9082 | **0.8419*** | -0.0102 | **-0.2042**** | **-0.1747***** | 0.7463 |
| SRI2 | BM2 | -0.0001 | -0.0019 | 0.9338 | 0.9577 | -0.0084 | **0.1450*** | -0.0167 | 0.9366 |
| SRI3 | BM3 | -0.0006 | -0.0008 | 0.9984 | 0.9789 | 0.0351 | -0.0638 | **-0.1112***** | 0.8698 |
| SRI4 | BM4 | -0.0036 | -0.0025 | **0.7082**** | **0.6093***** | 0.1459 | **0.4278***** | **-0.1568**** | 0.5999 |
| SRI5 | BM5 | 0.0028 | -0.0008 | 0.8114* | **0.6551***** | **-0.1539*** | **-0.3472***** | -0.0414 | 0.5606 |
| SRI6 | BM6 | -0.0009 | -0.0022 | 1.017 | 0.9166 | **0.1647**** | 0.0113 | **-0.0788**** | 0.9484 |
| SRI7 | BM7 | -0.0023 | **-0.0057*** | **0.8652**** | **0.7976***** | **0.7715***** | **0.1162*** | **-0.0973***** | 0.9165 |
| SRI8 | BM8 | -0.0003 | -0.0038 | 0.9564 | **0.8343***** | **0.2717***** | 0.0853 | **-0.0727**** | 0.9293 |
| SRI9 | BM9 | -0.0002 | -0.0008 | 1.0141 | 0.9896 | **0.1994***** | -0.0468 | **-0.0509*** | 0.9398 |
| SRI10 | BM10 | -0.0034 | -0.0054 | 0.8815 | **0.8066***** | **0.7669***** | **0.2463***** | -0.0525 | 0.9336 |
| SRI11 | BM11 | -0.0008 | -0.0012 | 0.9770 | 0.9599 | **0.2117***** | 0.0271 | **-0.0440**** | 0.9469 |
| SRI12 | BM12 | -0.0001 | -0.0008 | 1.0223 | 0.9670 | **0.1391*** | **-0.1341**** | **-0.0786**** | 0.9038 |
| SRI13 | BM13 | -0.0004 | -0.0024 | 0.9904 | **0.8820**** | 0.0901 | -0.0338 | **-0.0747**** | 0.9225 |
| SRI14 | BM14 | 0.0002 | -0.0007 | 0.9822 | 0.9663 | **0.1308**** | -0.2081 | **-0.0915***** | 0.8644 |

Table 3.10 reports the results of estimations using the four factor asymmetric model. For each of the SRI indices the estimations of the alphas are in monthly percentage terms. S.e are calculated according to Newey-West and so they are robust to heteroscedasticity and autocorrelation. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

[9]Bauer et al. (2005) and Renneboog et al. (2008a) find that SRI screening results in differences in the risk exposures of SRI and conventional portfolios, but that these differences did not affect their relative risk-adjusted performance statistically.

## 3.5 Sector and Industry Exposure Analysis

### 3.5.1 Sector Exposure Analysis

Sector exposure analysis is used to analyse the SRI indices' levels of sector exposure relative to those of their benchmarks. This is important because if the sector exposure levels of the SRI indices and conventional indices are similar, this will indicate that the SRI screening practices used in the construction of the SRI indices do not significantly affect their sector exposures. The work follows the approach of Sharpe (1992) who analyses the sector exposure of a group of conventional mutual funds and Benson et al. (2006) who analyses the sector exposures of a group of US SRI mutual funds relative to a group of conventional mutual funds.

The essence of the approach is to regress the US SRI and conventional indices' returns on the individual sector returns of the S&P 500, in order to establish the extent to which the indices returns are exposed to each sector. The sector returns are weighted by sector market capitalization so that the returns of each sector are assigned their appropriate weight according to the percentage of the total market cap of the S&P 500 which the specific sector represents at time t. In the analysis, a coefficient (gamma) for each sector of the S&P 500 is estimated for each SRI and conventional index and the measure of the exposure of each index to each respective S&P500 sector is captured by gamma. Then t-tests are performed between the gammas of the SRI indices and those of the benchmark indices with respect to each sector. For example, a t-test was performed between the set of gammas for the Consumer Discretionary sector from the regressions which used the SRI indices, and from the regressions which used the conventional indices, in order to establish whether the SRI indices have a significantly different level of exposure to the Consumer Discretionary sector than their conventional benchmarks as a result of their requirement to screen.

The model is expressed as:

$$\alpha_i + \sum_{n=1}^{10} \gamma_{n,t} S_{n,t} = R_{p,t} \qquad (11)$$

$R_p$ is the monthly return on the SRI or conventional index, $S_n$ is the value weighted monthly return on the sector index *n* (n = 1,…,10). $\gamma_n$ refers to the coefficients on the sector *n* return of the regression. Equation (11) is estimated for each SRI and conventional index.

Table 3.11 shows two sample t-tests between gammas of the SRI and conventional indices within each sector. This methodology allows for the average exposure of SRI indices to a specific sector to be compared to the average exposure of conventional indices to the same sector. Therefore, the analysis allows for an evaluation as to whether SRI screening affects indices' exposures to specific sectors in general.

This methodology does not analyse the effect of screening on each index's exposure to specific sectors. In order to analyse effectively whether screening creates different exposures to sectors within each index the benchmark pair analysis would require both current and historic holdings, which is beyond the scope of the study. The results in Table 3.11 show that there were no significant differences between the SRI and conventional gammas for each sector (at the 5 or 1% level). These results therefore indicate that the practice of SRI screening had little effect on the sector exposures of the SRI indices. These results are consistent with those of Benson et al. (2006) which analysed the relative sector exposure of SRI and conventional funds and found little evidence of statistically significant differences between the exposures of US SRI funds and matched conventional funds.

**Table 3.11: Sector Exposure Analysis Within Sectors**

| | | **t-test** | **Prob** |
|---|---|---|---|
| Sector1 | Consumer Discretionary | 0.0049 | 0.9961 |
| Sector 2 | Consumer Staples | -1.0560 | 0.3007 |
| Sector 3 | Energy | 0.9300 | 0.3609 |
| Sector 4 | Financials | 0.7492 | 0.4605 |
| Sector 5 | Health Care | 0.6741 | 0.5061 |
| Sector 6 | Industrials | -0.3075 | 0.7609 |
| Sector 7 | Information Technology | -0.8101 | 0.4252 |
| Sector 8 | Materials | **-1.7603*** | 0.0901 |
| Sector 9 | Telecommunication Services | -0.3790 | 0.7077 |
| Sector 10 | Utilities | -0.7179 | 0.4792 |

Table 3.11 shows two sample t-tests on the group of gammas which relate to the SRI indices and those which belong to the benchmark indices. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold.

### 3.5.2 Industry Exposure Analysis

Industry exposure analysis analyses the SRI indices' levels of industry exposure relative to their benchmarks. The work follows the same approach as the sector exposure analysis, but the analysis takes this further by using industry exposures to provide a more detailed analysis. The approach regresses each index return on 9 of the 10 S&P sector returns and the 1 sector's constituent industries returns. This sector is broken down into the returns of its constituent industries and it is the exposures of the index to these constituent industries which is of importance and examined in this industry exposure analysis. For example, the Consumer Discretionary sector constitutes the following industries: Auto Components, Automobiles, Household Durables, Leisure Equipment & Products, Textiles, Apparel & Luxury Goods, Hotels, Restaurants & Leisure, Media, Distributors, Internet & Catalog Retail, Multiline Retail, and Specialty Retail. The returns of each industry are weighted according to the percentage of the total proportional market capitalisation of the Consumer Discretionary sector which they represented. The other nine sectors remain as a whole and are used as controls. The sectors were weighted according to their market capitalisation as before. The returns of each index are therefore regressed on the returns of the other sectors. The industry exposures are defined by rhos. The process is then repeated for each sector which is separated into its constituent industries, whilst the other sectors are included as sector returns and are not broken up into their constituent industries.

The model can be expressed as:

$$\alpha \; + \sum_{\substack{n=1 \\ n \neq j}}^{10} \gamma_{n,t} S_{n,t} + \sum_{m=1}^{h} \rho_{m,t} I_{m,t} = R_{p,t} \qquad (12)$$

$R_{p,t}$ is the monthly return on the SRI or conventional index, $S_{n,t}$ is the value weighted monthly return on sector $n$ (n = 1,…,10). Sector j is broken down into industry constituents represented by the industry variable *I*. $I_m$ is the value weighted monthly return on industry index $m$ corresponding to sector *j*. In each sector there are *h* constituent industries and hence *h* varies across sectors. $\delta_n$ refers to the coefficients on the sector *n* return of the constrained regression. $\rho_m$ refers to the coefficients on industry *m* returns of the constrained regression.

This model allows for each S&P sector to be broken into its constituent industries in turn, while the other sectors are used as controls.

Table 3.12 shows two sample t-tests between the rhos of SRI indices and the rhos of conventional indices within each industry. The results indicate that there were some significant differences between the industry exposures of the SRI indices and their conventional benchmark indices, but not in the majority of cases. Statistically significant differences were identified in 14 of the 61 industries, including the Leisure Equipment & Products, Construction & Engineering, Oil, Gas & Consumable Fuels, Commercial Banks and Pharmaceuticals industries. This suggests that the SRI indices screening practices may have had some effect on their ability to include stocks from some industries and that these practices may have resulted in the SRI indices being skewed towards including stocks in specific industries and excluding stocks from other industries.

For example, a number of the SRI indices screening practices may result in them being skewed away from holding companies from the Pharmaceutical industry because many pharmaceutical companies test products on animals and many of the SRI indices screen out companies that allow this practice. This may explain why the results show that the SRI and conventional indices have significantly different exposures to the Pharmaceutical industry. However, there is less intuitive reasoning behind a number of the other significant differences in exposure found. For example the significant difference between the exposure of the SRI and conventional indices to the Commercial Banks industry. It is important to recognise that the methodology used does not allow for a direct comparison of the holdings of the SRI and conventional indices and therefore while it provides an indication of the general level of difference between the exposures of the SRI and conventional indices relative to all of the sectors of the S&P 500, the findings in relation to individual sectors may be less robust than would be the case if direct analysis of the holdings of the indices had been possible.

For the majority of industries there is no significant difference and these results emphasise the potential that SRI screening practices may not in general significantly affect the holdings of the SRI indices. There are no significant differences between the exposure of the SRI indices and their conventional benchmark indices to any of the industries within the Consumer Discretionary, Information Technology, Materials, Telecommunication, Services and Utilities sectors. Interestingly, there is no significant difference in exposures to the

Tobacco industry which is within the Consumer Staples, sector or the Aerospace & Defence industry the Industrials sector. The results for these industries may be surprising because SRI portfolios are typically associated with the exclusion of these stocks. However, only four of the fourteen SRI indices entirely screen out Tobacco producers; the FTSE KLD 400 Social Index screens out companies involved beyond certain thresholds in the Tobacco industry and none of the other SRI indices screen out the tobacco industry in any capacity.

Also, none of the SRI indices entirely screen out all stocks within the Aerospace & Defense industry. Instead, those which screen negatively in relation to this industry only negatively screen out certain types of stocks. For example, the FTSE KLD Catholic Values Index only negatively screens out those companies within this industry which are associated with the manufacture of anti-personnel landmines. As a result, once the industry exposure of all of the SRI indices is aggregated and compared to the industry exposure of their conventional benchmark indices, the lack of significant statistical difference between the exposures to the Tobacco and Aerospace & Defense industries is consistent with the screening practices of the majority of the SRI indices. In the 14 industries for which the exposures of the SRI and conventional indices are significantly different, these differences are unlikely to be the direct result of the use of negative screening because the negative screening practices of the vast majority of the SRI indices do not relate to these industries (see Table 3.2). Therefore, these statistical differences are likely to be a result of the SRI indices' positive and restricted screening practices. For example, a number of the SRI indices positively discriminate in favour of those companies which have strong environmental rankings and this may have resulted in fewer companies involved in the Oil, Gas & Consumable Fuels industry being included within their portfolios (the SRI indices were less exposed to this industry than their conventional benchmark indices, 0.085 average rho relative to 0.174). The results indicate that the SRI indices' screening practices do not affect their exposures to the vast majority of industries. Importantly, these tests only analyse the relative industry exposures of the groups of SRI indices and their benchmarks. The results therefore relate to SRI screening practices in general. This methodology does not allow for analysis of the effects for individual indices screening practices on exposures to specific industries.

## Table 3.12: Industry Exposure Analysis Within Industries

| **Sector 1 Consumer Discretionary** | **t-test** | **Sector 2 Consumer Staples** | **t-test** | **Sector 3 Energy** | **t-test** | **Sector 4 Financials** | **t-test** | **Sector 5 Health Care** | **t-test** |
|---|---|---|---|---|---|---|---|---|---|
| Auto Components | 0.2872 | Food & Staples Retailing | 0.0024 | Energy Equipment & Services | 0.0999 | Commercial Banks | **2.3718**** | Health Care Equipment & Supplies | **2.0177*** |
| Automobiles | 0.5987 | Beverages | 1.4897 | Oil, Gas & Consumable Fuels | **2.8122**** | Thrifts & Mortgage Finance | 1.1834 | Health Care Providers & Services | **3.1746**** |
| Household Durables | 0.1645 | Food Products | 0.6002 | | | Diversified Financial Services | **3.1475***** | Health Care Technology | **1.7891*** |
| Leisure Equipment & Products | **1.9735*** | Tobacco | 0.1095 | | | Consumer Finance | 1.1984 | Biotechnology | **3.4868**** |
| Textiles, Apparel & Luxury Goods | 1.4875 | Household Products | 0.3434 | | | Capital Markets | **2.5462**** | Pharmaceuticals | **4.005***** |
| Hotels, Restaurants & Leisure | 0.2024 | Personal Products | 0.7872 | | | Insurance | 0.9666 | Life Sciences Tools & Services | 0.5157 |
| Media | 1.2764 | | | | | Real Estate | 1.3069 | | |
| Distributors | 1.2253 | | | | | Real Estate Investment Trusts (REITs) | 1.0468 | | |
| Internet & Catalog Retail | 1.6511 | | | | | | | | |
| Multiline Retail | 1.5649 | | | | | | | | |
| Specialty Retail | 0.5167 | | | | | | | | |
| **Sector 6 Industrials** | **t-test** | **Sector 7 Information Technology** | **t-test** | **Sector 8 Materials** | **t-test** | **Sector 9 Telecommunication Services** | **t-test** | **Sector 10 Utilities** | **t-test** |
| Aerospace & Defense | 1.3922 | Internet Software & Services | 0.4300 | Chemicals | 0.3472 | Diversified Telecommunication Services | 0.2527 | Electric Utilities | 0.1312 |
| Building Products | 0.3118 | IT Services | 1.1666 | Construction Materials | 0.0565 | Wireless Telecommunication Services | 1.2194 | Gas Utilities | 1.1691 |
| Construction & Engineering | **1.8411*** | Software | 1.4932 | Containers & Packaging | 1.0394 | | | Multi-Utilities | 0.0470 |
| Electrical Equipment | 0.1227 | Communications Equipment | 0.3735 | Metals & Mining | **2.6955**** | | | | |
| Industrial Conglomerates | 0.3891 | Computers & Peripherals | 0.3591 | Paper & Forest Products | 1.5751 | | | | |
| Machinery | 0.1795 | Office Electronics | **1.8865*** | | | | | | |
| Trading Companies & Distributors | **3.0811***** | Semiconductors & Semiconductor Equipment | 0.5152 | | | | | | |
| Commercial Services & Supplies | 0.0650 | | | | | | | | |
| Air Freight & Logistics | 0.4480 | | | | | | | | |
| Airlines | 1.6291 | | | | | | | | |
| Road & Rail | 0.3203 | | | | | | | | |

Table 3.12 shows two sample t-tests on the group of rhos which relate to the SRI indices and those which belong to the benchmark indices. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold.

## 3.6 Idiosyncratic Volatility Analysis

The idiosyncratic volatility of a portfolio describes its unsystematic or idiosyncratic risk. The greater a portfolio's idiosyncratic volatility, the larger its level of idiosyncratic risk. Idiosyncratic volatility analysis is used to analyse the levels of idiosyncratic risk of the SRI indices, relative to their conventional benchmarks. If the levels of idiosyncratic risk of the two types of indices are similar, the results will indicate that the SRI indices screening practices do not significantly affect their diversification levels relative to their benchmarks. Idiosyncratic risk is the part of total risk not explained by systematic risk factors and so measures the amount of risk that could be diversified away.

If this is the case, it may explain the similar performance levels of SRI and conventional portfolios evidenced thus far in this area of research. It is important for SRI investors that they know whether SRI screening of a portfolio can result in lower levels of diversification and higher levels of idiosyncratic risk. This is because higher levels of risk may result in greater volatility and worse returns.

Bello (2005) uses residual variance analysis to establish that US SRI funds have similar levels of idiosyncratic risk to their conventional counterparts and the idiosyncratic volatility analysis in this chapter is designed to establish whether this is also the case with SRI indices. Ang et al. (2006) analyse the idiosyncratic volatility levels of US stocks. Following the approach of Ang et al. (2006), the idiosyncratic volatility of an index is defined as the standard deviation of the residual return after estimating the single factor model, the three factor model and the four factor model as denoted below:

$$\sigma(\varepsilon_{p,t}) = IV \qquad (14)$$

Idiosyncratic volatilities are presented for all of SRI and conventional indices in Table 3.13. In order to allow for comparison between the idiosyncratic volatilities of the SRI indices and the conventional indices the same market benchmark is used in all of the Jensen alpha tests, and this is the S&P 500. The S&P 500 is chosen because its performance represents that of the broad US stock market. The idiosyncratic volatilities are therefore

measures of the idiosyncratic risk of all the indices when the S&P 500 is the market benchmark. This assumes the S&P 500 is fully diversified and all tests are done using this approach. The idiosyncratic volatility of an index is calculated after estimating the single factor model (Jensen, 1968), the three factor model (Fama and French, 1993) and the four factor model (Carhart, 1997) because the identification of idiosyncratic volatility using the Jensen Alpha model (1968) does not control for the potential effects of differences between the size, value or momentum of the stocks held within the SRI and conventional funds. Using the three (Fama and French, 1993) and four factor models (Carhart, 1997) may allow for the analysis to more accurately identify the effect of screening on the relative idiosyncratic volatilities of the SRI and conventional funds because these factors are controlled for.

The results presented show that the idiosyncratic volatilities of the SRI indices are higher generally than those of their benchmarks. These results indicate that SRI indices may be less diversified and have higher levels of idiosyncratic risk. These results are consistent with the practice of SRI screening limiting the potential stock universes of SRI funds and consequently their levels of diversification relative to conventional portfolios. These findings are consistent with Rudd (1981), who predicts a higher level of extramarket covariation for screened portfolios, but not with the findings of Bello (2005) who found US SRI mutual funds do not have significantly higher levels of residual variance than their conventional counterparts. In addition, the results show that the idiosyncratic volatilities of both the SRI and conventional indices are smaller when the three (Fama and French, 1993) and four factor models (Carhart, 1997) are used than when the Jensen Alpha (1998). This indicates that controlling for the size, value and momentum factors provides a more accurate analysis of the effects of screening on the relative idiosyncratic volatilities of the SRI and conventional indices.

The findings in this section support those from earlier analysis in this chapter and indicate that while the risk-adjusted performance of the SRI indices and the conventional indices may not be significantly different as a result of the screening practices used in the construction of the SRI indices, these screening practices may have created significant differences in the risk levels of the two types of indices.

## Table 3.13: Idiosyncratic Volatility Levels of the Indices

| SRI | Jensen Alpha | 3 Factor | 4 Factor | Conventional | Jensen Alpha | 3 Factor | 4 Factor |
|---|---|---|---|---|---|---|---|
| SRI1 | 0.0238 | 0.0236 | 0.0228 | BM1 | 0.0048 | 0.0031 | 0.0029 |
| SRI2 | 0.0084 | 0.0085 | 0.0085 | BM2 | 0.0027 | 0.0017 | 0.0017 |
| SRI3 | 0.0093 | 0.0093 | 0.0092 | BM3 | 0.0019 | 0.0014 | 0.0014 |
| SRI4 | 0.0358 | 0.0336 | 0.0330 | BM4 | 0.0019 | 0.0014 | 0.0014 |
| SRI5 | 0.0309 | 0.0292 | 0.0293 | BM5 | 0.0023 | 0.0016 | 0.0015 |
| SRI6 | 0.0081 | 0.0071 | 0.0066 | BM6 | 0.0021 | 0.0011 | 0.0011 |
| SRI7 | 0.0291 | 0.0101 | 0.0101 | BM7 | 0.0164 | 0.0116 | 0.0117 |
| SRI8 | 0.0173 | 0.0116 | 0.0110 | BM8 | 0.0149 | 0.0111 | 0.0111 |
| SRI9 | 0.0072 | 0.0062 | 0.0060 | BM9 | 0.0026 | 0.0021 | 0.0021 |
| SRI10 | 0.0243 | 0.0085 | 0.9787 | BM10 | 0.0149 | 0.0111 | 0.0111 |
| SRI11 | 0.0081 | 0.0049 | 0.0048 | BM11 | 0.0037 | 0.0019 | 0.0019 |
| SRI12 | 0.0073 | 0.0056 | 0.0055 | BM12 | 0.0018 | 0.0011 | 0.0011 |
| SRI13 | 0.0097 | 0.0096 | 0.0095 | BM13 | 0.0018 | 0.0010 | 0.0010 |
| SRI14 | 0.0101 | 0.0080 | 0.0078 | BM14 | 0.0036 | 0.0029 | 0.0028 |
| Mean | 0.0164 | 0.0126 | 0.0816 | Mean Conventional | 0.0054 | 0.0038 | 0.0038 |

Table 3.13 shows the idiosyncratic volatility for each SRI and conventional index.

## 3.7 Conclusion

The results from the single, three and four-factor tests generally support Hypothesis 3 ("no effect"), and suggest that the risk-adjusted returns of socially responsible indices are not statistically significantly different from their benchmark indices in the majority of cases. However, there are a few cases were the alphas are statistically significant and these alphas are mostly negative. In general, these results are consistent with other studies which have also used symmetric risk-adjusted performance analysis methodologies to analyse the performance of SRI indices[10]. When the three and four factor models are used, there is some evidence of statistically significant alphas during the early analysis period (1998-2005) but less in the latter period. This would suggest that the practice of SRI screening had less of an effect on the performance of the SRI indices as the US SRI sector became more mature. This may be the result of more companies introducing CSR and ethical strategies over time and therefore there being more potential for the SRI and conventional indices to contain more of the same stocks. This analysis benefits from a number of contributions made by this work to this area of academia. The work is the first to analyse the performance and exposures of all of the 14 major US SRI indices relative to carefully selected conventional benchmarks. Previous work uses a mixture of official and unofficial conventional benchmarks. Official benchmarks are those that the index companies believe to be most accurate and are the benchmark the index companies' measure index performance against. The unofficial benchmarks used in previous work such as Schröder (2007) are selected by the respected authors and are used because data for the official benchmarks was not available. The use of official benchmarks within the work ensures that the analysis is accurate. In addition, the analysis uses an updated sample period. The most recent robust study of the performance of US SRI indices was by Schröder (2007) with a sample period between 1992 and 2003. Many US SRI indices only came into existence in the early 2000's and therefore the majority of their performance had not been analysed before the analysis in this chapter. Also, the work in this chapter benefits from the use of three and four factor models to study the risk-adjusted performance of SRI indices relative to their benchmark indices. The work is the first to use the three and four factor models to study the risk-adjusted performance of SRI indices relative to their benchmark indices. The use of these models, allows for a more accurate measurement of the risk-adjusted returns of the SRI and conventional portfolios. The inclusion of the three and

[10] See Statman (2000), Statman (2006) and Schröder (2007).

four factor models also enables the analysis of the risk exposures of the SRI indices and those of their benchmarks.

The results from the asymmetric tests in this chapter indicate that there were some differences between the risk-adjusted performance of the SRI and conventional indices during the periods analysed but that in the majority of cases these differences were not statistically significant. There is no indication that the relative performance of the SRI indices is different during periods of market and economic expansion than during periods of market and economic contraction. The results support Hypothesis 5 and reject Hypothesis 4 in general because they indicate that changing stock market and economic conditions affect US SRI and conventional portfolios similarly. The use of asymmetric models to analyse the performance of the US SRI indices across different stages of the US economic and market cycles constitutes another contribution of the work. Three studies have analysed the performance of SRI portfolios in different investment conditions. To date, there has only been one study which has analysed the performance of SRI indices during different investment conditions and this study is Managi et al. (2012). Managi et al. (2012) is an investigation of the performance of US, UK and Japanese SRI indices in which a Markov switching model is used in order to find bull and bear periods in the international equity markets (volatility regimes) and to compare the performance of the SRI indices and their conventional benchmarks over these periods. This chapter uses asymmetric models in the analysis of the performance of SRI indices against their benchmarks. These models, which incorporate economic and stock market indicators, allow for the risk-adjusted performance of the SRI and conventional indices to be analysed across different stages of the US stock market and economic cycle. For SRI investment managers and investors it is important to establish what effects, if any, SRI screening has of the performance of equity SRI indices over different stages of market and economic cycles because this data may potentially change their asset selection across the cycles.

The results from the work in this chapter also indicate that there were some significant differences between the industry exposures of the SRI indices and their conventional benchmark indices, but not for the majority of indices. This suggests that the SRI indices screening practices may have had some effect on their ability to include stocks from some industries and that these practices may have resulted in the SRI indices being skewed towards including stocks in specific industries. However, for the majority of industries there is no

significant difference and these results emphasise that SRI screening practices may not significantly affect the holdings of the SRI indices. The sector and industry exposure work in this chapter contributes to this area of academia because it is the first work to analyse SRI indices' levels of sector and industry exposure relative to conventional indices. In addition, the results from the work in this chapter also indicate that the idiosyncratic volatilities of the SRI indices are higher generally than those of their benchmark indices. These results are consistent with the practice of SRI screening limiting the potential stock universes of SRI funds and consequently their levels of diversification relative to conventional portfolios. These findings are consistent with Rudd (1981), who predicts a higher level of extramarket covariation for screened portfolios. It is important for SRI investors that they know that the SRI screening of a portfolio can result in lower levels of diversification and higher levels of idiosyncratic risk. This is because higher levels of risk may result in greater volatility and worse returns. The use of idiosyncratic volatility analysis constituents the final contribution of the work in this chapter to this area of academia and this is the first work to analyse the idiosyncratic volatility levels of US SRI indices.

Work of this nature is extremely important for SRI investors as it helps to establish whether there are any costs associated with the ethical benefits they receive through investing in ethically screened portfolios. Overall, the findings provide little evidence that investors pay a price for investing in socially responsible stocks because the performance of the indices was not significantly different. It is important to study the performance of SRI indices in addition to SRI funds because while the findings from studies of SRI fund performance are valuable they are limited in their ability to explain the relative returns of socially responsible companies because mutual fund performance is susceptible to the influence of fund fees, costs associated with screening practices and fund manager skill (Schröder, 2007, Statman et al., 2008). Consequently, analysing the performance of SRI indices relative to their conventional benchmark indices is purported to be an alternative method for investigating the performance of socially responsible companies because these influences do not have to be considered. The findings from the work in this chapter are broadly consistent with previous analysis of the performance of US SRI indices, such as Statman (2000, 2006) and Schröder (2007), in that they indicate that while there may be differences between the constituents of socially responsible indices and their benchmark indices as the result of screening, these differences do not result in statistically significant risk-adjusted performance differentials between the two types of indices.

# Chapter 4: Investigating the Performance of UK Socially Responsible Equity Funds

## 4.1 Introduction and Contribution of Chapter 4

Chapter 3 investigated the effect of SRI screening on the performance and risk levels of US SRI equity indices. While the SRI screening practices, used in the construction of the US SRI indices, did not create significant risk-adjusted performance differences between SRI indices and their benchmarks in general, the results showed that they may create considerable differences between the risk exposures and idiosyncratic volatility levels of the two types of indices. This suggests that the requirement to screen ethically can affect SRI portfolios such as SRI indices. The work in this chapter provides an analysis of the effect of SRI screening on the UK SRI fund sector. Chapter 3 outlines the growth in the US SRI sector. This trend has been echoed in the UK and the rest of Europe and the importance of SRI has increased year on year. In Europe a recent report by the European Sustainable Investment Forum, a pan-European network and think-tank, whose mission is to develop sustainability through European financial markets, reports that the total value of European assets under management using SRI strategies is in excess of €6.9 trillion (Eurosif, 2014). A recent report by Experts in Responsible Investment Solutions (EIRIS), a non-profit sustainable investment research firm, reports that the UK's contribution to this figure is in excess of £11.5 billion (EIRIS, 2014). The UK SRI fund sector is therefore an extremely important SRI sector, which motivates the research of this chapter.

In Chapter 3, key issues relating to SRI portfolio performance were highlighted, for example, the possibility that the screening of an investment portfolio may result in the portfolio incurring additional investment risks. The work in this chapter and Chapter 5 further explores the potential issues that may influence this form of investing. There are five potential risks identified and investigated. The first three (A, B and C) relate to the screening methodology used in the construction of SRI portfolios, while the last two (D and E) relate to the nature of the potential investment universes of the portfolio.

A. The screening area

Different SRI portfolios are not only constructed using different screening methods or combinations of screening methods, but they also apply these screening methods to different areas. For example, some screen in relation to a company's human rights records, while others screen in relation to what goods or services companies produce. The area to which the screening methods are applied may affect the characteristics of the portfolio. Barnett and Salomon's (2006) findings indicate that screening based on community relations criteria is associated with increased financial performance, while screening based on environmental and labour relations criteria is associated with lower financial performance. Renneboog et al. (2008a) found that the SRI funds which focused on screening for companies with high levels of 'community involvement' performed around 30 basis points a month better than those which did not (3.6 % per year relative to a matched sample of conventional funds), while the SRI funds which focused on excluding 'sin stocks' (alcohol and tobacco companies) performed considerably worse than those which did not exclude this form of 'unethical' stock. The work in this chapter analyses the effect of screening area on the performance and risk of UK SRI funds. This analysis is not performed in Chapter 5 on US SRI funds because it was beyond the scope of the work. This analysis may form part of future work.

B. The intensity of screening techniques (number of areas).

The intensity or number of areas to which screening is applied in the screening process may also be a factor which can affect the financial performance of an SRI portfolio. Barnett and Salomon (2006) identify a curvilinear relationship between the intensity of SRI screening and the financial performance of SRI funds and provide evidence that as the number of social screens used by an SRI fund increases, financial returns decline at first, but then rebound as the number of screens reach a maximum. This chapter includes an analysis of the relationship between the intensity of screening and UK SRI fund performance. This analysis is not performed in Chapter 5 on US SRI funds because it was beyond the scope of the work. This analysis may form part of future work.

C. The type of screening or combinations of types being used by an SRI portfolio (positive, negative and restricted).

Negative screening is likely to result in entire industries being excluded from an SRI portfolio; positive screening is likely to result in skewing SRI portfolios towards certain types

of stocks, while restricted screening restricts the stocks from within an industry which can be included in an SRI portfolio. Goldreyer and Diltz (1999) find that US SRI equity funds using positive screening techniques, outperformed those which use negative screening techniques at statistically significant levels. The findings of Goldreyer and Diltz (1999) suggest that the psychological returns achieved through negative screening may come at a greater financial risk than the psychological returns achieved through positive screening.

In this thesis, a different methodology to that used by Goldreyer and Diltz (1999) is employed to investigate whether the type of screening or combinations of types being used by an SRI portfolio affect its financial return. Goldreyer and Diltz (1999) compare the performance of US SRI funds which use positive screening techniques to those using negative screening. However, as confirmed in Chapter 5, current data on the screening techniques used by US SRI funds shows that they predominantly use positive and restricted screening rather than negative screening. Also, when they use negative screening, it is generally with respect to only a small number of areas and is often used in combination with positive and restricted screening in those areas. It is therefore difficult to compare the performance of US SRI funds that use positive and restricted screening practices with those that use negative screening. Conversely, in this chapter, almost all UK SRI funds are shown to use negative screening in most areas. When they use restricted and positive screening, it is usually with respect to only a few specific areas such as climate change and environment. Therefore, it is difficult to compare the performance of the UK SRI funds that use negative screening to those that use positive and restricted screening because the majority use negative screening in most areas. Consequently, the methodology used in the work to investigate whether the type of screening used by an SRI portfolio affects its financial return is focused on comparing the performance of UK SRI funds, which predominately use negative screening, with US SRI funds, which predominately use positive and restricted screening. This discussion forms part of Chapter 5. This is far from ideal because direct tests of the performance of funds with the same investment scope but different screening techniques would have allowed for a more comprehensive analysis, but the discussion in Chapter 5 does offer preliminary findings on the importance and effectiveness of screening type.

D. The size of the potential investment universe of the portfolio before SRI screening

The effect of SRI screening on the construction of a portfolio may only be partly decided by the screening methodology applied (A, B and C). The impact may also depend on the size of the investment universe of the portfolio. The greater the asset choice within a portfolios investment universe, the less likely SRI screening is to restrict the ability and choices of the SRI fund manager. Analysis to date has not established whether investment universe size is important in investigating the financial risks associated with screening SRI portfolios. The analysis in this chapter is designed to investigate whether this is important.

The work in this chapter builds on Bauer et al. (2005) and Gregory and Whittaker (2007) by splitting the UK SRI funds into those which only invest domestically and those which invest globally. Bauer et al. (2005) and Gregory and Whittaker (2007) find that UK SRI funds do not perform significantly differently from matched conventional funds regardless of their investment scope (domestic or global). However, Gregory and Whittaker (2007) found using the four factor model that UK SRI funds have less exposure to the Fama and French (1993) HML factor and greater exposure to the size factor and Carhart's (1997) momentum factor than their conventional counterparts, and that these differences in risk exposures are more severe between the domestic SRI and conventional funds than for the global funds. This indicates that the size of an SRI funds' investment choice may affect the impact of SRI screening on the fund.

E. The types of asset portfolios most affected by SRI screening

Other factors which may affect the financial risks associated with SRI investing are the types of assets included in the portfolio. Derwall and Koedijk (2009) find that a portfolio of SRI bond funds earned a benchmark-adjusted return similar to that of its conventional counterpart, but that a portfolio of SRI balanced funds outperformed a matched portfolio of conventional balanced funds. These findings indicate that the effect of SRI screening methodologies on portfolio performance may depend on the types of assets included within the funds. More research is needed to establish the relationships between the types of assets held in SRI portfolios and the effects of SRI screening methodologies on performance. For example, additional analysis is required to investigate whether SRI screening affects portfolios differently depending on the types of assets they hold (equities, bonds or balanced) and the forms those assets take (equity all of market, equity large cap, equity mid cap, equity

small cap). Chapter 5 includes an analysis of the relationship between the types of asset held within SRI portfolios and the effect of SRI screening on the performance of portfolios.

In addition to the possibility that the screening of an investment portfolio may result in additional investment risks, there is also the potential that socially responsible investors enjoy additional psychological returns. It is the potential of these additional psychological returns that attract ethical investors. These returns might be captured in the following ways:

F. The shareholder activism of SRI funds

Investment in SRI funds is associated with ethical shareholder activism and many of the funds actively promote their shareholder activism credentials within their prospectuses. Morgan et al. (2011) analyse mutual funds votes on shareholder proposals. As part of this analysis, they find that the 44 SRI funds used in their work are more likely to support shareholder proposals that promote environmental and social actions by firms. An ethical investor may receive a psychological return if they invest in SRI funds with proxy voting strategies that promote environmental and social actions, if they value the SRI fund's promotion of these actions. In Chapter 5, an analysis is performed on the shareholder activism of US SRI funds and the work builds on that of Morgan et al. (2011) by analysing the shareholder activism of SRI funds, in greater scope.

G. The potential that the holdings of SRI funds may be more ethical than those of their conventional counteracts

Kempf and Ostoff (2008) test the frequently made claim that SRI funds are simply conventional funds in disguise. They compare the portfolio holdings of US SRI funds to conventional funds by measuring their ESG ratings. They find that SRI funds have a significantly higher ethical ranking than conventional funds, meaning that they are not conventional funds in disguise. This finding suggests that for most ethical investors there is likely to be a psychological return associated with the holdings of SRI funds which result from screening. The data period used in Kempf and Ostoff (2008) is 1991 to 2004 and the holdings data used are only semi-annual. Therefore, there is scope for an updated, more comprehensive analysis of the ethical scores of the holdings within SRI and conventional funds. This analysis is beyond the scope of this thesis but may form part of future work.

In addition, to the aforementioned contributions the work in this chapter makes to our understanding of the performance and risks associated with investing in SRI portfolios in general, the work in this chapter makes a number of contributions to the literature which specifically relates to the effects of SRI screening on UK SRI funds. The work in this chapter builds on Bauer et al. (2005) and Gregory and Whittaker (2007) by splitting the UK SRI funds into those which only invest domestically and those which invest globally. The work provides a more thorough analysis of the differences between UK SRI funds with domestic and global investment universes. This analysis includes an investigation of their performance using a number of methodologies, their systematic risk, their industry and sector exposures and their levels of idiosyncratic volatility. The work tests the theory that the size of an SRI fund's potential investment choice may affect the impact of SRI screening. The smaller the natural investment universe of an SRI fund, the more likely SRI screening will affect the fund's performance and risk because it is more likely that post screening a fund manager will no longer be able purchase assets with the potential to provide a good return and/or fail to diversify risk effectively.

A contribution of the work in this chapter is the use of asymmetric models to analyse the performance of UK SRI funds relative to conventional UK funds. The use of these models allows for the risk-adjusted performance of SRI and conventional funds to be analysed across different asymmetric stages of the UK stock market cycle. There are numerous reasons why the performance of SRI funds and conventional funds may differ over stock market cycles and these are discussed in detail in Chapter 2. Renneboog et al. (2008a) perform an analysis of the effects of changes in publicly available macroeconomic information on the performance of UK SRI mutual funds and find little evidence of any significant effect. However, the methodology used in Renneboog et al. (2008a) only allows for tests as to whether macroeconomic information is a significant driving factor of SRI fund returns and does not analyse what effect, if any, changes in UK stock market cycles have on SRI funds. For investors, the effect of stock market cycles on investments is likely to be more important and profound than the effects of macro-economic data. As a consequence, there is a need for an analysis which effectively analyses the performance of UK SRI funds during different stages of the UK stock market cycle to allow for the performance and market timing of the UK SRI funds to be analysed across UK stock market cycles.

In addition, the work in this chapter also contributes to this area of academia by analysing the sector and industry of UK SRI funds. The work follows the approaches of Sharpe (1992) who analyses the sector exposure of a group of conventional US mutual funds and Benson et al. (2006) who analyse the sector exposure of a group of US SRI mutual funds relative to a group of conventional mutual funds. Benson el al., (2006) analyse whether US SRI funds exhibit different sector gammas than their conventional counterparts. They find no consistent results of specific industries in which SRI funds take a relatively higher weight as the result of SRI screening. This chapter is the first to use sector exposure analysis to investigate the sector exposure of UK SRI funds relative to conventional funds. In addition, it is also the first work to use industry exposure analysis in relation to mutual funds in any capacity. The use of industry level data as opposed to sector level data allows for a more comprehensive examination because each sector is made up by a number of industries. This analysis is important because if sector and industry exposures of SRI and conventional funds are similar, the SRI screening practices used in the construction of the SRI funds do not significantly affect their holdings relative to conventional funds. Alternatively, different exposures would indicate that SRI screening practices significantly affect their holdings in particular sector and industries. In addition, different industry exposures that combine with different performance allow interesting and more detailed analysis of the impact of screening on fund performance.

Another contribution of the work in this chapter is the analysis of the idiosyncratic volatility levels of the UK SRI funds. Bello (2005) uses residual variance analysis to establish that US SRI funds have similar levels of idiosyncratic risk to their conventional counterparts. Chapter 3 shows that SRI indices have higher levels of idiosyncratic volatility than their conventional benchmarks and may therefore be less diversified. Idiosyncratic volatility analysis is used in this chapter to analyse the levels of idiosyncratic risk of the UK SRI funds which can only invest domestically and those with a global choice of stocks. This is the first work to analyse the idiosyncratic volatility of UK SRI funds. If the levels of idiosyncratic risk of the SRI and conventional funds are similar, then screening practices do not significantly affect diversification. If the levels of idiosyncratic risk differ, SRI screening may be shown to impact funds' abilities to diversify, and this ability to diversify may be related to the funds asset universes.

In addition, the work in this chapter also contributes to this area of academia by analysing the effect of screening intensity on the UK SRI funds. Barnett and Salomon (2006) identify a curvilinear relationship between the intensity of SRI screening (number of criteria to which SRI screens are applied) and the financial performance of US SRI funds. They provide evidence that as the number of social screens increases, financial returns decline at first, but then rebound as the number of screens reaches a maximum. They hypothesize, using a combination of modern portfolio and stakeholder theories, that these findings are the result of the financial loss borne by an SRI fund due to SRI screening resulting in poor diversification, being offset as social screening intensifies because better managed and more stable firms are selected into fund portfolios. Renneboog et al. (2008a) find global SRI fund returns decrease in general with screening intensity on social and corporate governance criteria and that all else being equal, funds with one additional screen are associated with a 1% lower four-factor-adjusted return per annum. These results are consistent with SRI screening constituting a portfolio constraint which negatively affects the risk-adjusted performance of SRI funds, relative to conventional funds. The screening intensity analysis in this chapter builds on the work of Barnett and Salomon (2006) and Renneboog et al. (2008a). The methodology focuses on analysing the effect that screening intensity has on the risk-adjusted performance of two types of SRI funds, UK SRI funds that can only invest in the UK and those that can invest globally. These groups may be affected differently by screening intensity because the funds that can only invest in the UK have a smaller investment universe and the limitations imposed by screening may therefore have a greater proportional effect on the ability of their fund managers to find desirable investments post-screening.

## 4.2 Description of Data Used

The first sample contains SRI funds which can only invest in stocks listed on the UK stock market (domestic), while the second sample contains SRI funds which can invest in stocks listed on any global stock market (global). These domestic and global SRI samples only include funds that are equity only, available to retail investors in the UK, non-specialist and active funds. As a result, the SRI funds are only constrained in their stock selection by their screening criteria and the geographical market from which their fund managers can pick stocks. The SRI funds represent all which meet the inclusion criteria and for which detailed independent screening information is available. An initial list of all the SRI funds was

obtained from EIRIS along with their screening criteria. The initial list contained 91 SRI funds, of which 53 SRI funds met the inclusion criteria and are used in this analysis. 32 of these SRI funds can only invest the UK stock market (domestic), while the other 21 can invest in stocks listed on any global stock market (global).

These SRI fund samples were then matched with 977 conventional funds all of which met the same inclusion criteria. Of these 977 funds, 566 can only invest in the UK stock market and are therefore matched with the 32 SRI funds with the same investment choice and 411 of the conventional funds can invest in global stock markets and are therefore matched with 21 global SRI funds. The SRI funds are matched against a large number of conventional funds instead of one fund each, in order to mitigate the problem that mutual funds are not entirely equal in terms of the age (any discrepancies average out) and in order to ensure results are not fund specific. The purpose of the analysis within this chapter is to analyse the performance of the UK SRI domestic funds relative to the UK domestic conventional funds in general and the performance of the UK SRI global funds relative to the UK global conventional funds in general, in order to allow for broad conclusions as to the effect of screening on the SRI funds' performance and the extent to which the size of the SRI funds investment universes affects performance, if at all. The analysis is not focused on the performance of individual funds.

Monthly performance data for all funds was obtained from Thomson DataStream. The sample period runs from January 1990 to January 2012, prior to 1990 the number of SRI funds was quite small[11]. Table 4.1 provides a breakdown of the fund data as well as some descriptive statistics of the monthly returns. Data for the FTSE All Share and FTSE All World, used as proxies for the UK and Global stock markets, were also collected from Thomson DataStream. The mutual fund returns are calculated on a net asset value price basis, with income reinvested and are net of fees. The Fama and French (1993) and Carhart (1997) factors for the UK stock market were provided by Exeter University (Gregory et al., 2013), while the Fama and French (1993) and Carhart (1997) factors for the global stock market were obtained from the Kenneth R. French Data Library.

[11] As EIRIS only provide a list of SRI funds and accurate screening data for those SRI funds which are currently available to invest in, only live SRI funds were used in this study and the SRI fund sample is attrition free. In order to ensure there were no impacts of survivor bias on the empirical results only conventional funds which were also available to retail investors were included in the study. This follows the approach of Statman (2000) and Kreander et al. (2005).

Table 4.1 shows that the sample of SRI and conventional funds which share the same investment choice, have similar mean inception years. This indicates that the fund samples are well matched and that the analysis is free of the 'new fund effect' (newer funds perform badly relative to older funds due to start-up costs, (Hamilton et al., 1993). Importantly, the statistics presented in Table 4.1 show that both samples of SRI funds had lower mean monthly returns than their conventional funds. This indicates that the SRI funds may have underperformed their conventional counterparts. However, this performance is clearly not risk-adjusted. In addition, the SRI fund samples have higher variance of returns than conventional funds. This indicates that their performance was more volatile than that of the conventional funds. This suggests the need to analyse in detail the risks and performance of these funds and to investigate which characteristics are causing these differences.

**Table 4.1: Descriptive Statistics of the Fund Samples**

| | Number of funds | Investment Universe | Official Index Benchmark | Mean Inception Year | Mean Monthly Return | Variance of Mean Monthly Return |
|---|---|---|---|---|---|---|
| Domestic SRI | 32 | UK Only | FTSE ALL Share | 2001 | 0.18% | 21.7% |
| Domestic Con | 566 | UK Only | FTSE ALL Share | 2000 | 0.54% | 15.9% |
| Global SRI | 21 | Global | FTSE All World | 2003 | 0.19% | 31.5% |
| Global Con | 411 | Global | FTSE All World | 2003 | 0.87% | 22.3% |

Table 4.1 reports the number of domestic and global SRI and conventional funds, their investment universes, official benchmarks mean inception year and variance of mean monthly return.

Tables 4.2 to 4.5 show data on the screening practices of the SRI funds. Table 4.2 shows data on the screening practices on the domestic SRI funds, while Table 4.3 contains data on the intensity of their screening. Table 4.4 illustrates data on the screening practices of the global SRI funds, while Table 4.5 presents data on the intensity of their screening. In Tables 4.2 and 4.4 an N or a P indicates that a fund has a policy which addresses a particular issue. N indicates that the fund avoids investment in certain 'negative' areas, such as weapons or tobacco manufacturers, or may avoid investment in certain companies because of poor ethical performance, such as poor human rights. P indicates that it focuses investment on 'positive' investment criteria in a certain area, such as a company having a good record on human rights or climate change policy. The notation N+P indicates that the fund uses both negative and positive screening criteria in a particular area. In Tables 4.3 and 4.5, X indicates the intensity of the fund screening. The intensity of a funds screening is defined as the total

number of areas in which the fund uses any type of screening (negative or positive screening or both)[12].

Table 4.2 shows that the domestic SRI funds use negative screening in most areas and therefore focus their ethical screening on excluding stocks which do not meet ethical criteria. The majority of the funds also use some form of positive screening, but this is less common than negative screening, and it is mostly used in combination with negative screening. When positive and negative screening are used in combination a fund excludes investment in stocks which do not meet ethical criteria and also focuses on including stocks which have a positive impact. For example, a fund may actively exclude investment in stocks which have a negative effect on climate change, while actively focusing investment in companies which have a positive impact relating to climate change. Nearly half of the domestic SRI funds (14) screen out all sin stocks (alcohol, gambling, armaments, pornography and tobacco). Table 4.3 shows that the majority of the domestic SRI funds are intensive in their screening practices. For example, 24 out of the 32 funds screen in 7 or more of the areas for which EIRIS provides data. Given the nature and the intensity of the screening practices of the domestic SRI funds this screening may affect fund managers' investment choice significantly. In addition, since the majority of this screening is negative, most of the funds are unable to invest in certain areas, and the work is interested in explaining the impact of these restrictions on funds' risk and performance characteristics. Table 4.4 illustrates that, similar to the domestic SRI funds, the global SRI funds also use negative screening in most areas. In addition, the majority of the funds also perform some form of positive screening in certain areas but mostly in combination with negative screening. The three areas where this occurs most are climate change, environment and human rights. Finally, Table 4.5 shows that the majority of the global SRI funds screen in 8 of the 10 areas. The screening practices of the global SRI funds, like those of the domestic funds, have the potential to significantly affect fund managers' investment choices. All of the SRI funds have smaller potential investment choice than matched conventional funds because of their screening practices, and this chapter investigates the impact of this on portfolios and whether geographical restrictions exaggerate these effects.

[12] This definition of the screening intensity used is the same as is used in Barnett and Saloman (2006).

## Table 4.2: Domestic SRI Funds Screening Practices

| SRI Fund | Alcohol | Animal Testing | Climate Change | Environment | Gambling | Genetic Engineering | Human Rights | Military | Porn | Tobacco |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N | | | N | N | | N | N | N | N |
| 2 | N | N | N+P | N+P | N | N | N+P | N | N | N |
| 3 | | N | N+P | N+P | N | N | N+P | N | N | N |
| 4 | N | N | N+P | N+P | N | N | N | N | N | N |
| 5 | | P | P | P | | P | P | P | | |
| 6 | | P | P | P | P | P | P | P | | |
| 7 | N | N | P | P | | | P | N | N | N |
| 8 | N | N | N+P | N+P | N | | N+P | N | N | N |
| 9 | N | N | N+P | N+P | N | | N+P | N | N | N |
| 10 | N | N | | N | | | N | N | | N |
| 11 | N | N | P | N | N | | N+P | N | N | N |
| 12 | N | N | P | N | N | | N+P | N | N | N |
| 13 | N | N | P | N | N | | N+P | N | N | N |
| 14 | N | N | P | N | N | | N+P | N | N | N |
| 15 | N | N | P | N | N | | N+P | N | N | N |
| 16 | N | P | N+P | N+P | N | N | N+P | N | N | N |
| 17 | | N | | N+P | | | | N | | N |
| 18 | N | N | N | N | N | N | N | N | N | |
| 19 | N | N | N | N | N | N | N | N | N | N |
| 20 | | N | N | N | N | | N | N | N | N |
| 21 | | N | N | N | N | | N | N | N | N |
| 22 | | N | | N+P | N | | N | N | N | N |
| 23 | N | | | N+P | N | | P | N | N | |
| 24 | N | N | | N+P | N | | N+P | N | N | N |
| 25 | | | | N | | N | N | N | N | N |
| 26 | N | N | | N+P | N | | N+P | N | N | |
| 27 | | N | | P | | | N | N | | N |
| 28 | | N | N+P | N+P | | N | | | | |
| 29 | N | N | | N+P | N | | N+P | N | N | |
| 30 | N | | | N+P | N | | N+P | N | | |
| 31 | N | | N | N+P | N | N | N+P | N | N | |
| 32 | N | N | N | N+P | N | N | N+P | | N | |

Table 4.2 reports the screening practices of the domestic SRI funds. It shows whether the funds screen with respect to each area and if so whether they use positive or negative screening or a combination of the two.

## Table 4.3: Domestic SRI Funds Screening Intensity

| | 2 Or More | 3 or more | 4 or More | 5 or more | 6 or more | 7 or more | 8 or more | 9 or more | All 10 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | X | X | X | X | X | X | | | |
| 2 | X | X | X | X | X | X | X | X | X |
| 3 | X | X | X | X | X | X | X | X | X |
| 4 | X | X | X | X | X | X | X | X | X |
| 5 | X | X | X | X | X | | | | |
| 6 | X | X | X | X | X | X | | | |
| 7 | X | X | X | X | X | X | X | | |
| 8 | X | X | X | X | X | X | X | X | |
| 9 | X | X | X | X | X | X | X | X | |
| 10 | X | X | X | X | X | | | | |
| 11 | X | X | X | X | X | X | X | X | |
| 12 | X | X | X | X | X | X | X | X | |
| 13 | X | X | X | X | X | X | X | X | |
| 14 | X | X | X | X | X | X | X | X | |
| 15 | X | X | X | X | X | X | X | X | |
| 16 | X | X | X | X | X | X | X | X | |
| 17 | X | X | X | | | | | | |
| 18 | X | X | X | X | X | X | X | X | |
| 19 | X | X | X | X | X | X | X | X | X |
| 20 | X | X | X | X | X | X | X | | |
| 21 | X | X | X | X | X | X | X | | |
| 22 | X | X | X | X | X | X | | | |
| 23 | X | X | X | X | X | | | | |
| 24 | X | X | X | X | X | X | X | | |
| 25 | X | X | X | X | X | | | | |
| 26 | X | X | X | X | X | X | | | |
| 27 | X | X | X | X | | | | | |
| 28 | X | X | X | | | | | | |
| 29 | X | X | X | X | X | X | | | |
| 30 | X | X | X | X | | | | | |
| 31 | X | X | X | X | X | X | X | | |
| 32 | X | X | X | X | X | X | X | | |

Table 4.3 reports the intensity of the domestic SRI funds screening, it shows whether each fund screens in 2 or more, 3 or more, 5 or more, 6 or more, 7 or more, 8 or more, 9 or more or all 10 areas.

## Table 4.4: Global SRI Funds Screening Practices

| SRI Fund | Alcohol | Animal Testing | Climate Change | Environment | Gambling | Genetic Engineering | Human Rights | Military | Porn | Tobacco |
|---|---|---|---|---|---|---|---|---|---|---|
| 33 | N | N | | N+P | N | | N+P | N | N | N |
| 34 | | | P | P | | | | | | |
| 35 | N | N | N+P | N+P | N | N | N+P | N | N | N |
| 36 | N | N | N+P | N+P | N | N | N | N | N | N |
| 37 | N | N | N+P | N+P | N | N | N | N | N | N |
| 38 | | N | N+P | N+P | | N | P | N | N | N |
| 39 | | N | | N+P | N | | N | N | N | N |
| 40 | N | N | N+P | N+P | N | | N+P | N | N | N |
| 41 | N | N | N+P | N+P | N | | N | N | N | N |
| 42 | N | N | N+P | N+P | N | | N | N | N | |
| 43 | N | N | N+P | N+P | N | N | N+P | N | N | N |
| 44 | N | N | N+P | N+P | N | N | N+P | N | N | N |
| 45 | | | P | P | | | | | | |
| 46 | | N | N+P | N+P | N | | N | N | N | N |
| 47 | N | N | | N+P | N | N | | N | N | N |
| 48 | | | | P | | | | | | |
| 49 | | | N+P | N+P | | | | | | |
| 50 | N | N | | N+P | N | | N+P | N | N | N |
| 51 | | N | N | N | | N | | N | | |
| 52 | N | | | | N | | | N | | N |
| 53 | | | | | N | | | N | N | N |

Table 4.4 reports the screening practices of the global SRI funds. It shows whether the funds screen with respect to each area and if so whether they use positive or negative screening or a combination of the two.

**Table 4.5: Global SRI Funds Screening Intensity**

| | 2 Or More | 3 or more | 4 or More | 5 or more | 6 or more | 7 or more | 8 or more | 9 or more | All 10 |
|---|---|---|---|---|---|---|---|---|---|
| 33 | X | X | X | X | X | X | X | | |
| 34 | X | | | | | | | | |
| 35 | X | X | X | X | X | X | X | X | X |
| 36 | X | X | X | X | X | X | X | X | X |
| 37 | X | X | X | X | X | X | X | X | X |
| 38 | X | X | X | X | X | X | X | | |
| 39 | X | X | X | X | X | X | | | |
| 40 | X | X | X | X | X | X | X | X | |
| 41 | X | X | X | X | X | X | X | X | |
| 42 | X | X | X | X | X | X | X | | |
| 43 | X | X | X | X | X | X | X | X | X |
| 44 | X | X | X | X | X | X | X | X | X |
| 45 | X | | | | | | | | |
| 46 | X | X | X | X | X | X | X | | |
| 47 | X | X | X | X | X | X | X | | |
| 48 | X | | | | | | | | |
| 49 | X | X | | | | | | | |
| 50 | X | X | X | X | X | X | X | | |
| 51 | X | X | X | X | | | | | |
| 52 | X | X | X | | | | | | |
| 53 | X | X | X | | | | | | |

Table 4.5 reports the intensity of the global SRI funds screening, it shows whether each fund screens in 2 or more, 3 or more, 5 or more, 6 or more, 7 or more, 8 or more, 9 or more or all 10 areas.

Compared to the US SRI indices analysed in Chapter 3, the UK SRI funds used in this chapter employ a far higher proportion of negative screening and far less positive screening. The US SRI indices primarily use positive and restricted screening. This difference is important because the use of positive and restricted screening does not necessarily result in entire industries being screened out and consequently do not necessarily affect the industry exposures of SRI portfolios. It is therefore possible that the industry weightings of the US SRI indices may be less affected by their screening practices than the UK SRI funds analysed in this chapter. There is an important distinction between the screening used in the construction of US SRI portfolios, indices and funds compared to UK SRI funds. This may be the result of cultural differences between the desires of US and UK SRI investors, but presents a very interesting motivation to investigate the potential impact of more restricted

screening methods on fund characteristics and performance. The UK SRI industry, which is also commonly called the ethical investing industry in the UK, has traditionally been associated with negative screening and in particular the screening out of potential investment in the "sin sectors" (alcohol, tobacco, gambling, pornography and armament). In contrast, within the US SRI industry there has traditionally been more of a focus on promoting investment in companies which have a positive impact on society. It is therefore unsurprising that the US indices and funds which are analysed in this thesis have more of a focus on positive and restrictive screening, than the UK funds which are analysed in this chapter that have more of a focus on negative screening.

The next section presents the performance and risk analysis of the SRI funds. This chapter uses two approaches to analyse the performance of UK SRI funds. The first is to analyse the performance of individual SRI funds. This approach differs from that of more recent work in this area such as Bauer et al. (2005), Gregory and Whittaker (2007) and Renneboog et al. (2008a) which focus on analysing the performance of portfolios of SRI funds. The chapter also incorporates the portfolio based methodology of grouping funds into a portfolio. Using both methodologies allows an analysis of whether the portfolio based methodology results in the averaging of any affects SRI screening has on the performance of SRI funds and therefore a loss of statistical significance.

## 4.3 Performance and Risk Evaluation

### 4.3.1 Jensen Alpha Tests

Table 4.6 summarises the findings from the tests of the individual domestic and global funds. The domestic SRI funds' mean risk-adjusted performances (0.2967) are lower than those of their conventional counterparts (0.6153). T-tests of the mean alpha measures show significantly lower performance by the SRI funds. T-tests between the mean beta measures show significantly higher levels of systematic risk.

The global SRI funds mean risk-adjusted performances are also lower than those of their conventional counterparts but the t-tests of the means do not indicate significantly lower performance. Importantly, there is no statistically significant difference between the mean betas of the global SRI and conventional funds and this is in direct contrast to the domestic

funds. While both sets of global funds' levels of systematic risk are close to one, the conventional funds betas are on average slightly closer. These results suggest that the practice of SRI screening may slightly affect the systematic risk levels of the global SRI funds.

Interestingly, the mean betas of the domestic SRI funds are higher and closer to one than the conventional funds. This suggests that the SRI funds carry more systematic risk and that their performances are closer to the performance of the FTSE All Share Index. This finding indicates that the constraint of having to screen ethically results in the SRI fund manager's performance being similar to the market. This is consistent with SRI fund manager holdings stocks that are representative of the index's performance. This may be because their choice is limited by the constraints imposed by the requirement to screen, or because SRI fund managers are more inclined to track the benchmark index more closely since their investors are achieving an additional psychological return and may therefore be less demanding on the financial performance of the SRI funds.

**Table 4.6: Comparison of the SRI and Conventional Funds Performance and Systematic Risk Levels**

| Domestic Funds | Mean α | Mean β |
|---|---|---|
| Domestic SRI Funds | 0.2967 | 0.8704 |
| Domestic Conventional Funds | 0.6153 | 0.8276 |
| t-tests between sample means | **-7.0408*** ** | **5.5831** ** |
| Global Funds | Mean α | Mean β |
| Global SRI Funds | 0.2396 | 0.8758 |
| Global Conventional Funds | 0.3826 | 1.0888 |
| t-tests between samples means | -0.5036 | -0.4282 |

Table 4.6 reports the Jensen alpha and beta measures. The estimations of the alphas are in monthly percentage terms. The table also reports t-tests between the mean alphas and betas of the SRI and conventional funds. *, ** and *** show significance levels at the 10%, 5% and 1% thresholds respectively. Coefficients that are statistically significant are denoted in bold.

Whilst Table 4.6 shows averages across funds, Table 4.7 includes information on the distribution of α and β estimates across funds. Table 4.7 shows that a lower percentage of domestic SRI funds' alphas are statistically significant compared to the domestic conventional funds. The alphas of the domestic SRI funds are less often statistically significantly different from zero. The vast majority of the alphas of both groups of funds are

positive and more of these alphas are significant for the conventional funds than the SRI funds. This indicates that the domestic SRI funds underperformed their conventional counterparts. The results are consistent with SRI screening having a detrimental effect on the risk-adjusted performance of the domestic SRI funds.

Table 4.7 also shows that a far higher percentage of the global conventional funds have positive alphas compared to global SRI funds (85% compared to 52%). In addition, a larger percentage of the conventional funds' alphas are statistically significant than for the SRI funds (9% compared to 5% at the 5% level). The results indicate a slight underperformance by the global SRI funds; however, this underperformance is less severe than for the domestic SRI funds. This indicates that Global SRI funds may be less affected by screening than domestic SRI funds. This is likely to be because post screening global SRI fund managers are more able to purchase assets with the potential to provide a good return and to diversify risk effectively than domestic SRI fund managers due to their larger investment universe.

These results are not consistent with Bauer et al. (2005) and Gregory and Whittaker (2007) who find no statistically significant difference in performance between SRI and conventional funds in both domestic and global samples. The results in this section are partially consistent with Renneboog et al. (2008a) who find some evidence of SRI investors paying a price for their ethics, but Renneboog et al. (2008a) find that the difference between the risk-adjusted returns of SRI and conventional funds is not always statistically significant. The differences in the findings between those in this section and those of prior literature may be the result of differences in the methodology used. Bauer et al. (2005), Gregory and Whittaker (2007) and Renneboog et al. (2008a) use a portfolio of funds approach, while the analysis in this section tests the performance of each fund independently. Fund portfolio based analysis is performed later in this chapter to test whether the results are consistent with these other studies[13].

[13] These findings are also consistent with those from Sharpe Ratio tests which were performed but not reported in this Chapter.

**Table 4.7: Analysis of the Statistical Significance of the Alphas and Betas of the SRI and Conventional Funds**

| Domestic Funds | Positive α | Negative α | Significant α at the 10% Level | Significant α at the 5% Level | Significant α at the 1% Level | Significant β at the 10% Level | Significant β at the 5% Level | Significant β at the 1% Level |
|---|---|---|---|---|---|---|---|---|
| Number of SRI Funds | 29 | 3 | 10 | 3 | 0 | 27 | 24 | 24 |
| Percentage SRI Funds | 91% | 9% | 31% | 9% | 0% | 84% | 75% | 75% |
| Number of Conventional Funds | 559 | 7 | 344 | 204 | 89 | 522 | 509 | 488 |
| Percentage of Conventional Funds | 99% | 1% | 61% | 36% | 16% | 92% | 90% | 86% |
| Global Funds | Positive α | Negative α | Significant α at the 10% Level | Significant α at the 5% Level | Significant α at the 1% Level | Significant β at the 10% Level | Significant β at the 5% Level | Significant β at the 1% Level |
| Number SRI Funds | 11 | 10 | 1 | 1 | 0 | 19 | 19 | 19 |
| Percentage SRI Funds | 52% | 48% | 5% | 5% | 0% | 90% | 90% | 90% |
| Number Conventional Funds | 351 | 59 | 63 | 38 | 7 | 282 | 275 | 271 |
| Percentage Conventional Funds | 85% | 14% | 15% | 9% | 2% | 69% | 67% | 66% |

Table 4.7 reports the number and percentages of the funds' alphas and betas which were significant at the 10%, 5% and 1% significance levels, the number and percentage of the alphas which were positive and those which were negative. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

### 4.3.2 Four Factor Model Tests

The results presented in Table 4.8 indicate that when the four factor Carhart (1997) model is used, the domestic SRI funds' mean alpha is lower than that of the domestic conventional funds on average. The t-tests between the mean alphas and betas indicate that performance and market risk exposure were statistically significantly different between the SRI and conventional domestic funds. The t-tests between the mean exposures of the funds to the Fama and French (1993) size, book-to-market factors and the Carhart (1997) momentum factor indicate that exposures of the domestic SRI funds were statistically significantly different from the exposures of the domestic conventional funds. The results also indicate that the global SRI funds' mean alpha is slightly lower than that of the global conventional funds. However, the t-test between the mean alphas of the global SRI and conventional funds show that they are not significantly different from each other statistically. In addition, the t-tests between the mean betas and the mean exposures of the funds to the size, book-to-market and momentum factors indicate that the exposures of the global SRI and conventional funds were not statistically significantly different.

**Table 4.8: SRI and Conventional Funds Performance and Systematic Risk Levels**

| Domestic Funds | Mean α | Mean β | Mean SMB | Mean HML | Mean MOM |
|---|---|---|---|---|---|
| Domestic SRI | 0.4391 | 0.8547 | 0.1083 | -0.1401 | -0.0929 |
| Domestic Conventional | 0.9697 | 0.8277 | -0.2602 | 0.1849 | -0.2124 |
| t-tests between sample means | **-7.4812*** ** | **3.0975*** ** | **11.5060*** ** | **-6.6678*** ** | **4.9300*** ** |
| Global Funds | Mean α | Mean β | Mean SMB | Mean HML | Mean MOM |
| Global SRI | -0.0995 | 0.8277 | 1.1343 | -0.2226 | -0.1019 |
| Global Conventional | -0.0428 | 1.1251 | 0.4957 | -0.9516 | 0.1180 |
| t-tests between sample means | -0.0598 | -0.4232 | 2.9749*** | 0.2469 | -0.4219 |

Table 4.8 reports the results of estimations using the four factor alpha performance measure. Estimations are in monthly percentage terms. The table also reports t-tests between the mean alpha, beta, size, book-to-market and momentum coefficients. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold.

Table 4.9 shows that for both sets of domestic funds the majority of the alphas are positive, which suggests that the funds outperformed the FTSE All share. A higher percentage of the domestic conventional funds' alphas are statistically significant than for the SRI funds. 54% of the conventional funds' alphas are statistically significant at the 5% level of significance, 23% at the 1% level. Comparatively only 25% and 13% of the domestic SRI funds are significant at the same levels. Interestingly for global funds, Table 4.9 shows a mixture of positive and negative alphas. For instance, for the global SRI funds, 25% of the alphas were positive and 41% were negative, while for the global conventional funds 80% of the alphas were positive and 20% were negative.

Regarding significance, 0% of the global SRI funds' alphas were statistically significant at the 5% and 10% levels. Meanwhile 4% of the global conventional funds were statistically significant at the 5% level and 0% were significant at the 5% level. Therefore, for both sets of global funds, risk-adjusted performance was rarely statistically significantly different from that of the FTSE All World Index, their global market benchmark. This is in stark contrast to the performance of domestic funds which tended to outperform their market index (the FTSE All Share).

Table 4.9 also shows that only 22% of the global SRI funds have significant exposure to the Fama and French (1993) size factor at the 5% significance level, and 3% of them at the

1% level. In contrast, for the global conventional funds, the size factor is significant for 53% of the funds at the 5% significance level and 29% at the 1% level of significance. In addition, Table 4.9 shows that for both SRI and conventional global funds, the majority of the Fama and French (1993) book-to-market and Carhart (1997) momentum factors are not statistically significant. For example, only 13% of the global SRI funds have significant exposure to the Fama and French (1993) book-to-market factor at the 5% level of significance and 3% at the 1% level of significance, while 16% of the global conventional funds have significant exposure to the book-to-market factor at the 5% level of significance and 7% at the 1% level of significance. In this section, the results indicate that the practice of ethically screening affects the performance of the SRI funds available to the UK retail market, but that these effects are more pronounced for those funds which can only invest in the UK stock market. These findings indicate that the global SRI funds are less affected by screening than domestic SRI funds and it is likely that this is because they have a greater investment choice.

Interestingly, the results from the four factor tests indicate that the practice of ethically screening may result in both sets of SRI funds having different exposures to the Fama and French (1993) and Carhart (1997) factors. In particular, there is evidence that they are less exposed to the size (SMB) factor than their conventional counterparts and this finding would be consistent with them having more exposure to large stocks. This result supports the hypothesis that SRI fund managers hold stocks that are more representative of their benchmark indices because UK SRI fund managers are more inclined to track the benchmark index more closely since their investors are achieving an additional psychological return and may therefore be less demanding on the financial performance of the SRI funds. Therefore, the UK SRI funds managers are not as pressured to achieve alpha as their conventional counterparts and are consequently less inclined to hold more risky smaller cap stocks.

## Table 4.9: Analysis of the Statistical Significance of the Alphas, Betas, Size, Book-to-Market and Momentum coefficients of the Funds

| Domestic Funds | Number of Positive α | Number of Negative α | Significant α at the10% Level | Significant α at the 5% Level | Significant α at the 1% Level | Significant β at 10% Level | Significant β at the 5% Level | Significant β at the 1% Level | |
|---|---|---|---|---|---|---|---|---|---|
| Number of SRI Funds | 31 | 1 | 16 | 8 | 4 | 30 | 28 | 28 | |
| Percentage of SRI Funds | 97% | 3% | 50% | 25% | 13% | 94% | 88% | 88% | |
| Number of Conventional Funds | 565 | 1 | 461 | 305 | 129 | 542 | 530 | 514 | |
| Percentage of Conventional Funds | 100% | 0% | 81% | 54% | 23% | 96% | 94% | 91% | |
| | Significant SMB at the 10% Level | Significant SMB at the 5% Level | Significant SMB at the 1% Level | Significant HML at the 10% Level | Significant HML at the 5% Level | Significant HML at the 1% Level | Significant MOM at the 10% Level | Significant MOM at the 5% Level | Significant MOM at the 1% Level |
| Number of SRI Funds | 12 | 7 | 5 | 11 | 8 | 7 | 7 | 5 | 3 |
| Percentage of SRI Funds | 38% | 22% | 16% | 34% | 25% | 22% | 22% | 16% | 9% |
| Number of Conventional Funds | 149 | 84 | 9 | 121 | 41 | 5 | 222 | 192 | 65 |
| Percentage of Conventional Funds | 26% | 15% | 2% | 21% | 7% | 1% | 39% | 34% | 11% |
| Global funds | Number of Positive α | Number of Negative α | Significant α at 10% Level | Significant α at the 5% Level | Significant α at the 1% Level | Significant β at 10% Level | Significant β at the 5% Level | Significant β at the 1% Level | |
| Number of SRI Funds | 8 | 13 | 1 | 0 | 0 | 19 | 19 | 16 | |
| Percentage of SRI Funds | 25% | 41% | 3% | 0% | 0% | 90% | 90% | 76% | |
| Number of Conventional Funds | 328 | 83 | 46 | 17 | 0 | 333 | 328 | 319 | |
| Percentage of Conventional Funds | 80% | 20% | 11% | 4% | 0% | 81% | 80% | 78% | |
| | Significant SMB at the 10% Level | Significant SMB at the 5% Level | Significant SMB at the 1% Level | Significant HML at the 10% Level | Significant HML at the 5% Level | Significant HML at the 1% Level | Significant MOM at the 10% Level | Significant MOM at the 5% Level | Significant MOM at the 1% Level |
| Number SRI Funds | 9 | 7 | 1 | 4 | 4 | 1 | 0 | 0 | 0 |
| Percentage of SRI Funds | 28% | 22% | 3% | 13% | 13% | 3% | 0% | 0% | 0% |
| Number of Conventional Funds | 273 | 216 | 121 | 99 | 64 | 29 | 114 | 80 | 26 |
| Percentage of Conventional Funds | 66% | 53% | 29% | 24% | 16% | 7% | 28% | 19% | 6% |

Table 4.9 reports the number and percentage of the funds alpha, beta, Fama and French (1993) size and Book-to-market and carhart (1997) momentum factor coefficients from four factor Jensen alpha test which were significant at the 10%, 5% and 1% significance levels. The number and percentage of the alphas which were positive and negative. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

## 4.4 Asymmetric Performance Analysis

The analysis in this section uses asymmetric models to analyse the performance of UK SRI funds relative to conventional UK funds. The use of these models allows for the risk-adjusted performance of SRI and conventional funds to be analysed across different asymmetric stages of the UK stock market cycle. There are numerous reasons why the performance of SRI funds and conventional funds may differ over stock market cycles and these are discussed in detail in Chapter 2. In addition, the work uses the three and four factor asymmetric models which incorporate Fama and French's (1993) small minus big (SMB) and value minus growth (HML) factors, and Carhart's (1997) momentum factor, to allow for a more accurate measurement of the risk-adjusted returns of the SRI and conventional portfolios across asymmetric stages of the UK stock market cycle.

Table 4.10 shows that the differences between the mean alphas of the domestic SRI and conventional funds are significantly different in both periods and that the domestic UK SRI funds performed worse than their conventional counterparts in both periods. The results indicate that the domestic SRI funds symmetric underperformance presented earlier is a result of the funds underperformance in both periods. Table 4.10 also shows results for the global SRI and conventional funds, indicating that the global SRI funds also underperformed during market expansion and contraction periods. However, in contrast to the domestic funds, the t-tests between the mean alphas of the global SRI and conventional funds are not significantly different in either market expansion or contraction periods.

**Table 4.10: The Asymmetric Performance and Systematic Risk Level of the Funds**

| Domestic Funds | Mean α+ | Mean α- | Mean β + | Mean β - |
|---|---|---|---|---|
| Domestic SRI | -1.8959 | 1.8408 | 0.9147 | 0.9128 |
| Domestic Conventional | -1.2231 | 3.2251 | 0.8766 | 0.8868 |
| t-tests between sample means | **5.3651*** ** | **-12.5731*** ** | **5.9396** ** | **4.0239** ** |
| Global Funds | Mean α+ | Mean α- | Mean β + | Mean β - |
| Global SRI | -0.6792 | 2.2543 | 0.9584 | 1.0391 |
| Global Conventional | -0.0342 | 2.6185 | 0.9414 | 1.3854 |
| t-tests between samples means | -0.6126 | -0.0552 | 1.2368 | -0.2797 |

Table 4.10 reports the asymmetric Jensen alpha and beta measures. The estimations of the alphas are in monthly percentage terms. The table also reports t-tests between the mean alphas and betas of the SRI and conventional funds. *, ** and *** show significance levels at the 10%, 5% and 1% thresholds respectively. Coefficients that are statistically significant are denoted in bold. The + notation indicates periods of market expansion – contraction.

Consistent with the previous section, Table 4.11 shows more detail referring to the distribution of estimates of the individual funds. The results show most domestic SRI and conventional funds' alphas were negative during market expansion periods and positive during contraction periods. These results are consistent with those in Table 4.11 and show that both samples of domestic funds underperformed in market expansion periods and outperformed during contraction periods. For the domestic SRI funds 63% of the expansion period alphas are statistically significant at the 5% level and 48% are significant at the 1% level. Meanwhile, 91% of the contraction period alphas are statistically significant at the 5% level and 69% at the 1% level. With respect to the domestic conventional funds, 80% of the expansion period alphas are statistically significant at the 5% significance level and 58% at the 1% level. 98% of the contraction period alphas are statistically significant at the 5% and 93% at the 1% significance level. The results in Table 4.11 also show that in expansion periods the majority of the global SRI funds alphas are negative with 57% significant at the 5% level and 43% at the 1% level. In contraction periods 95% of the global SRI funds alphas are positive with 71% being significant at the 5% significance level and 62% at the 1% level. Similarly, the findings for the global conventional funds show that the majority of alphas in expansion periods are negative and that the majority of alphas are positive in contraction periods. A higher percentage of the global conventional funds alphas are statistically significant in the contraction periods than the expansion periods. For example, 38% and 26% of alphas are statistically significant at the 5% and 1% significance levels respectively, while in contrast in expansion periods only 18% and 9% of the corresponding alphas are statistically significant at the respective levels of significance. These results indicate that the global SRI and conventional global funds underperform the FTSE ALL World in expansion periods and outperform in contraction periods. These findings are broadly consistent with those of the domestic funds.

The results presented in Tables 4.10 and 4.11 indicate that the domestic SRI funds significantly underperform conventional funds during both contraction and expansion periods. The results also indicate that global SRI funds underperformed their conventional

counterparts during market expansion and contraction periods. However, the findings indicate that this underperformance was less severe for the global SRI funds[14].

**Table 4.11: Analysis of the Statistical Significance of the Alphas, Betas, Size, Book-to-Market and Momentum Coefficients of the Funds**

| Domestic Funds | Number α + Positive | Number of α + Negative | α + at the 10% Level | α + at the 5% Level | α + at the 1% Level | β + at the 10% Level | β+ at the 5% level | β+at the 1% Level |
|---|---|---|---|---|---|---|---|---|
| Number of SRI Funds | 2 | 30 | 21 | 20 | 14 | 28 | 27 | 27 |
| Percentage of SRI Funds | 6% | 94% | 65% | 63% | 48% | 89% | 84% | 84% |
| Number of Conventional Funds | 10 | 556 | 495 | 451 | 330 | 565 | 549 | 543 |
| Percentage of Conventional Funds | 2% | 98% | 87% | 80% | 58% | 99% | 97% | 96% |
| | Number of α -Positive | Number of α - Negative | α –at the 10% Level | α-at the 5% Level | α-at the 1% Level | β-at the 10% Level | β- at the 5% Level | β-at the 1% Level |
| Number of SRI Funds | 31 | 1 | 29 | 29 | 22 | 31 | 30 | 30 |
| Percentage of SRI Funds | 97% | 3% | 91% | 91% | 69% | 97% | 94% | 94% |
| Number of Conventional Funds | 554 | 12 | 564 | 556 | 524 | 558 | 553 | 546 |
| Percentage of Conventional Funds | 98% | 2% | 99% | 98% | 93% | 99% | 98% | 94% |
| Global Funds | Number of α + Positive | Number of α + Negative | α +at the 10% Level | α+at the 5% Level | α + at the 1% Level | β+at the 10% Level | β+ at the 5% Level | β+ at the 1% Level |
| Number of SRI Funds | 2 | 19 | 12 | 12 | 9 | 20 | 18 | 14 |
| Percentage of SRI Funds | 10% | 90% | 57% | 57% | 43% | 95% | 86% | 14% |
| Number of Conventional Funds | 178 | 233 | 117 | 74 | 37 | 352 | 352 | 352 |
| Percentage of Conventional Funds | 43% | 57% | 28% | 18% | 9% | 86% | 86% | 86% |
| | Number of α - Positive | Number of α- Negative | α-at the 10% Level | α- at the 5% Level | α-at the 1% Level | β-at the 10% Level | β-at the 5% Level | β-at the 1% Level |
| Number of SRI Funds | 20 | 1 | 16 | 15 | 13 | 12 | 9 | 7 |
| Percentage of SRI Funds | 95% | 5% | 76% | 71% | 62% | 57% | 43% | 33% |
| Number of Conventional Funds | 393 | 18 | 217 | 156 | 107 | 64 | 62 | 58 |
| Percentage of Conventional Funds | 96% | 4% | 53% | 38% | 26% | 16% | 15% | 14% |

Table 4.11 reports the number and percentage of the funds alpha and beta coefficients from Asymmetric Jensen alpha tests which were significant at the 10%, 5% and 1% significance levels. The number and percentage of the alphas which were positive and negative. The + notation indicates periods of market expansion and the – notation indicates periods of market contraction. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

In summary, the results from the Jensen alpha tests presented in Table 4.6 indicate that the practice of screening affected the risk-adjusted performance of the domestic SRI funds detrimentally because their mean alpha is lower than that of their conventional counterparts. The results presented in Table 4.7 support this finding because while the vast majority of the alphas of both groups of funds are shown to be positive, a lower percentage of the domestic SRI funds' alphas are statistically significant than for the domestic conventional funds. The results shown in Tables 4.6 and 4.7 also indicate that the global SRI funds

[14] Four Factor Asymmetric model tests were also performed on the domestic and global funds. The findings of these tests were consistent with those presented in this chapter. The results from these tests are not presented in this thesis.

performed worse than their conventional counterparts in general. However, analysis of the findings indicates that the underperformance of the global SRI funds was far less severe than was the case for the domestic SRI funds. This is likely to be because they have a greater investment choice making it relatively easy for a global SRI fund manager to select a portfolio of attractive investments, even after screening has limited the fund's potential investment universe. These results clearly show that the size of an SRI funds investment choice is an important factor that should be considered by investors. Those SRI funds with smaller investment universes are likely to be affected detrimentally by their requirement to screen ethically compared to those with larger investment choices.

The results from the single factor asymmetric Jensen alpha tests indicate that the domestic SRI and conventional funds underperformed their market benchmarks in periods of market expansion, but outperformed in periods of market contraction[15]. The discovery that so many of the funds available to UK retail investors only outperform market benchmarks during market contraction periods is a very important and interesting finding. This finding for the UK fund market is consistent with that of Kosowski (2011) who documents that US funds perform better relative to market benchmarks during economic and business cycle contractions than during economic and business expansion periods. Kosowski's (2011) study does not specifically focus on SRI fund performance. The implication for investors is that investing in, or switching to, actively managed funds as opposed to holding trackers or ETF's, and incurring the additional costs that come with this form of investment, would seem to be sensible if they believe there is likely to be a sustained periods of market decline. In contrast the indication is that if they believe that there is likely to be a sustained period of stock market growth, they would achieve better returns if they invest in relatively cheap funds that track the stock market or ETF's.

In addition, the findings reported in this section indicate that the domestic SRI funds significantly underperformed the domestic conventional funds during contraction and expansion periods. The results also indicate that the global SRI funds underperformed their conventional counterparts during market expansion and contraction periods. However, the findings indicate that this underperformance was less severe for the global SRI funds than it was for the domestic SRI funds. This suggests that while both the domestic and the global

[15] Tests were also performed using the four factor asymmetric model and these results were consistent with those presented in this section.

SRI funds' performance was affected by screening, the size of the stock choice available to the global SRI funds may have protected their performance.

The results from the performance analysis presented in earlier indicate that the practice of ethically screening is associated with a detrimental risk-adjusted performance, particularly for those SRI funds which can only invest in the UK stock market. These results are not consistent with Bauer et al. (2005), or Gregory and Whittaker (2007), who find no statistically significant difference in performance between UK ethical and UK conventional mutual funds (for both domestic and global funds). These results are partially consistent with Renneboog et al. (2008a) who find some evidence of SRI investors paying a price for their ethics, but the difference between the risk-adjusted returns of UK SRI and conventional funds are not statistically significant in their study. The differences in the findings within this chapter and those of Bauer et al (2005), Gregory and Whittaker (2007), and Renneboog et al. (2008a) may be the result of the differences in methodology. The prior studies investigate the performance of portfolios of funds using of their equally-weighted returns. The analysis in this section focused on analysing the performance of individual funds because the aggregation of the fund returns in the fund portfolio approach can result in the averaging of any effects of SRI screening on performance and therefore a loss of statistical significance. In the following section, the analysis uses the fund portfolio approach in order to test explicitly whether the performance differentials presented thus far in this chapter are due to methodology used and in order to provide analysis which is consistent with prior studies.

## 4.5 Portfolio Based Analysis

This section presents the analysis of the risk-adjusted performance of the funds when performed using equally-weighted portfolios of individual fund returns. Performance tests are performed on the whole period and two sample periods: January 1990 to January 2001 and February 2001 to January 2012. Subperiods are used in order to analyse whether the performance of the SRI funds has changed over time. In addition, the most recent noteworthy papers on the performance of UK SRI funds are Gregory and Whittaker (2007) and Renneboorg et al. (2008a) which had sample periods of 1989 to 2002 and 1987 to 2003, respectively. Therefore, the analysis of the performance of the SRI funds in the first subperiod overlaps with the sample periods of these studies. Importantly, the performance of

SRI funds during the latter subperiod has not been analysed and therefore it is important that the performance of the funds is analysed across this period.

### 4.5.1 Jensen Alpha Model and Four Factor Jensen Alpha Model Tests

Table 4.12 shows results from tests of the performance of portfolios of the domestic and global SRI funds using the Jensen alpha and four factor Jensen alpha models. In these tests the domestic and global conventional fund portfolios are used as the market benchmarks for the domestic SRI and global fund portfolios, respectively. The results show that the alphas for both the domestic and SRI portfolios are negative over the whole period and this indicates that the SRI fund portfolios underperformed their conventional counterparts, in general. These findings are consistent with the results from the individual fund analysis. Interestingly, the alphas of both the SRI funds are negative during the later time period but positive during the earlier period and this indicates that the SRI portfolios performance relative to the conventional fund portfolios may have worsened in the latter period. However, importantly, over the whole period and both subperiods the performance differences between the domestic and global SRI portfolios and their conventional benchmark portfolios are shown to be not statistically significant.

**Table 4.12: The Symmetric Performance of the SRI Fund Portfolios**

| Domestic SRI | α | β | SMB | HML | MOM |
|---|---|---|---|---|---|
| Whole of Period | -0.0520 | **0.5909*** ** | | | |
| Whole of Period | -0.0157 | **0.5394*** ** | **0.4212*** ** | 0.0067 | 0.0449 |
| 1990-2001 | 0.2441 | **0.5313** ** | | | |
| 1990-2001 | 0.2043 | **0.508*** ** | **0.4863*** ** | **0.1599** ** | 0.1044 |
| 2001-2012 | -0.0994 | **0.6287** * | | | |
| 2001-2012 | -0.1925 | **0.5746** ** | **0.4695** ** | -0.1057 | 0.0830 |
| Global SRI | α | β | SMB | HML | MOM |
| Whole of period | -0.0461 | **0.5816*** ** | | | |
| Whole of period | -0.0147 | **0.5447** * | **0.4695*** ** | 0.0509 | -0.0653 |
| 1990-2001 | 0.1327 | 0.5678 | | | |
| 1990-2001 | 0.1881 | **0.5345** ** | **0.4042*** ** | 0.1427 | 0.0881 |
| 2001-2012 | -0.2172 | **0.5876*** ** | | | |
| 2001-2012 | -0.3469 | **0.5146*** ** | **0.0001** ** | 0.1228 | **-0.1685** ** |

Table 4.12 reports the results of estimations using the Jensen alpha and four factor performance measures. The estimations of the alphas are in monthly percentage terms. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

Table 4.13 shows results from tests of the performance of the portfolios of the domestic and global SRI, and conventional funds using the Jensen alpha and four factor Jensen alpha models. In these tests, the FTSE All Share is used as the market benchmark for the domestic fund portfolios and the FTSE All World is used as the market benchmark for the global fund portfolios. A comparison of the results for the domestic SRI and conventional fund portfolios show that the domestic conventional fund portfolio had a higher alpha than the domestic SRI portfolio across all sample periods. The alphas for domestic conventional portfolio is statistically significant across all time periods and models except for when the Jensen alpha model is used to analyse performance in the later time period. With respect to the domestic SRI portfolio the alphas are only significant when the four factor model is used to test performance across the whole period and when the Jensen alpha model is used to test performance in the earlier period.

The results in Table 4.13 with respect to the global fund portfolios show that global conventional fund portfolio had higher alphas across the whole period than the global SRI portfolio when both models were used. These results indicate that in general over the whole period the global conventional fund portfolio performed better than the global SRI portfolio. Importantly, the alpha for the conventional global portfolio over the whole period, when the Jensen alpha model is used is statistically significant and this indicates that it outperformed the FTSE All World at a statistically significant level over this time period, albeit only at the 10% level of significance. None of the global SRI portfolios alphas are significant.

**Table 4.13: The Symmetric Performance of the Portfolios vs the FTSE ALL Share and FTSE All World**

| Domestic SRI | α | β | SMB | HML | MOM |
|---|---|---|---|---|---|
| Whole of Period | 0.1727 | **0.6116*** ** | | | |
| Whole of Period | **0.2418**** | **0.5404*** ** | **0.2367*** ** | -0.0521 | -0.0476 |
| 1990-2001 | 0.2765 | **0.6328**** | | | |
| 1990-2001 | **0.3158**** | **0.5542**** | **0.2748*** ** | 0.0294 | 0.0066 |
| 2001-2012 | 0.0513 | **0.5967**** | | | |
| 2001-2012 | 0.1461 | **0.5218*** ** | **0.2349**** | -0.0832 | -0.0587 |
| Domestic Conventional | α | β | SMB | HML | MOM |
| Whole of Period | **0.4106**** | **0.3785*** ** | | | |
| Whole of Period | **0.6262*** ** | **0.3647**** | -0.0340 | -0.0598 | **-0.1955*** ** |
| 1990-2001 | **0.6323*** ** | **0.3248*** ** | | | |
| 1990-2001 | **0.6646*** ** | **0.3539*** | -0.0875 | -0.0649 | -0.0919 |
| 2001-2012 | 0.2228 | **0.4046*** | | | |
| 2001-2012 | **0.5707**** | **0.3677*** ** | -0.0922 | 0.0261 | **-0.2713*** ** |
| Global SRI | α | β | SMB | HML | MOM |
| whole of period | 0.1136 | **0.4537*** | | | |
| whole of period | 0.1251 | **0.4718*** | **0.7173*** ** | 0.0122 | **-0.0826**** |
| 1990-2001 | 0.4117 | 0.2422 | | | |
| 1990-2001 | 0.4470 | 0.3092 | **0.5344*** ** | 0.1082 | 0.0759 |
| 2001-2012 | 0.0353 | **0.5573**** | | | |
| 2001-2012 | -0.1797 | **0.5256**** | **0.0009*** ** | -0.0511 | -0.0861 |
| Global Conventional | α | β | SMB | HML | MOM |
| whole of period | **0.3154*** | **0.7125*** | | | |
| whole of period | 0.3870 | **0.7099*** | **0.4479*** ** | -0.1285 | -0.0602 |
| 1990-2001 | 0.1975 | **0.6333*** ** | | | |
| 1990-2001 | 0.2873 | **0.6757**** | **0.3556*** ** | 0.0110 | -0.0144 |
| 2001-2012 | **0.4308*** | **0.7562**** | | | |
| 2001-2012 | 0.3830 | **0.7585*** ** | **0.0006*** ** | -0.3333 | 0.0217 |

Table 4.13 reports the results of estimations using the Jensen alpha and four factor performance measures. The estimations of the alphas are in monthly percentage terms. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

### 4.5.2 Asymmetric Tests

Table 4.14 shows results from the single and four factor asymmetric tests of the performance of the domestic and global SRI fund portfolios. In these tests the domestic and global conventional fund portfolios are used as the market benchmarks for the domestic SRI and global fund portfolios, respectively. The results indicate that for all three sample periods,

and across the stock market expansion and contraction periods, the domestic SRI fund portfolio underperformed the conventional fund portfolio because all of the alphas are negative. However, this underperformance is only statistically significant during the period between 1990 and 2001 in the market expansion periods, and when the single factor asymmetric model is used. The results in Table 4.14 for the global SRI fund portfolio indicate that the portfolio underperformed the global conventional fund portfolio over the whole sample period in both expansion and contraction periods, when both asymmetric models were used. However, the performance difference between the global fund portfolios is only significant in the early sample period and when the single factor asymmetric Jensen alpha model is used. The results show significant underperformance by the global SRI portfolio during this period. Interestingly, when the four factor asymmetric model is used this significance disappears, and this indicates that controlling for differences between the fund portfolios exposures to the Fama and French (1993) factors, and the Carhart (1997) factor, significantly lowers the performance differentials between the two fund portfolios during the early sample period.

**Table 4.14: The Asymmetric Performance of the SRI Fund portfolios**

| Domestic SRI | α+ | α- | β+ | β- | SMB | HML | MOM |
|---|---|---|---|---|---|---|---|
| Whole of Period | -1.6583 | -1.8139 | **0.4169*** ** | **0.4977**** ** | | | |
| Whole of Period | -1.3666 | -1.4464 | **0.4165*** | **0.4637**** | **0.3212*** ** | -0.0333 | 0.0040 |
| 1990-2001 | **-1.8938**** | -1.7521 | **0.4366*** ** | **0.3802*** ** | | | |
| 1990-2001 | -1.5397 | -1.3286 | **0.4316*** | **0.4043**** | **0.3426*** | 0.0587 | 0.0390 |
| 2001-2012 | -1.4177 | -1.7726 | **0.3987**** | 0.5843 | | | |
| 2001-2012 | -1.0509 | -1.4705 | 0.4293 | **0.5135*** | **0.3761*** ** | **-0.1066**** | 0.0363 |
| Global SRI | α+ | α- | β+ | β- | SMB | HML | MOM |
| Whole of period | -0.4409 | -0.0934 | **0.7105**** | **0.5542*** ** | | | |
| Whole of period | -0.1516 | -0.2574 | **0.6190*** ** | **0.5047**** | **0.4567*** ** | 0.0499 | **-0.0728*** |
| 1990-2001 | **-1.013**** | 0.4735 | **0.9306**** | **0.3948**** | | | |
| 1990-2001 | -0.6670 | 0.1471 | **0.8341*** ** | **0.3396*** | **0.3035*** ** | 0.1266 | 0.0914 |
| 2001-2012 | 0.2193 | -0.5571 | **0.5129*** ** | **0.5596*** ** | | | |
| 2001-2012 | 0.0055 | -0.6532 | **0.4586*** | **0.4909**** | **0.6079*** ** | 0.1240 | **-0.1601*** ** |

Table 4.14 reports the results of estimations using the asymmetric Jensen alpha and four factor alpha performance measures. The estimations of the alphas are in monthly percentage terms. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1. Where the coefficients are statistically significant they are denoted in bold. The + notation indicates periods of market expansion and the – notation indicates periods of market contraction.

Table 4.15 shows results from the single and four factor asymmetric tests of the performance of the domestic and global SRI and conventional funds. In these tests the FTSE All Share is used as the market benchmark for the domestic fund portfolios, and the FTSE All World is used as the market benchmark for the global fund portfolios. Table 4.15 shows that the domestic SRI fund portfolio significantly underperformed the FTSE All Share between 2001 and 2012 during market expansion periods. The domestic conventional fund portfolio also underperformed the FTSE All Share between 2001 and 2012 during market expansion periods, but importantly not significantly. Both the domestic SRI and conventional fund portfolios outperformed the FTSE ALL Share between 2001 and 2012 during market contraction periods. This performance is statistically significant for the domestic conventional fund portfolio when the four factor asymmetric model is used. The findings are consistent with those from the asymmetric individual fund analysis and they indicate that both sets of domestic funds underperformed their FTSE benchmark during market expansion periods, in general. Similarly, the results show that both the global SRI and conventional fund portfolios unperformed their FTSE benchmark over the periods of market expansion, but outperformed in market contraction periods. Interestingly, the global SRI funds under and over performance over the whole sample period is statistically significant when the single factor asymmetric model is used, while the global conventional fund portfolio's is not.

In summary, the results from the individual fund analysis indicate that the practice of ethical screening affects the performance of the SRI funds available to the UK retail market and that these effects are more pronounced for those funds which can only invest in the UK stock market than for those that can invest in any stock market globally. The results in this section from the portfolio of funds analysis are broadly consistent with those from the individual fund analysis.

## Table 4.15: The Asymmetric Performance of the Portfolios vs the FTSE ALL Share and FTSE All World

| Domestic SRI | α+ | α- | β+ | β- | SMB | HML | MOM |
|---|---|---|---|---|---|---|---|
| Whole of Period | **-0.6440**** | 0.1644 | **0.4930***** | **0.6342***** | | | |
| Whole of Period | **-0.6974**** | 0.1703 | **0.4364***** | **0.5506***** | **0.2295**** | -0.0556 | -0.0579 |
| 1990-2001 | **-0.8198**** | 0.0992 | **0.5118*** | **0.6266*** | | | |
| 1990-2001 | **-0.6247*** | 0.1489 | **0.4913**** | 0.5347 | **0.2676***** | 0.0205 | -0.0015 |
| 2001-2012 | 0.4848 | 0.2257 | **0.4667**** | **0.6383**** | | | |
| 2001-2012 | **-0.6922*** | 0.2065 | **0.3825***** | 0.5520 | **0.2166**** | -0.0724 | **-0.0754*** |
| Domestic Conventional | α+ | α- | β+ | β- | SMB | HML | MOM |
| Whole of Period | -0.0657 | 0.6533 | **0.4815***** | **0.3976***** | | | |
| Whole of Period | 0.4373 | **0.7607*** | **0.4007***** | **0.3803***** | -0.0318 | -0.0577 | **-0.1914***** |
| 1990-2001 | 0.1351 | 0.8623 | **0.4324***** | 0.3488 | | | |
| 1990-2001 | -0.3250 | 0.9517 | **0.4193***** | 0.4030 | -0.0803 | -0.0563 | -0.0851 |
| 2001-2012 | -0.2377 | 0.2396 | **0.5257***** | **0.3885***** | | | |
| 2001-2012 | -0.7022 | 0.4888 | **0.3417***** | **0.3608***** | -0.0947 | 0.0269 | **-0.2746***** |
| Global SRI | α+ | α - | β+ | β- | SMB | HML | MOM |
| whole of period | **-0.3992**** | **0.8322*** | **0.3397***** | **0.6012***** | | | |
| whole of period | -0.2696 | **0.8721**** | **0.3931***** | **0.6135***** | **0.7115***** | -0.0036 | **-0.0843*** |
| 1990-2001 | -0.358 | 0.0801 | **0.4587***** | 0.1219 | | | |
| 1990-2001 | -0.2500 | 0.1251 | **0.5063***** | 0.1977 | **0.5323***** | 0.1146 | 0.0763 |
| 2001-2012 | 0.9308 | **1.1513**** | **0.2616**** | **0.7923***** | | | |
| 2001-2012 | 0.3618 | **1.0565**** | **0.3089**** | **0.7539***** | **0.8937***** | -0.0503 | -0.1077 |
| Global Conventional | α+ | α- | β+ | β- | SMB | HML | MOM |
| whole of period | -0.7673 | 0.2019 | **0.6024***** | **0.7139** | | | |
| whole of period | -0.6960 | 0.4389 | **0.6731**** | **0.7766**** | **0.6076***** | -0.3271 | 0.0126 |
| 1990-2001 | -0.1495 | -0.0809 | **0.6593*** | **0.5725***** | | | |
| 1990-2001 | 0.2702 | 0.0395 | **0.6925*** | **0.6262*** | **0.3574***** | 0.0196 | -0.0125 |
| 2001-2012 | 1.2102 | 0.3363 | **0.5626***** | **0.7721*** | | | |
| 2001-2012 | 0.6962 | 0.4389 | **0.6731***** | 0.7766 | **0.6076***** | -0.3271 | 0.0126 |

Table 4.15 reports the results of estimations using the asymmetric Jensen alpha and four factor alpha performance measures. The estimations of the alphas are in monthly percentage terms. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1. Where the coefficients are statistically significant they are denoted in bold. The + notation indicates periods of market expansion and the – notation indicates periods of market contraction.

## 4.6 Sector and Industry Exposure Analysis

### 4.6.1 Sector Exposure Analysis

Sector exposure analysis is used in the work to analyse the SRI funds' exposure to specific constituent sectors of the FTSE All Share and FTSE All World. This is important because if the sector exposure levels of the SRI and the conventional funds are similar, the findings will indicate that the SRI screening practices used in the construction of the SRI funds do not significantly affect their holdings relative to conventional funds. Table 4.16 presents the FTSE All Share Index and FTSE All World Index Sectors which are used in the sector exposure analysis.

**Table 4.16: FTSE All Share & FTSE All World Sectors**

| Sector | FTSE All Share & FTSE All World Sectors |
|---|---|
| 1 | OIL & GAS |
| 2 | BASIC MATS |
| 3 | INDUSTRIALS |
| 4 | CONSUMER GDS |
| 5 | HEALTH CARE |
| 6 | CONSUMER SERVCIES |
| 7 | TELECOMUNCIATIONS |
| 8 | UTILITIES |
| 9 | FINANCIALS |
| 10 | TECHNOLOGY |

Table 4.17 reports the results from t-tests between the mean gammas for the domestic and global SRI and conventional funds. The results in Table 4.17 indicate that the sector exposures of the domestic SRI funds and their conventional counterparts were significantly different to all sectors except for Consumer Goods. This suggests that the domestic SRI funds practice of ethically screening affected their investment at sector level leading to differing levels of exposures. The findings for the global SRI funds differ and indicate that the sector exposures of the global SRI funds were similar to those of their conventional counterparts. Statistically significant differences are only presented with respect to one sector (Oil and Gas) and this difference is only statistically significant at the 10% level. These results indicate that the requirement to screen had a more significant effect on the sector exposure of the domestic SRI funds than the global SRI funds. These findings may explain why the

performance differentials of the domestic SRI and conventional funds are larger than those of the global SRI and conventional funds.

**Table 4.17: T-tests between the SRI and Conventional Funds Sector Exposures**

| | Domestic | Global |
|---|---|---|
| Sector1 | **14.9223**** | **0.0073*** |
| Sector 2 | **8.4509***** | 0.2592 |
| Sector 3 | **1.6603*** | 2.4411 |
| Sector 4 | 1.0015 | -0.4000 |
| Sector 5 | **14.1442***** | 0.4517 |
| Sector 6 | **2.4870**** | -0.7163 |
| Sector 7 | **-7.0476***** | -0.1132 |
| Sector 8 | **2.9184***** | -0.1693 |
| Sector 9 | **4.2142*** | -0.1838 |
| Sector 10 | **-3.2615***** | 0.2676 |

Table 4.17 reports the results of t-tests between the mean gammas of the SRI and conventional funds . *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold.

### 4.6.2 Industry Exposure Analysis

The industry exposure analysis in this chapter takes the sector exposure analysis further by using industry classifications to provide a more detailed investigation and to analyse SRI funds' levels of industry exposure relative to conventional funds. Table 4.18 presents the FTSE All Share Index and FTSE All World Index industries.

The results from the industry exposure analysis are presented in Table 4.19. The findings indicate that the industry exposure of the domestic SRI funds and their conventional counterparts were significantly different across almost all industries. These results are consistent with those from the sector exposure analysis and indicate that the practice of ethically screening affects the industry exposures of the domestic SRI funds relative to their conventional counterparts. The industry exposures of the global SRI funds do not differ from those of the global conventional funds in a statistically significant sense apart from with respect to three industries. Statistically significant differences are only found to the Alternative Energy, Industrial Metals and Mining, and Real Estate and Investment Trusts

industries. The difference between the exposures to the Real Estate and Investment Trusts industry is only significant at the 10% level, whereas the differences in exposures to Alternative energy, and Industrial Metals and Mining industries is significant at the 1% level.

**Table 4.18: FTSE All Share & FTSE All World Industries**

| Industry | FTSE All Share & FTSE All World | Industry | |
|---|---|---|---|
| 1 | OIL & GAS PROD | 21 | TOBACCO |
| 2 | OIL/EQ SVS/DST | 22 | H/C EQ & SVS |
| 3 | ALT ENERGY £ | 23 | PHARM & BIO |
| 4 | CHEMICALS £ | 24 | FD & DRUG RTL |
| 5 | FORESTRY & PAP | 25 | GEN RETAILERS |
| 6 | INDL MET & MNG | 26 | MEDIA |
| 7 | MINING | 27 | TRAVEL & LEIS |
| 8 | CON & MAT | 28 | FXD LINE T/CM |
| 9 | AERO/DEFENCE | 29 | MOBILE T/CM |
| 10 | GENERAL INDS | 30 | ELECTRICITY |
| 11 | ELTRO/ELEC EQ | 31 | GS/WT/MUL UTIL |
| 12 | INDS ENG | 32 | BANKS |
| 13 | INDS TRANSPT | 33 | NONLIFE INSUR |
| 14 | SUPPORT SVS | 34 | LIFE INSURANCE |
| 15 | AUTO & PARTS | 35 | R/E IVST TRUST |
| 16 | BEVERAGES | 36 | FIN SVS |
| 17 | FD PRODUCERS | 37 | EQT IVST INS |
| 18 | HSGD & HM CON | 38 | S/W & COMP SVS |
| 19 | LEISURE GDS | 39 | TCH H/W & EQ |
| 20 | PERSONAL GOODS | | |

In summary, there is considerable evidence that the sector and industry exposures of the domestic SRI funds differ from their conventional counterparts significantly. These differences may be the result of the SRI funds' practice of screening. As SRI funds screen out stocks and positively focus on screening in stocks on the basis of certain activities it is logical that this could affect their sector and industry exposures, and that these exposures could therefore differ from those of conventional funds. Interestingly, the evidence for global SRI funds is less compelling. At both the sector and industry level there is little evidence that SRI screening has significantly affected the sector or industry exposures of the global SRI funds. This contrast between the effect of SRI screening on the exposures of the domestic SRI funds and the global SRI funds may be the result of the global SRI funds being less affected by their requirements to screen because their potential investment choice is much bigger and

therefore, even after screening, fund managers have substantial levels of stocks to choose from allowing them to greater maintain their desired allocations and exposures.

**Table 4.19: T-tests between the Domestic and Global SRI and Conventional Funds Industry Exposures**

| Domestic Funds | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Industry1 | Industry 2 | Industry 3 | Industry 4 | Industry 5 | Industry 6 | Industry 7 | Industry 8 | Industry 9 | Industry 10 |
| T-test | **-16.7128*** ** | **-13.4822** ** | **7.1084*** ** | **-8.0304*** ** | -1.5172 | **10.7060** * | **-7.9362*** ** | -1.6311 | **-10.8741*** ** | **-1.9343*** |
| | I11 | I12 | I13 | I14 | I15 | I16 | I17 | I18 | I19 | I20 |
| t-test | **3.6672** ** | **-2.9622*** ** | **3.6805*** ** | **-5.1109*** ** | **8.3198*** | **-7.6936*** | **-6.2344*** ** | **-2.4028** ** | **-6.0218** ** | **11.8566** * |
| | I21 | I22 | I23 | I24 | I25 | I26 | I27 | I28 | I29 | I30 |
| t-test | **-9.7623*** | 8.6110 | **-13.6673** ** | **9.9986** ** | **-5.9369*** ** | **-5.6292*** ** | **4.5413*** ** | 10.2340 | **-4.8935** ** | **10.028*** ** |
| | I31 | I32 | I33 | I34 | I35 | I36 | I37 | I38 | I39 | |
| t-test | **1.9389*** | **-5.7988*** ** | **-11.4925*** ** | **-8.9599*** | **19.5631** * | **-3.3270*** ** | **8.0769*** ** | -0.9824 | **9.0333*** ** | |
| Global Funds | | | | | | | | | | |
| | Industry 1 | Industry 2 | Industry 3 | Industry 4 | Industry 5 | Industry 6 | Industry 7 | Industry 8 | Industry 9 | Industry 10 |
| t-test | -1.3961 | 0.8129 | **3.4595*** ** | 0.1942 | -0.0701 | -0.1964 | -0.4012 | -0.2169 | -0.2745 | 0.1608 |
| | I11 | I12 | I13 | I14 | I15 | I16 | I17 | I18 | I19 | I20 |
| t-test | -0.4035 | 0.3897 | 0.6400 | -0.2830 | 0.6175 | **-6.4566*** ** | 0.2248 | -0.0429 | -0.0562 | -0.3902 |
| | I21 | I22 | I23 | I24 | I25 | I26 | I27 | I28 | I29 | I30 |
| t-test | -0.2273 | -0.1040 | -0.5048 | -0.0782 | -0.1431 | -0.1950 | 0.4147 | 0.2944 | 0.2731 | -0.2322 |
| | I31 | I32 | I33 | I34 | I35 | I36 | I37 | I38 | I39 | |
| t-test | 0.3839 | 0.3375 | -0.4282 | 0.1504 | **1.8868*** | 0.2661 | -0.2083 | -0.2189 | -0.1267 | |

Table 4.19 reports the results of t-tests between the mean rhos of the SRI and conventional funds . *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold.

## 4.7 Idiosyncratic Volatility Analysis

The idiosyncratic volatility of a portfolio describes its unsystematic or idiosyncratic risk. The greater a portfolio's idiosyncratic volatility, the larger its level of idiosyncratic risk. Idiosyncratic volatility analysis is used to analyse the levels of idiosyncratic risk of the SRI funds, relative to their conventional benchmarks. If the levels of idiosyncratic risk of the SRI and conventional funds are similar, the results will indicate that the SRI funds screening practices do not significantly affect their diversification levels relative to their benchmarks. Idiosyncratic risk is the part of total risk not explained by systematic risk factors and so measures the amount of risk that could be diversified away. The idiosyncratic volatility of a

fund is defined as the standard deviation of the residual return after estimating the single factor model as denoted below:

$$\sigma(\varepsilon_{p,t}) = IV \quad (14)$$

Idiosyncratic volatilities are presented for SRI and conventional funds in Table 4.20. For the domestic funds, the same market benchmark is used in all of the Jensen alpha tests and this is the FTSE All Share. For the global funds, the market benchmark used is the FTSE All World. The idiosyncratic volatilities are therefore measures of the idiosyncratic risk of all the funds when these benchmarks are used. The findings presented in Table 4.20 indicate that the domestic SRI funds had lower levels of idiosyncratic risk than their conventional counterparts during the period analysed and that this difference was statistically significant. These results are consistent with the domestic SRI fund managers taking on more exposure to stocks which are representative of the index performance. This may be because their choice is limited by the constraints imposed by the requirement to screen. The SRI fund managers may also track the market to a greater extent than their conventional counterparts, because their investors achieve an additional psychological return and therefore may be less demanding in relation to the financial performance of the SRI funds. The findings in Table 4.20 indicate that global SRI funds also had lower levels of idiosyncratic risk than their conventional counterparts but that the difference between the levels of idiosyncratic volatility of the two types global funds are not statistically significant. This finding is consistent with the global SRI fund managers not selecting representative stocks to same extent as the domestic SRI fund managers.

**Table 4.20: The Idiosyncratic Volatility Levels of the Funds**

| | Domestic IV | Global IV |
|---|---|---|
| SRI | 3.8711 | 5.2596 |
| Conventional | 4.9777 | 7.1184 |
| Difference | -1.1066 | -1.8588 |
| t-test between mean samples | **-9.8127*** ** | -0.1145 |

Table 4.20 reports the idiosyncratic volatilities of the Domestic and Global SRI and conventional funds when the Jensen Alpha Model was used. It also shows the results of t-tests between the idiosyncratic volatilities of the Domestic SRI funds and the Domestic Conventional funds. In addition, Table 4.20 also reports the results of t-tests between the mean idiosyncratic volatilities of the Global SRI funds and the Global Conventional Funds. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold.

In summary, the findings reported in this chapter indicate that the domestic SRI Funds underperformed their conventional counterparts and that they also had different levels of idiosyncratic risk. The findings presented in this chapter also indicate that the global SRI funds underperform their conventional counterparts, in general, but not to such an extent as the domestic SRI funds. In addition, the results presented in this section indicate that the global SRI funds, and their conventional counterparts, do not have significantly different levels of idiosyncratic risk. These results are consistent with those presented in previous sections in that they suggest that the domestic SRI funds are more affected by the requirement to screen than the global SRI funds, possibly because they have a smaller investment choice from which their fund managers can select stocks.

## 4.8 The Effect of Screening Area and Intensity on Performance

### 4.8.1 The Effect of Screening Area on SRI Fund Performance

Having analysed the performance of the domestic and global SRI and conventional funds, their systematic and idiosyncratic risk levels, and their sector and industry exposures, the following tests analyse whether the specific areas in which SRI funds screen are significant factors in their risk-adjusted performance. This builds on the work of Barnett and Salomon (2006) who found that the financial performance of US SRI funds is influenced by the areas in which SRI funds screen. For example, they find that environmental and labour relations screening is associated with lower financial performance. This chapter also builds on Renneboog et al. (2008a) who provide further evidence, for an international sample of SRI funds, that the specific areas in which SRI funds screen affects their risk-adjusted performance. They find that funds that invest in firms adopting policies that focus on community involvement can expect an additional return of 30 basis points per month. The analysis in this chapter builds on this work by providing an analysis of the effect of specific screening areas on UK SRI funds which can only invest in the UK stock market and UK SRI funds which can invest in any stock market globally.

In order to perform this analysis, funds which screen in a specific area are formed into an equally weighted portfolio, and funds which do not screen in that specific area are combined into a separate portfolio. For example, funds which screened in relation to the production or

sale of alcohol are combined into a "No Alcohol" portfolio, while all those which do not screen in this area are placed into an "Alcohol" portfolio. The risk-adjusted performances of the two portfolios are compared to the respective FTSE benchmark, and to each other. All of these tests used the Jensen alpha model. Table 4.21 reports the results using FTSE benchmarks. Table 4.22 shows the results from tests of the SRI fund portfolios made up of funds which screen in a specific area against the benchmarks of those which do not. Tables 4.21 and 4.22 show that there is little evidence that the specific areas in which the domestic SRI funds screen has any statistically significant effect on their performance. There is evidence in both tables that those funds which screen out all of the "sin stock" areas (Alcohol, Tobacco, Pornography and Military armaments) underperformed those which did not and these results are consistent with those of Renneboog et al. (2008a). However, this underperformance was not at statistically significant levels[16]. With respect to the global SRI funds, Tables 4.21 and 4.22 also show that the specific screening areas of the SRI funds had little effect on their performance. In addition, the findings indicate that the portfolios of the global SRI funds which screen in specific areas and those which do not have very similar levels of systematic risk (betas)[17].

[16] All of the funds screened in the area of the environment and so this area could not be used in the tests.
[17] One issue with this form of screening analysis is that many of the funds screen in a number of areas and it is therefore difficult to separate out the effect of screening in one specific area.

## Table 4.21: The Effect of Screening in Specific Areas on the Performance on the SRI Funds SRI vs FTSE All Share

| Domestic Funds | α | β | R2 | Global Funds α | β | R2 |
|---|---|---|---|---|---|---|
| No Alcohol | -0.4408 | **0.843**** | 0.9418 | -0.1459 | **0.4623***** | 0.3175 |
| Alcohol | -0.2423 | **0.9152***** | 0.9538 | -0.0472 | **0.4569*** | 0.2427 |
| No Animal Testing | -0.4499 | **0.8489***** | 0.9454 | -0.1113 | **0.4518**** | 0.3081 |
| Animal Testing | -0.1733 | 0.9023 | 0.9549 | -0.0402 | **0.6359*** | 0.3233 |
| No Climate Change | -0.2385 | **0.8309*** | 0.9252 | 0.0253 | **0.5352***** | 0.3758 |
| Climate Change | -0.1311 | **0.9260**** | 0.9587 | -0.3451 | **0.2485***** | 0.3568 |
| No Gambling | -0.2649 | **0.8484***** | 0.9382 | -0.1977 | **0.1215**** | 0.2138 |
| Gambling | -0.3008 | 0.8637 | 0.9004 | -0.1326 | **0.4496***** | 0.1925 |
| No Genetic Engineering | -0.3984 | **0.8694***** | 0.9188 | -0.3469 | **0.0295***** | 0.1383 |
| Genetic Engineering | -0.4229 | **0.8497*** | 0.9443 | 0.1212 | 0.56030 | 0.3703 |
| No Human Rights | -0.4518 | **0.8533**** | 0.9507 | 0.0512 | 0.50610 | 0.3584 |
| Human Rights | -0.2339 | **0.9043**** | 0.8609 | -0.3751 | **0.2556*** | 0.1639 |
| No Military | -0.4426 | **0.8556***** | 0.9554 | 0.1332 | **0.4624**** | 0.3189 |
| Military | -0.1107 | **0.9277***** | 0.8775 | -0.2501 | **0.4308**** | 0.172 |
| No Pornography | -0.4476 | **0.8550**** | 0.9511 | 0.1099 | **0.4517***** | 0.3083 |
| Pornography | -0.1583 | 0.8910 | 0.9154 | -0.3113 | **0.51900*** | 0.2175 |
| No Tobacco | -0.2219 | **0.8397***** | 0.938 | 0.1322 | **0.4647*** | 0.3208 |
| Tobacco | -0.3708 | **0.8917**** | 0.9366 | -0.2098 | **0.1309***** | 0.1704 |
| All Sin Stocks Screened | -0.1658 | **0.8253*** | 0.9269 | -0.2032 | **0.4812***** | 0.2857 |
| All Sin Stocks Not Screened | -0.3027 | **0.9048*** | 0.9477 | 0.2275 | **0.5443**** | 0.3187 |

Table 4.21 reports the coefficients from tests which analyse the performance of those domestic SRI funds which screen in a specific area against the FTSE All Share and those domestic SRI funds which do not screen in the same against the FTSE All Share, using the Jensen alpha model. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

**Table 4.22: The Effect of Screening in Specific Areas on the Performance on the SRI Funds Vs Non-Screened Benchmark**

| Domestic Funds | α | β | R2 |
|---|---|---|---|
| No Alcohol VS Alcohol | -0.0428 | **0.9582*** | 0.9924 |
| No Animal Testing VS Animal Testing | -0.0136 | **0.9695*** | 0.9922 |
| No Climate Change vs Climate Change | 0.0913 | **0.9493*** | 0.9917 |
| No Gambling vs Gambling | 0.3815 | **0.9955***** | 0.9851 |
| No Genetic Engineering VS Genetic Engineering | 0.1064 | **1.0021**** | 0.9826 |
| No Human Rights Vs Human Rights | 0.1785 | **0.9387*** | 0.9581 |
| No Military vs Military | 0.1893 | **0.9006**** | 0.9507 |
| No Pornography vs Pornography | 0.0118 | **0.9963***** | 0.9937 |
| No Tobacco vs Tobacco | 0.0427 | **0.9732*** | 0.9958 |
| All Sin Stocks Screened vs Not Screened | -0.0737 | **0.9616***** | 0.9972 |
| Global | α | β | R2 |
| No Alcohol VS Alcohol | 0.2175 | **0.9952**** | 0.8790 |
| No Animal Testing VS Animal Testing | -0.0634 | **0.9158*** | 0.9609 |
| No Climate Change vs Climate Change | -0.2357 | **0.9226*** | 0.9646 |
| No Gambling vs Gambling | 0.3495 | **0.9048***** | 0.8647 |
| No Genetic Engineering VS Genetic Engineering | -0.0359 | 1.0005 | 0.9541 |
| No Human Rights Vs Human Rights | 0.1551 | **0.9191**** | 0.8730 |
| No Military vs Military | 0.0216 | **0.7079*** | 0.8164 |
| No Pornography vs Pornography | 0.1895 | 0.8902 | 0.8866 |
| No Tobacco vs Tobacco | 0.2391 | **0.7936***** | 0.8063 |
| All Sin Stocks Screened vs Not Screened | 0.1044 | **1.0847**** | 0.8594 |

Table 4.22 reports the coefficients from tests which analyse the performance of those domestic SRI funds which screen in a specific area against those domestic SRI funds which do not screen in the same area using the Jensen Alpha model. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

### 4.8.2 The Effect of Screening Intensity on SRI Fund Performance

For this analysis, the intensity of a fund's screening is defined as the total number of areas in which the fund uses any type of screening (negative, positive or both). This definition of screening intensity is used by other studies including Barnett and Salomon (2006). Barnett and Salomon (2006) identify a curvilinear relationship between the intensity of SRI screening and the financial performance of US SRI funds, and provide evidence that as the number of social screens increases financial returns decline at first, but then rebound as the number of screens reach a maximum. They hypothesize, using a combination of modern portfolio and stakeholder theories, that these findings are the result of the financial loss borne

by an SRI fund due to SRI screening resulting in poor diversification, being offset as social screening intensifies because better managed and more stable firms are selected into fund portfolios. Renneboog et al. (2008a) find that global SRI fund returns decrease in general with screening intensity on social and corporate governance criteria and that, all else being equal, funds with one additional screen are associated with a 1% lower four-factor-adjusted return per annum (significant at the 10% level). These results are consistent with SRI screening constituting a portfolio constraint which negatively affects the risk-adjusted performance of SRI funds relative to conventional funds.

The screening intensity analysis in this chapter builds on the work of Barnett and Salomon (2006) and Renneboog et al. (2008a). This analysis focuses on analysing the effect of screening intensity on the alphas (risk-adjusted performance) and betas (systematic risk levels) of the two types of SRI funds. In addition, because the work uses the two samples of SRI funds, each with different potential investment universes, this study is able to investigate whether the size of an SRI funds potential investment universe is important to this analysis. For example, the work can analyse whether screening intensity has more of an effect on those SRI funds which can only invest in the UK stock market. This may be the case because those funds have a smaller potential investment universe and less asset choice in each area. Therefore, as more areas are included in the screening process, the ability of these funds to find suitable assets to invest in may be disproportionately affected.

Table 4.23 presents the results from analysis of the performance of portfolios of the SRI funds which were constructed based on the intensity of their screening[18]. Equally weighted portfolios were constructed of the domestic SRI funds which screened in 6, 7, 8, and 9 areas or more and of funds which screened in all of the areas EIRIS collect data for. Performance is measured relative to their respective FTSE benchmarks using the Jensen alpha model. The results presented in Table 4.23 for the domestic SRI funds indicate that the portfolios which screen in 6 or more areas and 7 or more areas outperformed the FTSE All Share, while the other portfolios did not. These results are consistent with increasing levels of SRI screening intensity having a detrimental effect on the performance of the domestic SRI funds. These findings are consistent with those of Barnett and Salomon's (2006) and Renneboog et al. (2008a) which identified a negative relationship between screening intensity

[18] Few of the funds screen in less than six areas and therefore the work in this chapter does not analyse the effect of screening intensity on funds that screen in less than six areas.

and performance. In Table 4.23 the results indicate that the intensity of the global SRI funds screening was not statistically significant in explaining their performance because none of the SRI fund portfolios are shown to have statistically significant abnormal performance. However, the alphas of the portfolios which screen in 6 or more areas and 7 or more areas are higher than the other portfolios and this does indicate that screening intensity may have affected the global SRI funds' performance, although to a smaller extent than it affected the performance of the domestic SRI funds.

**Table 4.23: The Effect Screening Intensity on SRI Fund Portfolios**

| Domestic | α | β | R2 |
|---|---|---|---|
| 6 or more | **0.6681*** ** | **0.5258*** ** | 0.8707 |
| 7 or more | **0.6824*** ** | **0.5079*** ** | 0.8233 |
| 8 or more | 0.3990 | **0.4939** ** | 0.8042 |
| 9 or more | 0.4180 | **0.5030** ** | 0.7991 |
| All 10 | 0.3978 | **0.5084** ** | 0.5346 |
| Global | α | β | R2 |
| 6 or more | 0.1092 | **0.4534*** | 0.3101 |
| 7 or more | 0.1089 | **0.4534*** ** | 0.3101 |
| 8 or more | 0.0951 | **0.4807** ** | 0.3367 |
| 9 or more | 0.0524 | 0.5283 | 0.3796 |
| All 10 | 0.0751 | **0.4412*** | 0.2576 |

Table 4.23 reports the coefficients from Jensen alpha tests which analyse the performance of SRI fund portfolio which screen in a specific number of areas. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

## 4.9 Conclusion

The performance analysis work in this chapter builds on Bauer et al. (2005) and Gregory and Whittaker (2007) by splitting the UK SRI funds into those which only invest domestically and those which invest globally. The results from the performance analysis indicate that the practice of ethically screening is associated with a detrimental risk-adjusted performance, particularly for those SRI funds which can only invest in the UK stock market. These results are not consistent with Bauer et al. (2005) or Gregory and Whittaker (2007) who find no statistically significant difference in performance between UK ethical and UK conventional mutual funds (for both domestic and global funds). These results are partially consistent with Renneboog et al. (2008a) who find some evidence of SRI investors paying a price for their ethics, but the difference between the risk-adjusted returns of UK SRI and conventional funds are not statistically significant in their study. The evidence presented shows that the practice of ethical screening affects the performance and composition of the SRI funds available to the UK retail market and supports Hypothesis 1. These effects are more pronounced for those funds that can only invest in the UK stock market than for those that can invest globally. This is likely to be because global SRI funds have a greater investment choice and therefore it is easier for the global SRI fund manager to select a portfolio of attractive investments than it is for the domestic SRI fund manager, even after screening has limited the funds' potential investment universe. These results clearly show that the size of an SRI funds' investment choice is an important factor that should be considered by investors. Those SRI funds with smaller investment universes are more likely to be affected detrimentally by their requirement to screen ethically compared to those with larger investment choices.

Interestingly, the mean betas of the domestic SRI funds from the individual fund analysis are shown to be higher and closer to 1 than the conventional funds. This suggests that the SRI funds carry more systematic risk and that their performances are closer to the performance of the FTSE All Share Index. This finding indicates that the constraint of having to screen ethically results in the SRI fund manager's performance being similar to the market. This is consistent with SRI fund manager's holdings stocks that are representative of the index's performance. This may be because their choice is limited by the constraints imposed by the requirement to screen or because SRI fund managers are more inclined to track the

benchmark index more closely since their investors are achieving an additional psychological return and may therefore be less demanding on the financial performance of SRI funds. In addition, the results from the four factor tests indicate that the practice of ethically screening may result in both sets of SRI funds (global and domestic) having different exposures to the Fama and French (1993) and Carhart (1997) factors than their conventional counterparts. In particular, there is evidence that they are less exposed to the size (SMB) factor than their conventional counterparts and this finding would be consistent with them having more exposure to large stocks. This result supports the hypothesis that SRI fund managers hold stocks that are more representative of their benchmark indices since their investors are achieving an additional psychological return and may therefore be less demanding on the financial performance of the SRI funds. Therefore, the UK SRI funds managers are not as pressured to achieve alpha as their conventional counterparts and are consequently less inclined to hold more risky smaller cap stocks.

The results from the individual fund, single factor asymmetric Jensen alpha tests indicate that the domestic SRI and conventional funds underperformed their market benchmarks in periods of market expansion but outperformed in periods of market contraction. The discovery that so many of the funds available to UK retail investors only outperform market benchmarks during market contraction periods is a very important and interesting finding. This finding for the UK fund market is consistent with that of Kosowski (2011) who documents that US funds perform better relative to market benchmarks during economic and business cycle contractions than during economic and business expansion periods. Kosowski's (2011) study does not specifically focus on SRI fund performance. The implication for investors is that investing in, or switching to, actively managed funds as opposed to holding trackers or ETF's, and incurring the additional costs that come with this form of investment, would seem to be sensible if they believe there is likely to be a sustained periods of market decline. In contrast, the indication is that if they believe that there is likely to be a sustained period of stock market growth, they would achieve better returns if they invest in relatively cheap funds that track the stock market or ETF's. The results presented also indicate that the domestic SRI funds significantly underperform conventional funds during both contraction and expansion periods. In addition, the results also indicate that global SRI funds underperformed their conventional counterparts during market expansion and contraction periods. However, the findings indicate that this underperformance was less

severe for the global SRI funds. Therefore, these results indicate that the relative performance of the SRI funds and the conventional funds is similar during periods of stock market expansion and contraction. The results support Hypothesis 5 and reject Hypothesis 4, in general, because they indicate that changing stock market conditions affect UK SRI and conventional funds similarly.

The use of asymmetric models to analyse the performance of UK SRI funds relative to conventional UK funds is a contribution to this area of academia. The use of these models allows for the risk-adjusted performance of SRI and conventional funds to be analysed across different asymmetric stages of the UK stock market cycle. Renneboog et al. (2008a) perform an analysis of the effects of changes in publicly available macroeconomic information on the performance of UK SRI mutual funds. However, the methodology used in Renneboog et al. (2008a) only allows for tests as to whether macroeconomic information is a significant driving factor of SRI fund returns and does not analyse what effect, if any, changes in UK stock market cycles have on SRI funds. For investors, the effect of stock market cycles on investments is likely to be more important and profound than the effects of macro-economic data. As a consequence, there is a need for analysis which effectively tests the performance of UK SRI funds during different stages of the UK stock market cycle to allow for the performance and market timing of the UK SRI funds to be analysed across UK stock market cycles.

In addition, the results in this chapter indicate that the sector and industry exposures of the domestic SRI funds differ significantly from their conventional counterparts. These differences may be the result of SRI funds' practice of screening. As SRI funds screen out stocks on the basis of unethical activities, and positively focus on screening in stocks on the basis of certain ethical activities, it is logical that this could affect their sector and industry exposures and that these exposures could therefore differ from those of conventional funds which have the same investment objectives and investment universes, but do not have the constraints caused by the requirement to ethically screen. Interestingly, the evidence in relation to the global SRI funds and their conventional counterparts is different. At both the sector and industry level, there is little evidence that SRI screening significantly affects the sector or industry exposures of the global SRI funds. This contrast between the effect of SRI screening on the exposures of the domestic SRI funds and the global SRI funds may be the

result of the global SRI funds being less affected by their requirements to screen because their potential investment choice is much bigger. Therefore even after screening fund managers have substantial levels of stocks to choose from, allowing them to greater maintain their desired allocations and exposures. The sector and industry exposure analysis in this chapter represents a contribution to this area of academia because this work is the first to investigate the sector exposure of UK SRI funds relative to conventional funds. In addition, it is also the first work to use industry exposure analysis in relation to mutual funds in any capacity. The use of industry level data as opposed to sector level data allows for a more comprehensive examination because each sector is made up by a number of industries. The work follows the approaches of Sharpe (1992) who analyses the sector exposure of a group of conventional US mutual funds and Benson et al. (2006) who analyse the sector exposure of a group of US SRI mutual funds relative to a group of conventional mutual funds.

In addition, the findings presented in this chapter indicate that the domestic SRI funds had lower levels of idiosyncratic risk than their conventional counterparts during the period analysed and that this difference was statistically significant. These results are consistent with the domestic SRI fund managers taking on more exposure to stocks which are representative of the index performance. This may be because their choice is limited by the constraints imposed by the requirement to screen. The SRI fund managers may also track the market to a greater extent than their conventional counterparts, because their investors achieve an additional psychological return and therefore may be less demanding in relation to the financial performance of the SRI funds. The findings also indicate that global SRI funds also had lower levels of idiosyncratic risk than their conventional counterparts but that the difference between the levels of idiosyncratic volatility of the two types global funds are not statistically significant. This finding is consistent with the global SRI fund managers not selecting representative stocks to the same extent as the domestic SRI fund managers. The analysis of the idiosyncratic volatility levels of the UK SRI funds represents another contribution of the work in this chapter to this area of academia because this work is the first to analyse UK SRI funds levels of idiosyncratic volatility. Bello (2005) uses residual variance analysis to establish that US SRI funds have similar levels of idiosyncratic risk to their conventional counterparts.

The principal implication for UK ethical investors from the results presented in the chapter is the indication that the performance of their investments is likely to be detrimentally affected by their decision to purchase ethical funds as opposed to conventional funds, and that the psychological benefits they receive through investing ethically come at a financial cost. Importantly, the indication is also that this cost is more severe if ethical investors purchase funds that can only invest in the UK than if they purchase funds that have larger investment universes such as global SRI funds and therefore ethical investors may wish to focus more on investing in global SRI funds if it is feasible to do so and in keeping with their attitude to risk and investment objectives.

The findings presented in Chapter 3 indicate that SRI screening does not in general significantly affect the performance of US SRI indices. However, the results show that SRI screening does result in significant differences in the factor sensitivities of US SRI indices relative to their conventional counterparts and some differences in industry exposures. The analysis in Chapter 3 highlighted a number of key issues relating to SRI portfolio performance which required further investigation. Specifically, it was suggested that SRI screening may be associated with five investment risks which are not associated with conventional investment strategies, as well as two additional returns. In this chapter the importance of three of the risks are analysed.

A) The screening areas that the different screening methods are applied to.

B) The intensity of screening.

D) The size of the investment universe of the SRI portfolio.

With regard to screening areas, the analysis in this chapter finds little evidence that this is a significant factor that should be considered when appraising the potential risk of an SRI funds screening methodology. In relation to screening intensity this chapter finds that more screening intensity is associated with worse risk-adjusted performance and that this is particularly the case for funds that can only invest in the UK stock market. With respect to the size of an SRI funds investment universe, the work in this chapter establishes that this can influence the effect of SRI screening on an SRI funds' performance, exposures and

idiosyncratic risk. The analysis in this chapter finds that the smaller the investment choice available to an SRI fund manager the more likely it is that its performance, exposures and idiosyncratic risk will be effected by its requirement to screen.

The work in the next chapter analyses the importance of two more of the risks associated with investing in SRI portfolios:

E) The types of asset portfolios most affected by SRI screening.

This analysis was not performed in this chapter because the majority of UK SRI funds invest in equities and there are too few UK SRI balanced and bond funds for a comparison between the effects of screening on different UK SRI asset portfolios.

C) The type of screening, or the combination of types, being used by an SRI portfolio.

Chapter 5 provides a discussion in which the performance of UK SRI funds which predominately use negative screening and US SRI funds which predominately use positive and restricted screening is compared.

The work in the following chapter will also analyse the extent to which SRI funds provide one of the two additional psychological returns associated with this form of investment:

F) The shareholder activism of SRI funds.

The work analyses whether US SRI funds have higher levels of shareholder activism and whether SRI funds provide an additional psychological return through their proxy voting.

# Chapter 5: The Performance of US Socially Responsible Funds

## 5.1 Introduction and Contribution of Chapter 5

Chapters 3 and 4 investigated the effect of SRI screening on the performance and risk levels of US SRI equity indices and UK SRI equity funds. The discussion at the beginning of Chapter 4 presents a number of risks and returns which are specific to SRI portfolios. Five risks are outlined; the first three (A, B and C) relate to the screening methodology used in the construction of SRI portfolios. A is the screening areas that the different screening methods are applied to and B is the intensity of the SRI portfolios screening. C is the type of screening, or the combination of types being used by an SRI portfolio. The last two (D and E) relate to the nature of the portfolio's investment universes. D is the size of the investment universe of the SRI portfolio and E is the types of asset portfolios most affected by SRI screening.

The work in this chapter analyses the performance and risk levels of US SRI funds and investigates the importance of two of the potential SRI risks associated with this form of investing (risks C and E). The US SRI fund market is an important market to analyse because it is the largest in the world and the majority of prior studies have included an analysis of the US market.

E) The types of asset portfolios most affected by SRI screening.

A factor which may affect the financial risks associated with SRI investing is the type of assets included within an SRI portfolio. Derwall and Koedijk (2009) find that a portfolio of SRI bond funds earned a benchmark-adjusted return similar to that of its conventional counterpart, but that a portfolio of SRI balanced funds outperformed, at a statistically significant level, a matched portfolio of conventional balanced funds. These findings indicate that the effect of SRI screening methodologies on portfolio performance may depend on the types of assets included within the funds. This chapter provides further analysis as to whether certain types of asset portfolios are more affected by SRI screening by analysing the performance and risk levels of four samples of US SRI funds. The first sample is US SRI large cap equity funds, while the second is US SRI mid-small cap equity funds. The third

sample is US SRI balanced funds and the fourth is US SRI bond funds. There are a number of reasons why the requirement to screen may affect large cap, mid-small cap, balanced and bond funds differently. For example, there may be more ESG data available for large cap stocks than for mid-cap stocks because they have more spare resources available for the investment in and the disclosure of ESG activates. If this is the case, screening may have less of an effect on the choice available to large cap fund managers than mid-small cap fund managers. In addition, screening may have more of an effect on fund managers who purchase bonds than those who only purchase equities, because investment in ESG activities may affect the cost of debt in particular. Studying the effect of screening on portfolios which contain different asset classes is important because investment managers require this information in order to make optimal strategic and actual asset allocation decisions. Focusing solely on SRI equity funds in particular has limited value to strategic investment managers who seek to optimise their asset mix such as fund of fund managers and balanced fund managers (Derwall and Koedijk, 2009).

C) The type of screening, or the combination of types, being used by an SRI portfolio.

This chapter provides a discussion in which the performance of UK SRI funds which predominantly use negative screening is compared with the performance of US SRI funds which predominately use positive and restricted screening. As outlined in Chapter 1, negative screening is likely to result in entire industries being excluded from an SRI portfolio; positive screening is likely to result in skewing SRI portfolios towards certain types of stocks, and restricted screening restricts the stocks from an industry which can be included in an SRI portfolio. Goldreyer and Diltz (1999) find that US SRI equity funds using positive screening techniques, outperformed those which use negative screening techniques at statistically significant levels. The findings of Goldreyer and Diltz (1999) suggest that the psychological returns achieved through negative screening may come at a greater financial risk than the psychological returns achieved through positive screening. In this chapter, a different methodology to that used by Goldreyer and Diltz (1999) is employed to investigate whether the type of screening or combinations of types being used by an SRI portfolio affect its financial return. Goldreyer and Diltz (1999) compare the performance of US SRI funds which use positive screening techniques to those using negative screening. However, current data on the screening techniques used by US SRI funds shows that they predominantly use positive

and restricted screening rather than negative screening. Also, when they use negative screening, it is generally with respect to only a small number of areas and is often used in combination with positive and restricted screening in those areas. It is therefore difficult to compare the performance of US SRI funds that use positive and restricted screening practices with those that use negative screening. Conversely, in Chapter 4, almost all UK SRI funds use negative screening in most areas. When they use restricted and positive screening, it is usually with respect to only a few specific areas such as climate change and environment. Therefore, using UK SRI funds it is difficult to test the performance of the funds that use negative screening relative to those that use positive and restricted screening because the majority use negative screening in most areas. Consequently, the methodology used in the work to investigate whether the type of screening used by an SRI portfolio affects its financial return is focused on comparing the performance of UK SRI funds, which predominately use negative screening, to US SRI funds, which predominately use positive and restricted screening. This is far from ideal because direct tests of the performance the funds with the same investment scope but different screening techniques would have allowed for a more comprehensive analysis, but the discussion does offer preliminary findings in relation to the importance and effectiveness of screening type.

This chapter also analyses the extent to which SRI funds provide one of the two additional psychological returns associated with this form of investment:

F) The shareholder activism of SRI funds.

Investment in SRI funds can be associated with ethical shareholder activism and many of the funds actively promote their shareholder activism credentials. Morgan et al. (2011) analyse how mutual funds vote on shareholder proposals and identify factors that help determine support for wealth-increasing shareholder proposals. As part of this analysis they find that the 44 SRI funds used in their work are more likely than other funds to vote for proposals, consistent with their voting in line with social agendas. These findings indicate that US SRI funds provide a psychological return above those of conventional funds through their proxy voting. The work in this chapter builds on that of Morgan et al. (2011) to analyse the shareholder activism of SRI funds specifically. The work analyses whether US SRI funds have higher levels of shareholder activism and whether they provide an additional

psychological return through their proxy voting. If the findings indicate that SRI funds provide psychological returns in addition to their financial returns, this is an important finding and suggests that SRI funds may provide a higher total return than conventional funds where performance is not different and where investors value the SRI funds psychological return.

In addition, to the aforementioned contributions that the work in this chapter makes to our knowledge of the performance of SRI portfolios in general, the work in this chapter also makes a number of contributions to our understanding of the risks and potential returns available from investing in US SRI funds, specifically. The first of these contributions focuses on enhancing our understanding of the financial performance of US SRI funds, whilst the later contributions focus on enhancing our understanding of the psychological returns available from investing in US SRI funds.

A contribution of the work in this chapter is the use of asymmetric models in order to analyse the performance of the US SRI funds in different stages of the US market and economic cycle. There have been two significant studies which have analysed the performance of US SRI funds in different investment conditions. Renneboog et al. (2008a) perform an analysis of the effects of changes in publicly available macroeconomic information on the performance of SRI mutual funds and find little evidence of any significant effect. Nofsinger and Varma (2014) analyse the performance of SRI funds during normal and crisis periods using asymmetric models. They find that socially responsible mutual funds outperform during periods of market crises but that this dampening of downside risk comes at the cost of underperforming during non-crisis periods. This chapter builds on the work of Renneboog et al. (2008a) and Nofsinger and Varma (2014). It uses a more accurate fund matching methodology and asymmetric models which incorporate economic and stock market indicators, to allow for the risk-adjusted performance of the SRI funds to be analysed across different stages of the US stock market and economic cycle. This differs from the analysis in Nofsinger and Varma (2014) which focuses on market crisis and non-crisis periods. There are a number of reasons why performance may differ during different cycle periods and possible theoretical explanations for findings of this nature are outlined in Chapter 2. For SRI fund managers and investors it is important to establish what effects, if any, SRI screening has of the performance of funds over different stages of market and

economic cycles because this data may potentially change their asset selection across the cycles.

Another contribution of the work in this chapter is the analysis of the US SRI funds' levels of sector exposure relative to conventional funds. This is important because if the sector exposure levels of the SRI funds and conventional funds are similar, this would indicate that the SRI screening practices used in the construction of the SRI funds do not significantly affect their sector weightings relative to conventional funds. This sector analysis builds on the work of Benson et al. (2006). They find that there appears to be no consistent appearance of specific sectors in which SRI funds take a higher weight than their conventional counterparts as the result of SRI screening. Importantly, the analysis in this chapter uses a novel methodology to analyse the asymmetric sector exposure of the US SRI funds across different stages of the US stock market and economic cycle. This is the first work to use this methodology. There are a number of reasons why the sector exposures of SRI funds and conventional funds may be different in periods of market and economic expansion and contraction. For example, it is possible that SRI portfolios may have different exposures from conventional portfolios during market downturns or upturns because their screening practices create relatively small potential stock universes. During downturns this may significantly affect sector exposures by limiting the ability of SRI portfolios to include particular cyclical defensive stock industries such as tobacco stocks. Alternatively, during upturns, this constraint may affect the sector exposures of SRI portfolios because they may be unable to include some types of cyclical (sin) stocks such as gambling stocks.

In addition, the work in this chapter also contributes to this area of academia by analysing whether they type of assets included within an SRI portfolio affect the financial risks associated with SRI investing. Possible reasons for this are outlined within the introduction section of this chapter. Derwall and Koedijk (2009) find that a portfolio of SRI bond funds earned a benchmark-adjusted return similar to that of its conventional counterpart, but that a portfolio of SRI balanced funds outperformed at a statistically significant level a matched portfolio of conventional balanced funds. These findings indicate that the effect of SRI screening methodologies on portfolio performance may depend on the types of assets included within the funds. The analysis in this chapter builds on Derwall and Koedijk (2009) by using four distinct samples of US SRI funds. These are a sample of US large cap, small-

mid cap, balanced and bond SRI funds. By analysing the performance of each of these fund samples relative to matched samples of conventional funds, this chapter aims to establish whether different types of US SRI funds are affected differently by SRI screening.

The first of contribution of the voting work in this chapter is the use of an extended sample period for the voting analysis. To date, Morgan et al. (2011) is the only work which analyses the proxy voting practices of US SRI funds. Morgan et al. (2011) find that social funds are more likely than other funds to vote for proposals in line with their social agendas. However, Morgan et al. (2011) only analyse shareholder proposals made over a two year sample period (between 2003 and 2005). The voting analysis work in this chapter uses voting data from a 9 year period (2003 to 2012) and therefore has more potential to provide findings that can be generalised. In addition, the last votes analysed in Morgan et al. (2011) were in 2005 and, as a large proportion of US SRI funds only came into existence in the early 2000's, the majority of their voting records have not yet been analysed, so definitive conclusions as to the level of their shareholder activism has not yet been possible. This chapter is the first work which has the potential to provide any such conclusions.

The second contribution of the voting work in this chapter is the use of a superior fund sample than has previously been used and more accurate fund matching of the US SRI and conventional funds within the voting analysis. The analysis in Morgan et al. (2011) does not focus on investigating the voting of SRI funds specifically, and as a result the SRI funds used are not robustly matched with conventional funds for accurate comparison between their voting patterns. Morgan et al. (2011) do not match the SRI funds with conventional funds but instead include them as part of a larger fund sample which includes conventional funds. In order to analyse whether they vote differently from the conventional funds in the sample, Morgan et al. (2011) use a model in which the social fund characteristic is a dummy variable. The analysis within Morgan et al. (2011) is therefore potentially subject to a number of matching biases including fund age, size and investment objective. The SRI funds used in this chapter are matched against an equally weighted portfolio of conventional funds using fund age, end-of-period fund size, and investment objective as matching criteria in order to ensure that there are no biases which may affect the analysis of the voting patterns of the SRI and conventional funds.

The final contribution of the voting work in this chapter is the manner in which the voting analysis within the chapter distinguishes between different types of SRI funds, while previous studies have not. The fund sample used in Morgan et al. (2011) does not include closed-end funds. However, it does include all other types of funds that vote on shareholder resolutions. Morgan et al. (2011) do not distinguish between the types of funds included in their sample such as index funds, large cap funds, and mid-small cap funds. This is despite the fact that the relationship between these funds and the firms held within the fund portfolios are likely to be very different. For example, index funds do not have the same requirement to actively promote wealth maximising actions as mid-small cap funds because their investment objective is to track an index as opposed to provide investment returns. Meanwhile, large cap funds are far less likely to own an influential holding in the large companies within their portfolios compared to mid-small cap funds who are likely to own meaningful holdings in the small companies within their portfolios. Therefore, different types of funds may have different voting practices as a result of the relationships they have with the firms they hold, and the failure of the methodology in Morgan et al. (2011) to control for these differences allows for these differences to potentially bias the findings of the work. This chapter excludes funds which invest internationally (invest a proportion of their capital outside the US stock markets); equity speciality funds (have customised benchmarks and asset holdings); index funds (trackers), and distinguishes between the remaining large cap, mid-small cap and balanced funds in order to ensure that there are no potential biases in the voting analysis and to allow for comparison between the voting practices of different types of SRI funds. For example, whether large cap SRI funds vote differently to mid-small cap SRI funds.

In summary, this chapter makes a number of contributions to the literature which has evaluated the financial and social performance of US SRI funds. The following section provides a description of the data used in the analysis of the performance of the SRI funds and also a description of the data used in the analysis of the voting of the SRI funds.

## 5.2 Description of Data Used

### 5.2.1 Fund Data Used In the Fund Performance Analysis

The fund performance analysis in this chapter uses a data set of US SRI funds. An initial list of all US retail SRI funds was provided by US SIF (the Forum for Sustainable and Responsible Investment). The initial list contained 142 SRI funds and after excluding those funds which invest internationally (invest a proportion of their capital outside the US stock markets), equity speciality funds (have customised benchmarks and asset holdings) and index funds (trackers), a sample of 95 US SRI funds was established. This included 41 large cap, 26 mid-small cap, 10 balanced and 18 bond funds. Following the approach of Derwall and Koedijk (2009) each socially responsible fund was matched by the Center for Research in Security Prices to an equally weighted portfolio of five conventional funds using fund age, end-of-period fund size, and investment objective as matching criteria. Each SRI fund was matched to five conventional funds with similar age, fund size at end of the sample period (funds under management) and investment objective (large cap, mid-small cap, balanced or bond). The performance of each SRI fund is then compared to the performance of an equally weighted portfolio of its matched funds. By using these criteria, the work controls for these potential influences on fund returns. Five funds are used to compose a matched sample, instead of one fund, in order to mitigate the problem that mutual funds are not entirely equal in terms of the size criterion (any discrepancies average out). This matching approach allows for a more accurate analysis than those studies which simply match a large group of SRI funds against a large group of conventional funds such as Renneboog et al. (2008a). The Center for Research in Security Prices were unable to match one of the SRI balanced funds and one of the SRI bond funds to five conventional funds according to the matching criteria and so, as a result, these two SRI funds were excluded from the fund performance work in this chapter, leaving a final sample of 93 US SRI funds. Returns for all of the SRI and conventional funds were also provided by the Center for Research in Security Prices. These are calculated as the change in NAV adjusted for distributions (NAV is already net of management fees and other expenses). The sample period is January 1990 to January 2012.

Table 5.1 presents descriptive statistics relating to the SRI fund samples. Table 5.1 shows that on average the SRI balanced funds are older than the other three sets of funds.

Interestingly, the large cap funds are considerably younger than the other SRI fund types (average inception date is January 2009). This indicates that there has been a large number of new large cap funds in the past 6 years. The data presented in Table 5.1 also indicates that the large cap, balanced and bond funds tend on average to be a lot larger than the mid-small cap funds. In addition, the mid-small cap funds are on average the most expensive (management fee average 0.84 and mean expense ratio of 1.54) and most volatile (average standard deviation is 22.78). The fact that the returns of the equity mid-small cap funds are more volatile than those of the other fund types is consistent with what would be expected as mid and small cap stocks are more volatile than large cap stocks and fixed income securities.

**Table 5.1: Descriptive Statistics Relating to the SRI Fund Samples**

| Fund Type | Number of Funds | Mean Inception Month | Mean Assets (Millions) | Mean Annual Average Return % | Mean Management Fee % | Mean Expense Ratio % | Mean Standard Deviation |
|---|---|---|---|---|---|---|---|
| All Sample | 93 | Jul-99 | 617 | 7.65 | 0.64 | 1.25 | 15.43 |
| Equity Large Cap | 41 | Jan-09 | 829 | 7.52 | 0.56 | 1.15 | 17.32 |
| Equity Mid-Small Cap | 26 | Sep-02 | 239 | 9.02 | 0.84 | 1.54 | 22.78 |
| Balanced | 9 | Jul-92 | 746 | 6.68 | 0.64 | 1.37 | 11.47 |
| Bond | 17 | Feb-01 | 609 | 6.24 | 0.53 | 1.00 | 3.52 |

Table 5.1 reports descriptive statistics relating to the US SRI funds. It shows the number funds, their mean inception month, mean assets, mean annual average return, mean management fee, mean expense ratio and mean standard deviation.

Tables 5.2 and 5.3 present data on the screening practices of the SRI funds. US SIF provided screening data for each fund in relation to 14 unique screening areas including Climate/Clean Technology, Pollution/Toxics, Environment, Community Development, Employer Equality, Human Rights, Labour, Board Issues, Executive Pay, Alcohol, Animal Rights, Defence, Gambling and Tobacco. They also provide data on the type of screening each fund uses for each area.

Table 5.2 shows a summary of the screening practices of the US SRI funds. The data presented in Table 5.2 indicates that overall the US SRI funds predominantly use positive and restricted screening as opposed to negative screening. For example, the large cap funds use positive screening in 46% of areas, restricted screening in 24% of areas, negative screening in 12% of areas and do not screen at all in 18% of areas. This is consistent with the data

presented in Chapter 3 in relation to US SRI indices, but is in contrast to the data presented in Chapter 4 in relation to UK SRI funds which showed that UK SRI funds tend to use negative screening practices. This is an important finding because it is possible that negative screening practices may have a more detrimental effect on fund performance than positive and restricted screening practises, since negative screening practices exclude investments in certain areas and therefore may limit diversification, efficient asset selection and sector exposure compared to positive and restricted screening. If this is the case, we may find that US SRI funds perform better relative to their conventional counterparts than UK SRI funds.

**Table 5.2: Analysis of the Screening Techniques Used by US SRI Funds**

| | | | | |
|---|---|---|---|---|
| All Funds | P | R | X | -- |
| | 46% | 24% | 12% | 18% |
| Large Cap | P | R | X | -- |
| | 49% | 24% | 13% | 14% |
| Mid-small | P | R | X | -- |
| | 42% | 21% | 12% | 25% |
| Balanced | P | R | X | -- |
| | 49% | 28% | 1% | 22% |
| Bond | P | R | X | -- |
| | 40% | 18% | 13% | 29% |

Table 5.2 presents a breakdown of the types of screening used by the SRI funds in specific areas. P denotes the use of positive screening, R denotes the use of restricted screening, X denotes the use of negative screening and -- denotes the use of no screening practices in specific areas.

In Table 5.3 there is a contrast between the areas in which US SRI funds predominately use positive screening and those in which they focus more on the use of restricted and negative screening. The data indicates that a higher percentage of funds use negative screening in the sin areas (Alcohol, Tobacco, Gambling and Armaments) and Animal Rights area than in other areas where there is a greater use of positive screening. Interestingly, the data also indicate that there tends to be high levels of either restricted or negative screening used in some areas. In the areas in which positive screening is used the most, funds either use positive screening or no screening practices. Examples include Climate/Clean, Technology, Pollution/Toxics Environment, Community Development and Employer Equality.

## Table 5.3: Screening Breakdown by Area

All Funds

| | Climate/Clean Technology | Pollution/Toxics | Environment | Community Development | Employer Equality | Human Rights | Labour |
|---|---|---|---|---|---|---|---|
| P | 66% | 66% | 89% | 76% | 83% | 52% | 86% |
| R | 0% | 1% | 0% | 0% | 0% | 35% | 0% |
| X | 0% | 0% | 3% | 0% | 0% | 0% | 0% |
| -- | 34% | 33% | 7% | 24% | 17% | 14% | 14% |
| | Board Issues | Executive Pay | Alcohol | Animal Rights | Defence | Gambling | Tobacco |
| P | 69% | 53% | 0% | 0% | 0% | 0% | 0% |
| R | 0% | 0% | 58% | 75% | 62% | 57% | 54% |
| X | 0% | 0% | 36% | 4% | 35% | 37% | 46% |
| -- | 31% | 48% | 6% | 21% | 3% | 6% | 0% |

Large Cap

| | Climate/Clean Technology | Pollution/Toxics | Environment | Community Development | Employer Equality | Human Rights | Labour |
|---|---|---|---|---|---|---|---|
| P | 63% | 65% | 96% | 78% | 100% | 61% | 98% |
| R | 0% | 0% | 0% | 0% | 0% | 37% | 0% |
| X | 0% | 0% | 2% | 0% | 0% | 0% | 0% |
| -- | 37% | 35% | 2% | 22% | 0% | 2% | 2% |
| | Board Issues | Executive Pay | Alcohol | Animal Rights | Defence | Gambling | Tobacco |
| P | 70% | 52% | 0% | 0% | 0% | 0% | 0% |
| R | 0% | 0% | 52% | 89% | 59% | 52% | 46% |
| X | 0% | 0% | 46% | 0% | 41% | 46% | 54% |
| -- | 30% | 48% | 2% | 11% | 0% | 2% | 0% |

Mid-small

| | Climate/Clean Technology | Pollution/Toxics | Environment | Community Development | Employer Equality | Human Rights | Labour |
|---|---|---|---|---|---|---|---|
| P | 59% | 65% | 79% | 74% | 65% | 53% | 76% |
| R | 0% | 0% | 0% | 0% | 0% | 24% | 0% |
| X | 0% | 0% | 3% | 0% | 0% | 0% | 0% |
| -- | 41% | 35% | 18% | 2% | 35% | 24% | 24% |
| | Board Issues | Executive Pay | Alcohol | Animal Rights | Defence | Gambling | Tobacco |
| P | 68% | 44% | 0% | 0% | 0% | 0% | 0% |
| R | 0% | 0% | 50% | 59% | 53% | 50% | 50% |
| X | 0% | 0% | 35% | 12% | 38% | 35% | 50% |
| -- | 32% | 56% | 15% | 29% | 9% | 15% | 0% |

Balanced

| | Climate/Clean tech | Pollution/Toxics | Environment | Community Investing | Diversity & EEO | Human Rights | Labor Relations |
|---|---|---|---|---|---|---|---|
| P | 100% | 70% | 100% | 70% | 90% | 60% | 90% |
| R | 0% | 30% | 0% | 0% | 0% | 30% | 0% |
| X | 0% | 0% | 0% | 0% | 0% | 0.00% | 0% |
| -- | 0% | 0% | 0% | 30% | 10% | 10% | 10% |
| | Board Issues | Executive Pay | Alcohol | Animal Testing | Defence | Gambling | Tobacco |
| P | 60% | 50% | 0% | 0% | 0% | 0% | 0% |
| R | 0% | 0% | 50% | 60% | 90% | 50% | 80% |
| X | 0% | 0% | 0% | 0% | 0% | 0% | 10% |
| -- | 40% | 50% | 50% | 40% | 10% | 50% | 10% |

Bond

| | Climate/Clean Technology | Pollution/Toxics | Environment | Community Development | Employer Equality | Human Rights | Labour |
|---|---|---|---|---|---|---|---|
| P | 63% | 63% | 74% | 79% | 80% | 37% | 63% |
| R | 0% | 0% | 0% | 0% | 0% | 26% | 0% |
| X | 0% | 0% | 5% | 0% | 0% | 0% | 0% |
| -- | 37% | 37% | 21% | 21% | 21% | 37% | 37% |
| | Board Issues | Executive Pay | Alcohol | Animal Rights | Defence | Gambling | Tobacco |
| P | 53% | 47% | 0% | 0% | 0% | 0% | 0% |
| R | 0% | 0% | 42% | 63% | 42% | 42% | 42% |
| X | 0% | 0% | 37% | 16% | 37% | 37% | 53% |
| -- | 48% | 53% | 21% | 21% | 21% | 21% | 5% |

Table 5.3 reports the types of screening used by the US SRI funds with respect to each area.

### 5.2.2 Fund Benchmark Data Used in the Fund Performance Analysis

For each SRI fund sample a specific market benchmark is used in the analysis. Following the approach of Derwall and Koedijk (2009) for the large cap funds this is the Russell 1000 index and for the mid-small cap funds this is the Russell 2500 index. The Russell 1000 is a large cap index and the Russell 2500 index is a mid-small cap index. For the balanced fund this is the Vanguard Balanced index and for the bond funds this was the CGBI USBIG Overall Broad Investment grade index. The Vanguard Balanced index is a balanced index and the CGBI USBIG Overall Broad Investment grade index is a bond index. All of the benchmark indices used in the work are well respected and commonly used in investment management research. The data for the two Russell indices was provided by the Russell Group and the data for the balanced and bond index was collected from Thomson DataStream. For the asymmetric analysis, the US stock market cycle is measured by the Fama and French US Market Portfolio. Economic cycles are indicated by the Conference Board's Coincident Index. Data for the US risk free rate (One Month Treasury Bill rate), Fama and French's (1993) "size" (SMB) and "book-to-market" (HML) factors and Carhart (1997) "Momentum" (MOM) factor were obtained from the Centre for Research in Security Prices (CRSP).

### 5.2.3 Data Used In Voting Analysis

The voting analysis in this chapter uses the same US SRI large cap, mid-small cap and balanced funds as the performance analysis. However, because the bond funds do not hold stocks and do not have voting rights, they are excluded from the voting analysis. For the performance analyses, the US SRI funds are matched by CRSP to an equally weighted portfolio of five conventional funds. For the voting analysis the US SRI funds voting practices are compared to the same matched funds. However, for a number of SRI funds voting data was not obtainable for all five of their matched funds. When data could not be obtained for all of the matched funds, the relevant SRI fund was excluded from the voting analysis. After excluding those SRI funds, the final sample used in the voting analysis is 34 large cap funds, 19 mid-small cap funds and 8 balanced funds.

Voting records on shareholder proposals for the funds are obtained from the ISS Voting Analytics database, which compiles voting records from SEC N-PX filings. The SEC implemented a proxy voting disclosure rule in January 2003 which requires mutual funds to disclose their proxy voting records on portfolio shares annually by August 31 of each year. The voting sample available and used in this chapter runs from June 2003 to June 2012. Following the approach of Morgan et al. (2011) the work uses a dataset consisting of the voting records of mutual funds. This includes all shareholder proposals occurring during a 9 year sample period. The work focuses on voting at the individual fund level instead of the family level and focuses on shareholder proposals because shareholder proposals tend to be more controversial and varied than management proposals (Morgan et al. 2011). The work also follows the approach of Morgan et al. (2011) by grouping the proposals into five broad categories: board, compensation, governance, environmental, and social proposals and distinguishing potentially wealth-increasing proposals from wealth-decreasing proposals, using the same seven specific items used in Morgan et al. (2011) and documented by the previous literature such as Davis and Kim (2007). These are declassifying the board, allowing cumulative voting, establishing an independent chairman, seeking shareholder input on golden parachutes, expensing stock option, repealing poison pills and proposals that require majority vote for election of directors. These proposals are defined as being within three broad categories by the ISS and these are the board, governance, and compensation categories. For each fund vote, it is recorded whether the fund votes for the proposal, votes against the proposal, or abstains from voting.

## 5.3 Performance Evaluation: Single Factor and Four Factor Models

The results presented in Table 5.4 show the performance of the SRI funds using Jensen's alpha. The results in Table 5.4 show that there is no statistically significant difference between the mean alpha of the large cap SRI funds and their conventional counterparts. The mean alpha of the large cap SRI funds is -0.0009, and the mean alpha of the large cap conventional funds is -0.0013. Therefore, there is an indication that the SRI large cap funds may have slightly outperformed their conventional counterparts, although not significantly in a statistical sense. The mean alpha of the SRI mid-small cap funds is -0.0016, the SRI balanced funds is -0.0008 and the SRI bond funds is -0.0007. In comparison the mean alphas of the conventional mid-small cap SRI funds is -0.0022, for the balanced funds it is -0.0006

and for the bond funds it is -0.0009. The results therefore indicate that the mid-small cap SRI funds slightly outperformed their conventional counterparts, while the balanced and bond SRI funds underperformed. Similar to the results for the large cap SRI funds, there are no significant differences between the mean alphas of the mid-small cap SRI, balanced or bond funds and their conventional counterparts. These results are consistent with the practice of SRI screening not significantly affecting the performance of US SRI funds. For all of the funds, both SRI and conventional, the mean alphas are negative. This indicates that the actively managed funds underperformed their market benchmark indices.

**Table 5.4: Jensen Alpha Measures**

| Large Cap | Mean α | Mean β |
|---|---|---|
| SRI Funds | -0.0009 | 0.8521 |
| Conventional Funds | -0.0013 | 0.8697 |
| T-Tests between sample means | 0.1845 | 0.4027 |
| Mid-small Cap | Mean α | Mean β |
| SRI Funds | -0.0016 | 0.783 |
| Conventional Funds | -0.0022 | 0.8405 |
| T-Tests between sample means | 0.5543 | 0.9627 |
| Balanced | Mean α | Mean β |
| SRI Funds | -0.0008 | 0.9604 |
| Conventional Funds | -0.0006 | 0.9229 |
| T Tests between sample means | -0.2042 | 0.2353 |
| Bond | Mean α | Mean β |
| SRI Funds | -0.0007 | 0.7192 |
| Conventional Funds | -0.0009 | 0.6479 |
| T Tests between sample means | 0.3342 | 0.7693 |

Table 5.4 reports the Jensen alpha and beta measures. The estimations of the alphas are in monthly percentage terms. The table also reports t-tests between the mean alphas and betas of the SRI and conventional funds. *, ** and *** show significance levels at the 10%, 5% and 1% thresholds respectively. Coefficients that are statistically significant are denoted in bold.

Table 5.5 shows the number and percentages of the funds' alphas and betas which were significant at the 10%, 5% and 1% significance levels and the number and percentage of the alphas which were positive and negative. With respect to the large cap SRI funds, the results show that 24% of the funds had positive alphas and 76% had negative alphas. Similarly 29% of the large cap conventional funds had positive alphas and 71% had negative alphas. None of the large cap SRI funds' alphas are statistically significant at the 5% or 1% levels. 15% of the conventional large cap SRI fund's alphas are significant at the 5% level

and 7% at the 1% level. The majority of the alphas for both sets of funds are therefore not statistically significant and this indicates that performance for the majority of the large cap funds was not significantly different from the Russell 1000 on a risk adjusted-basis.

With respect to the mid-small cap SRI funds, 23% of the alphas are positive and 77% negative, while 14% of the conventional funds alphas are positive and 86% negative. Similar to the results for the large cap funds, the majority of the alphas are insignificant. For the mid-small cap SRI funds 12% are significant at the 5% level and 0% at the 1% level, while for their conventional counterparts, 19% are significant at the 5% level and 0% at the 1% level. Again the majority of the alphas for both sets of funds are therefore not statistically significant and this indicates that performance for the majority of the mid-small cap funds was not significantly different from the Russell 2500 on a risk adjusted-basis.

For the balanced SRI funds, 22% of the alphas are positive and 78% negative, with 56% of the alphas significant at the 5% level and 33% at the 1% level. For the balanced conventional funds, 22% of the alphas are also positive and 78% are also negative but far fewer of the alphas are significant, only 22% at the 5% level and 11% at the 1% level. This indicates that more of the SRI funds performed significantly differently from the Vanguard Balanced index than the conventional funds. With regard to the bond SRI funds, the results in Table 5.5 show that 24% of the alphas are positive and 76% negative, with 47% are significant at the 5% level and 47% at the 1% level. With respect to the bond conventional funds, 35% of the alphas are positive and 65% are negative, with 47% of the alphas significant at the 5% level and 35% at the 1% level. Again the majority of the alphas for both sets of funds are therefore not statistically significant.

In summary, Table 5.4 shows that the mean alphas of all the funds are negative and in Table 5.5 the majority of the SRI and conventional funds alphas are negative and this indicates that in general the funds underperformed their market benchmark indices on a risk-adjusted basis. However, there is little evidence presented in Tables 5.4 or 5.5 that the SRI funds' performance was significantly affected by their requirement to screen because SRI funds have similar percentages of positive and negative alphas to those of conventional funds, and there are no statistically significant differences between the mean alphas of the SRI funds and their conventional counterparts.

## Table 5.5: Analysis of the Significance of the Alphas and Betas of the funds

| Large Cap Funds | Positive α | Negative α | Significant α at 10% Level | Significant α at the 5% Level | Significant α at the 1% Level | Significant β at 10% Level | Significant β at the 5% Level | Significant β at the 1% Level |
|---|---|---|---|---|---|---|---|---|
| Number of SRI Funds | 10 | 31 | 2 | 0 | 0 | 38 | 38 | 38 |
| Percentage SRI Funds | 24% | 76% | 4% | 0% | 0% | 93% | 93% | 93% |
| Number of Conventional Funds | 12 | 29 | 15 | 6 | 3 | 39 | 39 | 36 |
| Percentage of Conventional Funds | 29% | 71% | 37% | 15% | 7% | 95% | 95% | 88% |
| **Mid-small Cap Funds** | **Positive α** | **Negative α** | **Significant α at 10% Level** | **Significant α at the 5% Level** | **Significant α at the 1% Level** | **Significant β at 10% Level** | **Significant β at the 5% Level** | **Significant β at the 1% Level** |
| Number of SRI Funds | 6 | 20 | 6 | 3 | 0 | 25 | 25 | 25 |
| Percentage SRI Funds | 23% | 77% | 23% | 12% | 0% | 96% | 96% | 96% |
| Number of Conventional Funds | 4 | 22 | 8 | 5 | 0 | 24 | 22 | 22 |
| Percentage of Conventional Funds | 14% | 86% | 31% | 19% | 0% | 92% | 85% | 85% |
| **Balanced Funds** | **Positive α** | **Negative** | **Significant α at 10% Level** | **Significant α at the 5% Level** | **Significant α at the 1% Level** | **Significant β at 10% Level** | **Significant β at the 5% Level** | **Significant β at the 1% Level** |
| Number of SRI Funds | 2 | 7 | 5 | 5 | 3 | 8 | 8 | 8 |
| Percentage of SRI Funds | 22% | 78% | 56% | 56% | 33% | 89% | 89% | 89% |
| Number of Conventional Funds | 2 | 7 | 2 | 2 | 1 | 8 | 8 | 8 |
| Percentage of Conventional Funds | 22% | 78% | 22% | 22% | 11% | 89% | 89% | 89% |
| **Bond Funds** | **Positive α** | **Negative α** | **Significant α at 10% Level** | **Significant α at the 5% Level** | **Significant α at the 1% Level** | **Significant β at 10% Level** | **Significant β at the 5% Level** | **Significant β at the 1% Level** |
| Number of SRI Funds | 4 | 13 | 9 | 8 | 8 | 15 | 15 | 15 |
| Percentage of SRI Funds | 24% | 76% | 53% | 47% | 47% | 88% | 88% | 88% |
| Number of Conventional Funds | 6 | 11 | 8 | 8 | 6 | 15 | 13 | 13 |
| Percentage of Conventional Funds | 35% | 65% | 47% | 47% | 35% | 88% | 76% | 76% |

Table 5.5 reports the number and percentages of the funds' alphas and betas which were significant at the 10%, 5% and 1% significance levels and the number and percentage of the alphas which were positive and negative. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

The results presented in Table 5.6 show the performance of the funds when the four factor model is used. The results in Table 5.6 show that the introduction of the Fama and French (1993) Size and Book-to-Market and the Carhart (1997) Momentum factors does not result in any statistically significant differences between the mean alphas of any of the samples of the SRI and conventional funds. With regard to the large cap SRI funds the mean alpha is -0.0014 and for the large cap conventional funds it is -0.0019. For the mid-small cap SRI funds the mean alpha is -0.0019 and for the conventional funds it is -0.0014. For the

balanced SRI funds the mean alpha is -0.0009 and for the conventional funds it is –0.0008. With regard to the bond SRI funds the mean alpha is -0.0012 and for the conventional funds it is -0.0014. Table 5.6 does show a statistically significant difference between the mean exposures of the SRI and conventional large cap funds to the Carhart (1997) momentum factor. In addition, with respect to the mid-small cap funds, the SRI funds are shown to have significantly different levels of exposure to the Fama and French (1993) Book-to-Market and the Carhart (1997) momentum factors than their conventional counterparts. The results in Table 5.6 also show that the balanced SRI funds have significantly different levels of exposure to the Fama and French (1993) Book-to-Market factor than their conventional counterparts. For all of the funds, both SRI and conventional, the mean alphas are negative. This indicates that the actively managed funds underperformed their market benchmark indices on a risk-adjusted basis.

**Table 5.6: Four Factor Jensen Alpha Tests**

| Large Cap | α | β | SMB | HML | MOM |
|---|---|---|---|---|---|
| SRI Funds | -0.0014 | 0.8545 | 0.0678 | 0.2603 | -0.0548 |
| Conventional Funds | -0.0019 | 0.897 | 0.0791 | 0.2272 | -0.0169 |
| t-tests between sample means | 0.8754 | -1.155 | -0.2786 | 0.7261 | **-2.4165**** |
| Mid-small Cap | α | β | SMB | HML | MOM |
| SRI Funds | -0.0019 | 0.8384 | -0.1031 | 0.1909 | -0.0423 |
| Conventional Funds | -0.0014 | 0.8847 | -0.1852 | 0.0702 | 0.0025 |
| t-tests between sample means | -0.9336 | -1.065 | 0.8728 | **1.7080*** | **-1.9181*** |
| Balanced | α | β | SMB | HML | MOM |
| SRI Funds | -0.0009 | 0.9576 | 0.0596 | -0.0597 | 0.0132 |
| Conventional Funds | -0.0008 | 0.9272 | 0.044 | 0.0596 | -0.0052 |
| t-tests between sample means | -0.0825 | 0.2012 | 0.1916 | **-2.1264**** | 1.3279 |
| Bond | α | β | SMB | HML | MOM |
| SRI Funds | -0.0012 | 0.7314 | 0.0675 | -0.0041 | -0.0399 |
| Conventional Funds | -0.0014 | 0.6689 | 0.1059 | -0.0134 | -0.0664 |
| t-tests between sample means | 0.5232 | 0.6843 | -0.6463 | 0.3521 | 1.1047 |

Table 5.6 reports the mean four factor alpha and beta measures and the mean Fama and French (1993) and Carhart (1997) factor coefficients. The estimations of the alphas are in monthly percentage terms. The table also reports t-tests between the mean alphas and betas of the SRI and conventional funds. *, ** and *** show significance levels at the 10%, 5% and 1% thresholds respectively. Coefficients that are statistically significant are denoted in bold.

The results presented in Table 5.7 confirm that the introduction of Fama and French's Size and Book-to-Market factors and Carharts (1997) Momentum factor to the performance

measure had little effect on the relative performance of the SRI and conventional funds. The majority of all of the fund's alphas remain negative and the percentages of the negative and positive alphas are similar for the SRI fund samples and those of their conventional counterparts. With respect to the large cap SRI funds, the results show that 15% had positive alphas and 85% had negative alphas. Similarly, 15% of the large cap conventional funds had positive alphas and 85% negative. Again the majority of the alphas for both sets of funds are not statistically significant and this indicates that for the majority of the funds' performance was not significantly different from their market benchmarks. For example, 37% of the SRI large cap alphas are statistically significant at the 5% level and 22% at the 1% level. While 49% of the conventional large cap funds alphas are significant at the 5% level and 32% at the 1% level.

With respect to the mid-small cap SRI funds, 15% of the alphas are positive and 85% negative, while 8% of the conventional funds alphas are positive and 92% negative. 19% of the mid-small cap SRI funds alphas are statistically significant at the 5% level and 12% at the 1% level. While 12% of the conventional mid-small cap funds alphas are significant at the 5% level and 4% at the 1% level. For the balanced SRI funds, 11% of the alphas are positive and 89% negative. For the balanced conventional funds, 22% of the alphas are positive and 78% negative. 56% of the balanced SRI funds alphas are statistically significant at the 5% level and 33% at the 1% level. While 22% of the conventional balanced funds alphas are significant at the 5% level and 11% at the 1% level.

With regard to the SRI bond funds, 24% of the alphas are positive and 76% negative, while with respect to the bond conventional funds, 35% of the alphas are positive and 65% negative. 53% of the SRI bond funds alphas are statistically significant at the 5% level and 47% at the 1% level. While 47% of the conventional bond funds alphas are significant at the 5% level and 41% at the 1% level. A high proportion of the funds are shown to be significantly exposed to the Fama and French (1993) and Carhart (1997) factors and there are differences between the SRI and conventional funds exposures to these factors. For example, 58% of the mid-cap SRI funds are significantly exposed to the Fama and French (1993) size factor at the 5% level and 46% at the 1% level. While 85% of the mid-small cap conventional funds are significantly exposed to the same factor at the 5% and 1% levels. However,

controlling for these exposures has not resulted in any additional evidence of under or outperformance by the SRI funds or differences in risk exposures.

**Table 5.7: Analysis of the Significance of the Alphas, Betas, Fama and French (1993) and Carhart (1997) Factors**

| | Number of positive α | Number of negative α | Significant α at 10% Level | Significant α at the 5% Level | Significant α at the 1% Level | Significant β at 10% Level | Significant β at the 5% Level | Significant β at the 1% Level | |
|---|---|---|---|---|---|---|---|---|---|
| Number of SRI Funds | 39 | 2 | 22 | 15 | 9 | 37 | 36 | 36 | |
| Percentage of SRI Funds | 15% | 85% | 54% | 37% | 22% | 90% | 88% | 88% | |
| Number of Conventional Funds | 6 | 35 | 23 | 20 | 13 | 40 | 40 | 40 | |
| Percentage of Conventional Funds | 15% | 85% | 56% | 49% | 32% | 98% | 98% | 98% | |
| | Significant SMB at the 10% Level | Significant SMB at the 5% Level | Significant SMB at the 1% Level | Significant HML at the 10% Level | Significant HML at the 5% Level | Significant HML at the 1% Level | Significant MOM at the 10% Level | Significant MOM at the 5% Level | Significant MOM at the 1% Level |
| Number of SRI Funds | 19 | 16 | 4 | 31 | 30 | 28 | 15 | 15 | 7 |
| Percentage of SRI Funds | 46% | 39% | 10% | 76% | 73% | 68% | 37% | 37% | 17% |
| Number of Conventional Funds | 24 | 23 | 19 | 37 | 31 | 31 | 21 | 17 | 6 |
| Percentage of Conventional Funds | 59% | 56% | 46% | 90% | 76% | 76% | 51% | 41% | 14% |
| Mid-small Cap | Number of positive α | Number of negative α | Significant α at 10% Level | Significant α at the 5% Level | Significant α at the 1% Level | Significant β at 10% Level | Significant β at the 5% Level | Significant β at the 1% Level | |
| | Positive | Negative | | | | | | | |
| Number of Equity Funds | 4 | 22 | 6 | 5 | 3 | 25 | 25 | 25 | |
| Percentage SRI Funds | 15% | 85% | 23% | 19% | 12% | 96% | 96% | 96% | |
| Number of Conventional Funds | 2 | 24 | 5 | 3 | 1 | 25 | 25 | 22 | |
| Percentage of Conventional Funds | 8% | 92% | 19% | 12% | 4% | 96% | 96% | 85% | |
| | Significant SMB at the 10% Level | Significant SMB at the 5% Level | Significant SMB at the 1% Level | Significant HML at the 10% Level | Significant HML at the 5% Level | Significant HML at the 1% Level | Significant MOM at the 10% Level | Significant MOM at the 5% Level | Significant MOM at the 1% Level |
| Number of SRI Funds | 18 | 15 | 12 | 19 | 14 | 10 | 9 | 9 | 9 |
| Percentage of SRI Funds | 69% | 58% | 46% | 73% | 54% | 38% | 35% | 35% | 35% |
| Number of Conventional Funds | 22 | 22 | 22 | 17 | 15 | 11 | 8 | 7 | 6 |
| Percentage of Conventional Funds | 85% | 85% | 85% | 65% | 58% | 42% | 30% | 27% | 23% |

## Table: 5: 7 Continued

| Balanced Funds | Number of positive α | Number of negative α | Significant α | Significant α | Significant α | Significant β | Significant β | Significant β | |
|---|---|---|---|---|---|---|---|---|---|
| | Positive | Negative | at 10% Level | at the 5% Level | at the 1% Level | at 10% Level | at the 5% Level | at the 1% Level | |
| Number of SRI Funds | 1 | 8 | 5 | 5 | 3 | 8 | 8 | 8 | |
| Percentage of SRI Funds | 11% | 89% | 56% | 56% | 33% | 89% | 89% | 89% | |
| Number of Conventional Funds | 2 | 7 | 4 | 2 | 1 | 8 | 8 | 7 | |
| Percentage of Conventional Funds | 22% | 78% | 44% | 22% | 11% | 89% | 89% | 89% | |
| | Significant SMB at the 10% Level | Significant SMB at the 5% Level | Significant SMB at the 1% Level | Significant HML at the 10% Level | Significant HML at the 5% Level | Significant HML at the 1% Level | Significant MOM at the 10% Level | Significant MOM at the 5% Level | Significant MOM at the 1% Level |
| Number of SRI Funds | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 |
| Percentage of SRI Funds | 22% | 22% | 11% | 22% | 22% | 11% | 22% | 22% | 22% |
| Number of Conventional Funds | 5 | 5 | 2 | 5 | 3 | 3 | 1 | 1 | 1 |
| Percentage of Conventional Funds | 56% | 56% | 22% | 56% | 33% | 33% | 11% | 11% | 11% |
| Bond Funds | Number of positive α | Number of negative α | Significant α | Significant α | Significant α | Significant β | Significant β | Significant β | |
| | | | at 10% Level | at the 5% Level | at the 1% Level | at 10% Level | at the 5% Level | at the 1% Level | |
| Number of SRI Funds | 4 | 13 | 12 | 9 | 8 | 15 | 15 | 15 | |
| Percentage of SRI Funds | 24% | 76% | 71% | 53% | 47% | 88% | 88% | 88% | |
| Number of Conventional Funds | 6 | 11 | 9 | 8 | 7 | 15 | 13 | 13 | |
| Percentage of Conventional Funds | 35% | 65% | 53% | 47% | 41% | 88% | 76% | 76% | |
| | Significant SMB at the 10% Level | Significant SMB at the 5% Level | Significant SMB at the 1% Level | Significant HML at the 10% Level | Significant HML at the 5% Level | Significant HML at the 1% Level | Significant MOM at the 10% Level | Significant MOM at the 5% Level | Significant MOM at the 1% Level |
| Number of SRI Funds | 10 | 9 | 8 | 1 | 1 | 1 | 12 | 11 | 9 |
| Percentage of SRI Funds | 59% | 53% | 47% | 6% | 6% | 6% | 71% | 65% | 53% |
| Number of Conventional Funds | 10 | 10 | 7 | 5 | 3 | 1 | 14 | 14 | 8 |
| Percentage of Conventional Funds | 59% | 59% | 41% | 29% | 18% | 6% | 82% | 82% | 47% |

Table 5.7 reports the number and percentages of the funds' alphas, betas, Fama and French (1993) Size and Book-to-market and Carhart (1997) Momentum coefficients which were significant at the 10%, 5% and 1% significance levels, the number and percentage of the alphas which were positive and those which were negative. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

In summary, the results presented in this section show that the risk-adjusted performance of US SRI funds is not significantly different from conventional funds[19]. These results are consistent with the findings of Renneboog et al. (2008a) who found that US SRI fund's risk-adjusted performance is not statistically different from their conventional counterparts. The results are also consistent with Derwall and Koedijk (2009) with respect to bond funds. However, these results contrast with Derwall and Koedijk (2009) with respect to balanced funds as they found that US balanced SRI funds outperform their conventional counterparts at statistically significant levels.

These results contrast to those presented in Chapter 4, which indicate that UK SRI funds are detrimentally affected by their requirement to screen. The likely reason for this is that UK SRI funds are more affected by their screening practices because they use negative screening to a greater extent than US SRI funds and negative screening has more of an effect on fund performance than other screening methodologies. Goldreyer and Diltz (1999) find that SRI equity funds using positive screening techniques, outperform those which do not at statistically significant levels and the findings of Goldreyer and Diltz (1999) would suggest that the psychological returns achieved through negative screening may come at a greater financial cost then the psychological returns achieved through positive or restricted screening.

## 5.4 Performance Evaluation: Single Factor Asymmetric Model

In this section the single factor model is used to analyse the asymmetric performance of the funds. In this analysis the US stock market cycle is measured by the Fama and French US Market Portfolio and the US economic cycle is measured by the Conference Board's Coincident Index[20]. The results in Table 5.8 show that there were no statistically significant difference between the mean alphas of the large cap SRI and conventional funds across either periods of economic expansion or contraction. In the economic expansion periods the SRI large cap funds mean alpha was 0.0001 and for the conventional funds it was 0.0005. In the contraction periods the SRI large cap funds mean alpha was -0.0011 and for the conventional funds it was -0.0024. Interestingly, both sets of funds outperformed the Russell 1000 during

[19] Sharpe Ratio analysis was also performed on the SRI and conventional funds. The results were consistent with those presented with respect to the Jensen Alpha tests. The results from the Sharpe ratio analysis are not presented in this chapter.

[20] Asymmetric tests were also performed where the ECRI cycle indictor was used. In addition, single and four factor asymmetric tests were performed where the CB, ECRI and Fama French cycle indicators were used. The results from these tests were consistent with those presented in this section, in general. Therefore the results added little to the work and are not presented in this thesis.

periods of economic expansion but underperformed in periods of economic contraction. In addition, findings indicate that the large cap SRI fund performed worse that the large cap conventional funds in expansion periods and better in the contraction periods.

Similarly, the results in Table 5.8 show that there were no statistically significant differences between the mean alphas of the mid-small cap, balanced and bond SRI funds and their conventional counterparts across either periods of economic expansion or contraction. In the economic expansion periods the SRI mid-small cap funds mean alpha was -0.0016 and for the conventional funds it was -0.0015. In the contraction periods the SRI mid-small cap funds mean alpha was -0.0012 and for the conventional funds it was -0.0035. The results therefore indicate that both sets of mid-cap funds underperformed the Russell 2500 in both economic expansion and contraction periods in general. With regard to the balanced funds, in the economic expansion periods the SRI balanced funds mean alpha was -0.0009 and for the conventional funds it was 0.0053. In the contraction periods the SRI balanced funds mean alpha was -0.0017 and for the conventional funds it was -0.0013. The results therefore indicate that the balanced SRI funds underperformed their benchmark in periods of periods of economic expansion, while the conventional funds outperformed their market benchmark in periods of economic expansion. Both sets of balanced funds are shown to have underperformed their market benchmark in periods of economic contraction.

With regard to the bond funds, in the economic expansion periods the SRI bond funds mean alpha was -0.0003 and for the conventional funds it was 0.0006. This indicates that the conventional funds outperformed the CGBI USBIG Overall Broad Investment grade index during these periods and that the SRI funds underperformed. In the contraction periods the SRI bond funds mean alpha was -0.0012 and for the conventional funds it was -0.0027. This indicates that both sets of bond funds underperformed their market benchmark during periods of economic contraction and that this underperformance was worse for the conventional funds. Importantly, the differences between the performance of the SRI and conventional bond funds is not statistically significant over either expansion or contraction periods. The results also show that there were no significant differences between the betas of the SRI and conventional funds.

**Table 5.8: The Asymmetric Single Factor Performance When the Conference Board Coincident Index Is the Cycle Indicator**

| Large Cap | α + | α - | β + | β - |
|---|---|---|---|---|
| Mean SRI | 0.0001 | -0.0011 | 0.8177 | 0.8682 |
| Mean Con | 0.0005 | -0.0024 | 0.8356 | 0.8749 |
| t-tests between sample means | -0.6953 | 1.5679 | -0.3904 | -0.1581 |
| Mid-Small Cap | α + | α - | β + | β - |
| Mean SRI | -0.0016 | -0.0015 | 0.7601 | 0.8051 |
| Mean Con | -0.0012 | -0.0035 | 0.8373 | 0.8439 |
| t-tests between sample means | -0.6341 | 1.5221 | -1.1662 | -0.6666 |
| Balanced | α+ | α + | β + | β - |
| Mean SRI | -0.0009 | -0.0017 | 0.9937 | 0.9316 |
| Mean Con | 0.0012 | -0.0013 | 0.9537 | 0.9212 |
| t-tests between sample means | -1.4576 | -0.2687 | 1.4888 | 1.1237 |
| Bond | α + | α - | β + | β - |
| Mean SRI | -0.0003 | -0.0012 | 0.6827 | 0.6986 |
| Mean Con | 0.0006 | -0.0027 | 0.5953 | 0.6436 |
| t-tests between sample means | -0.5765 | 1.5131 | 0.5129 | 0.6221 |

Table 5.8 reports the mean alpha and beta measures. The estimations of the alphas are in monthly percentage terms. The table also reports t-tests between the mean alphas and betas of the SRI and conventional funds. *, ** and *** show significance levels at the 10%, 5% and 1% thresholds respectively. Coefficients that are statistically significant are denoted in bold.

Table 5.9 shows that for both the SRI and conventional large cap funds the majority of the funds alphas are negative in both economic expansion and contraction periods. Therefore, there is an indication that, in general, the funds underperformed their market benchmarks. With respect to the large cap SRI funds, the results show that in the economic expansion periods 46% had positive alphas and 54% had negative alphas. Similarly 44% of the large cap conventional funds had positive alphas and 56% negative. In the economic contraction periods 27% of the large cap SRI funds had positive alphas and 73% had negative alphas, while 12% of the large cap conventional funds had positive alphas and 88% negative. However, the majority of both the SRI and conventional funds alphas are insignificant and therefore the underperformance recorded was generally not statistically significant. For example, only 2% of the large cap SRI fund alphas are significant for the expansion periods at the 5% level and 0% at the 1% level, while only 17% of the large cap conventional fund alphas are significant at the 5% level and 7% at the 1% level. In the economic contraction periods 15% of the SRI large cap funds alphas are significant at the 5% level and 5% at the

1% level. While, 22% of the conventional large cap funds alphas are significant at the 5% level and 12% at the 1% level. There is little evidence presented in Table 5.9 that the large cap SRI funds out or underperformed their conventional counterparts, because the percentages of their alphas which are positive and negative are similar to those of the conventional funds.

The results presented in Table 5.9 with respect to the mid-small cap, balanced and bond funds echo those for the large cap funds, and show that the majority of the funds had negative alphas with respect to both the periods of US economic expansion and contraction and also that the majority of alphas are again not statistically significant. In addition, there is little evidence that the mid-small cap, balanced or bond funds out or underperformed their conventional counterparts over either of the full periods. With respect to the mid-small cap SRI funds, the results show that in the economic expansion periods 27% had positive alphas and 73% had negative alphas. While, 35% of the mid-small cap conventional funds had positive alphas and 65% negative. In the economic contraction periods 15% of the mid-small cap SRI funds had positive alphas and 85 % had negative alphas. Similarly, 15% of the mid-small cap conventional funds had positive alphas and 85% had negative alphas in the economic contraction periods. The majority of the alphas are again insignificant. 8% of the mid-small cap SRI fund alphas are significant for the expansion periods at the 5% level and 4% at the 1% level, while 8% of the mid-small cap conventional fund alphas are significant at the 5% level and 0% at the 1% level. In the economic contraction periods 4% of the SRI mid-small cap funds alphas are significant at the 5% level and 0% at the 1% level, while, 31% of the conventional mid-small cap funds alphas are significant at the 5% level and 1% at the 1% level.

For the balanced SRI funds, the results show that in the economic expansion periods 22% had positive alphas and 78% had negative alphas. While, 12% of the balanced conventional funds had positive alphas and 23% negative. In the economic contraction periods 11% of the balanced SRI funds had positive alphas and 89% had negative alphas. While, 15% of the balanced conventional funds had positive alphas and 19% negative. 44% of the balanced cap SRI fund alphas are significant for the expansion period alphas at the 5% level and 33% at the 1% level, while 12% of the balanced conventional fund alphas are significant at the 5% level and 4% at the 1% level. In the economic contraction periods 33%

of the SRI balanced funds alphas are significant at the 5% level and 1% at the 1% level. In comparison, 0% of the conventional balanced funds alphas are significant at the 5% and 1% level.

With respect to the bond SRI funds, the results show that in the economic expansion periods 18% had positive alphas and 82% had negative alphas, while 35% of the bond conventional funds had positive alphas and 65% negative. In the economic contraction periods 29% of the bond SRI funds had positive alphas and 71% had negative alphas. In comparison, 6% of the conventional bond funds had positive alphas and 94% negative. 65% of the bond SRI fund alphas are significant for the expansion periods at the 5% level and 53% at the 1% level, while 59% of the bond conventional fund alphas are significant at the 5% level and 47% at the 1% level. In the economic contraction periods 6% of the SRI bond funds alphas are significant at the 5% level and 0% at the 1% level. In comparison, 41% of the conventional bonds funds alphas are significant at the 5% level and 12% at the 1% level.

**Table 5.9: Analysis of the Significance of the Alphas and Betas of SRI Funds where the Conference Board Coincident Index is the Cycle Indicator**

| Large Cap | α + Positive | α + Negative | α at the 10% Level | α at the 5% Level | α at the 1% Level | β + at the 10% level | β + at the 5 % Level | β + at the 1% Level |
|---|---|---|---|---|---|---|---|---|
| Number of SRI Funds | 19 | 22 | 1 | 1 | 0 | 38 | 38 | 38 |
| Percentage of SRI Funds | 46% | 54% | 2% | 2% | 0% | 93% | 93% | 93% |
| Number of UK Conventional Funds | 18 | 23 | 9 | 7 | 3 | 40 | 40 | 39 |
| Percentage of Conventional Funds | 44% | 56% | 22% | 17% | 7% | 98% | 95% | 95% |
| | α - Positive | -Negative | α -at the 10% Level | α -at the 5% Level | α -at the 1% Level | β - at the 10% Level | β -at the 5% Level | β -at the 1% Level |
| Number of SRI Funds | 11 | 30 | 8 | 6 | 2 | 39 | 39 | 38 |
| Percentage of SRI Funds | 27% | 73% | 20% | 15% | 5% | 95% | 95% | 93% |
| Number of Conventional Funds | 5 | 36 | 13 | 9 | 5 | 39 | 38 | 38 |
| Percentage of Conventional Funds | 12% | 88% | 32% | 22% | 12% | 95% | 93% | 93% |
| Mid-Small Cap | α + Positive | α + Negative | α + at the 10% Level | α + at the 5% level | α + at the 1% Level | β + at the 10% Level | β + at the 5% Level | β + at the 1% Level |
| Number of SRI Funds | 7 | 19 | 3 | 2 | 1 | 25 | 25 | 25 |
| Percentage of SRI Funds | 27% | 73% | 12% | 8% | 4% | 96% | 96% | 96% |
| Number of Conventional Funds | 9 | 17 | 3 | 2 | 0 | 24 | 22 | 22 |
| Percentage of Conventional Funds | 35% | 65% | 12% | 8% | 0% | 92% | 85% | 85% |
| | α - Positive | α - Negative | α -at the 10% Level | α - at the 5% Level | α - at the 1% Level | -at the 1% Level | -at the 5% Level | - at the 1% Level |
| Number of SRI Funds | 4 | 22 | 2 | 1 | 0 | 24 | 24 | 23 |
| Percentage of SRI Funds | 15% | 85% | 8% | 4% | 0% | 92% | 92% | 88% |
| Number of conventional Funds | 4 | 22 | 8 | 8 | 3 | 25 | 23 | 23 |
| Percentage of conventional Funds | 15% | 85% | 31% | 31% | 1% | 96% | 88% | 88% |

| Balanced | α + Positive | α + Negative | α + at the 10% Level | α + at the 5% Level | α + at the 1% Level | β + at the 10% Level | β + at the 5% Level | β + at the 1% Level |
|---|---|---|---|---|---|---|---|---|
| Number of SRI Funds | 2 | 7 | 5 | 4 | 3 | 8 | 8 | 8 |
| Percentage of SRI Funds | 22% | 78% | 56% | 44% | 33% | 89% | 89% | 89% |
| Number of Conventional Funds | 3 | 6 | 4 | 3 | 1 | 9 | 8 | 8 |
| Percentage of Conventional Funds | 12% | 23% | 15% | 12% | 4% | 35% | 31% | 31% |
| | α - Positive | α - Negative | α -at the 10% Level | α -at the 5% Level | α -at the 1% Level | β -at the 10% Level | β -at the 5% Level | β - at the 10% Level |
| Number of SRI Funds | 1 | 8 | 4 | 3 | 1 | 8 | 8 | 8 |
| Percentage of SRI Funds | 11% | 89% | 44% | 33% | 1% | 89% | 89% | 89% |
| Number of conventional Funds | 4 | 5 | 1 | 0 | 0 | 9 | 9 | 8 |
| Percentage of conventional Funds | 15% | 19% | 4% | 0% | 0% | 35% | 35% | 31% |
| Bond | α + Positive | α + Negative | α + at the 10% Level | α + at the 5% level | α + at the 1% Level | β + at the 10% Level | β + at the 5% Level | B + at the 1% Level |
| Number of SRI Funds | 3 | 14 | 12 | 11 | 9 | 16 | 15 | 15 |
| Percentage of SRI Funds | 18% | 82% | 71% | 65% | 53% | 94% | 88% | 88% |
| Number of Conventional Funds | 6 | 11 | 10 | 10 | 8 | 15 | 15 | 15 |
| Percentage of Conventional Funds | 35% | 65% | 59% | 59% | 47% | 88% | 88% | 88% |
| | α -Positive | -Negative | α -at the 10% Level | α - at the 5% Level | α -at the 1% Level | β -at the 10% Level | β -at the 5% Level | β -at the 1% Level |
| Number of SRI Funds | 5 | 12 | 4 | 1 | 0 | 14 | 14 | 13 |
| Percentage of SRI Funds | 29% | 71% | 24% | 6% | 0% | 82% | 82% | 76% |
| Number of Conventional Funds | 1 | 16 | 8 | 7 | 2 | 11 | 10 | 8 |
| Percentage of Conventional Funds | 6% | 94% | 47% | 41% | 12% | 65% | 59% | 47% |

Table 5.9 reports the number and percentages of the funds' alphas and betas which were significant at the 10%, 5% and 1% significance levels and the number and percentage of the alphas which were positive and negative. The + notation indicates periods of economic expansion and the – notation indicates periods of market contraction. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

The results presented in Table 5.10 show the asymmetric performance of the funds when the Fama French US market portfolio is the cycle indicator, and therefore during periods when the US stock market expanded and contracted. The results show that the mean alphas of the SRI large cap, mid-small cap, balanced and bond funds were not significantly different from those of their conventional counterparts, across both periods of US stock market expansion and contraction. These results indicate that the US SRI funds did not perform significantly differently from conventional funds during these periods despite their requirement to screen. In the economic expansion periods the SRI large cap funds mean alpha was 0.0012 and for the conventional funds it was 0.0033. In the contraction periods the SRI large cap funds mean alpha was -0.0043 and for the conventional funds it was -0.0055. These results indicate that both sets of large cap funds outperformed their market index during periods of market expansion and that the conventional funds outperformance was greater. In

addition, the results indicate that both sets of funds underperformed in periods of market contraction and that the SRI funds underperformance was less severe.

In the economic expansion periods the SRI mid-small cap funds mean alpha was 0.0038 and for the conventional funds it was 0.0024. In the contraction periods the SRI mid-small cap funds mean alpha was -0.0024 and for the conventional funds it was -0.0043. In the economic expansion periods the SRI balanced funds mean alpha was 0.0012 and for the conventional funds it was 0.0010. In the contraction periods the SRI balanced funds mean alpha was -0.0015 and for the conventional funds it was -0.0004. In the economic expansion periods the bond funds mean alpha was 0.0013 and for the conventional funds it was 0.0024. In the contraction periods the SRI bond funds mean alpha was -0.0037 and for the conventional funds it was -0.0058. Interestingly, all of the funds mean alphas are negative during the contraction periods and positive during the expansion periods and this indicates that the funds outperformed their market benchmarks in periods of market expansion and underperformed in periods of market contraction.

**Table 5.10: The Asymmetric Single Factor Performance When the Fama and French US Market Portfolio Is the Cycle Indicator**

| Large Cap | α + | α - | β + | β - |
|---|---|---|---|---|
| Mean SRI | 0.0012 | -0.0043 | 0.8212 | 0.8068 |
| Mean Con | 0.0033 | -0.0055 | 0.7938 | 0.8108 |
| t-tests between means | -1.6166 | 0.6812 | 0.5541 | -0.0956 |
| Mid-Small Cap | α + | α - | β + | β - |
| Mean SRI | 0.0038 | -0.0024 | 0.7243 | 0.7952 |
| Mean Con | 0.0024 | -0.0043 | 0.7797 | 0.8284 |
| t-tests between means | 0.5236 | 1.0255 | -1.0382 | -0.5186 |
| Balanced | α + | α - | β + | β - |
| Mean SRI | 0.0012 | -0.0015 | 0.8811 | 0.9587 |
| Mean Con | 0.0010 | -0.0004 | 0.8485 | 0.9545 |
| t-tests between means | 0.2116 | -0.6281 | 0.2513 | 0.0297 |
| Bond | α + | α - | β + | β - |
| Mean SRI | 0.0013 | -0.0037 | 0.7221 | 0.7662 |
| Mean Con | 0.0024 | -0.0058 | 0.702 | 0.6464 |
| t-tests between means | -0.4633 | 1.0107 | 0.2103 | 1.4495 |

Table 5.10 reports the mean alpha and beta measures. The estimations of the alphas are in monthly percentage terms. The table also reports t-tests between the mean alphas and betas of the SRI and conventional funds. *, ** and *** show significance levels at the 10%, 5% and 1% thresholds respectively. Coefficients that are statistically significant are denoted in bold.

Table 5.11 shows that for all of the funds, both SRI and conventional, the majority of the alphas are not statistically significant. This indicates that the majority of the SRI and conventional funds did not underperform or outperform their market benchmarks at statistically significant levels. Consistent with what would be expected from the results presented in Table 5.10, a higher percentage of the funds alphas are positive in market expansion periods and conversely a far higher percentage are negative in market contraction periods. With respect to the large cap SRI funds, the results show that in the market expansion periods 68% had positive alphas and 32% had negative alphas. Similarly, 71% of the large cap conventional funds had positive alphas and 29% negative. In the market contraction periods 17% of the large cap SRI funds had positive alphas and 83% had negative alphas, while 5% of the large cap conventional funds had positive alphas and 95% negative. Only 15% of the large cap SRI fund alphas are significant for the expansion period alphas at the 5% level and 5% at the 1% level, while only 39% of the large cap conventional fund alphas are significant at the 5% level and 27% at the 1% level. In the market contraction periods 34% of the SRI large cap funds alphas are significant at the 5% level and 0% at the 1% level, while 54% of the conventional large cap funds alphas are significant at the 5% level and 32% at the 1% level.

With respect to the mid-small cap SRI funds, the results show that in the market expansion periods 69% had positive alphas and 31% had negative alphas. Similarly, 77% of the mid-small cap conventional funds had positive alphas and 23% negative. In the market contraction periods 19% of the mid-small cap SRI funds had positive alphas and 81% had negative alphas. Similarly, 4% of the mid-small cap conventional funds had positive alphas and 96% negative. 15% of the mid-small cap SRI fund alphas are significant for the expansion periods at the 5% level and 0% at the 1% level, while only 19% of the mid-small cap conventional fund alphas are significant at the 5% level and 4% at the 1% level. In the market contraction periods 27% of the SRI mid-small cap funds alphas are significant at the 5% level and 4% at the 1% level, while 38% of the conventional mid-small cap funds alphas are significant at the 5% level and 15% at the 1% level.

With respect to the balanced SRI funds, the results show that for the market expansion periods 56% had positive alphas and 44% had negative alphas. Similarly 67% of the balanced conventional funds had positive alphas and 33% negative. In the market contraction periods

11% of the balanced SRI funds had positive alphas and 89% had negative alphas. Similarly, 33% of the balanced conventional funds had positive alphas and 67% negative. 0% of the balanced SRI fund alphas are significant for the expansion periods at the 5% level and 1% level, while only 22% of the balanced conventional fund alphas are significant at the 5% level and 0% at the 1% level. In the market contraction periods 11% of the SRI balanced funds alphas are significant at the 5% and 1% level, while 22% of the conventional balanced funds alphas are significant at the 5% and 1% level.

With respect to the bond SRI funds, the results show that for the market expansion periods 59% had positive alphas and 41% had negative alphas. Similarly, 59% of the bond conventional funds had positive alphas and 41% negative. For the market contraction periods 29% of the bond SRI funds had positive alphas and 71% had negative alphas. Similarly, 6% of the bond conventional funds had positive alphas and 94% negative. 41% of the SRI bond fund alphas are significant for the expansion period alphas at the 5% level and 29% at the 1% level, while 65% of the bond conventional fund alphas are significant at the 5% level and 35% at the 1% level. For the market contraction periods 24% of the SRI bond funds alphas are significant at the 5% and 1% level, while 76% of the conventional bond funds alphas are significant at the 5% level and 41% at the 1% level.

Importantly, in Table 5.11 there is again little evidence of significant differences between the performance of the US SRI and the conventional funds. The vast majority of the betas of all of the funds are statistically significant and this indicates that they are significantly different from 1. For example, in the expansion periods 98% of the large cap SRI funds betas are significant at the 5% and 1% level, while 98% of the large cap conventional funds betas are also significant at the 5% and 93% at the 1% level.

## Table 5.11: Analysis of the Significance of the Alphas and Betas of the Funds When the Fama and French US Market Portfolio Is the Cycle Indicator

| Large Cap | α | α | α | α | α | β | β | β |
|---|---|---|---|---|---|---|---|---|
| | + Positive | + Negative | + at the 10% Level | + at the 5% Level | + at the 1% Level | + at the 10% Level | + at the 5% Level | + at the 1% Level |
| Number of SRI Funds | 28 | 13 | 12 | 6 | 2 | 40 | 40 | 40 |
| Percentage of SRI Funds | 68% | 32% | 29% | 15% | 5% | 98% | 98% | 98% |
| Number of UK Conventional Funds | 29 | 12 | 21 | 16 | 11 | 40 | 40 | 38 |
| Percentage of Conventional Funds | 71% | 29% | 51% | 39% | 27% | 98% | 98% | 93% |
| | α | α | α | α | α | β | β | β |
| | - Positive | -Negative | -at the 10% level | -at the 5% Level | -at the 1% Level | - at the 10% Level | -at the 5% Level | -at the 1% Level |
| Number of SRI Funds | 7 | 34 | 24 | 14 | 0 | 39 | 38 | 38 |
| Percentage of SRI Funds | 17% | 83% | 59% | 34% | 0% | 95% | 93% | 93% |
| Number of Conventional Funds | 2 | 39 | 26 | 22 | 13 | 40 | 39 | 39 |
| Percentage of conventional Funds | 5% | 95% | 63% | 54% | 32% | 98% | 95% | 95% |
| Mid-small Cap | α | α | α | α | α | β | β | β |
| | + Positive | + Negative | + at the 10% Level | + at the 5% Level | + at the 1% Level | + at the 10% Level | + at the 5% Level | + at the 1% Level |
| Number of SRI Funds | 18 | 8 | 7 | 4 | 0 | 23 | 23 | 21 |
| Percentage of SRI Funds | 69% | 31% | 27% | 15% | 0% | 88% | 88% | 81% |
| Number of Conventional Funds | 20 | 6 | 10 | 5 | 1 | 25 | 25 | 25 |
| Percentage of Conventional Funds | 77% | 23% | 38% | 19% | 4% | 96% | 96% | 96% |
| | α | α | α | α | α | β | β | β |
| | - Positive | -Negative | -at the 10% level | -at the 5% Level | -at the 1% Level | - at the 10% Level | -at the 5% Level | -at the 1% Level |
| Number of SRI Funds | 5 | 21 | 12 | 7 | 1 | 25 | 25 | 25 |
| Percentage of SRI Funds | 19% | 81% | 46% | 27% | 4% | 96% | 96% | 96% |
| Number of Conventional Funds | 1 | 25 | 14 | 10 | 4 | 25 | 24 | 24 |
| Percentage of conventional Funds | 4% | 96% | 54% | 38% | 15% | 96% | 92% | 92% |
| Balanced | α | α | α | α | α | β | β | β |
| | + Positive | + Negative | + at the 10% Level | + at the 5% level | + at the 1% Level | + at the 10% level | + at the 5% Level | + at the 1% level |
| Number of SRI Funds | 5 | 4 | 2 | 0 | 0 | 9 | 9 | 8 |
| Percentage of SRI Funds | 56% | 44% | 22% | 0% | 0% | 100% | 100% | 89% |
| Number of Conventional Funds | 6 | 3 | 3 | 2 | 0 | 9 | 8 | 8 |
| Percentage of Conventional Funds | 67% | 33% | 33% | 22% | 0% | 100% | 89% | 89% |
| | α | α | α | α | α | β | β | β |
| | -Positive | -Negative | -at the 10% Level | -at the 5% Level | -at the 1% Level | -at the 10% Level | -at the 5% Level | -at the 1% Level |
| Number of SRI Funds | 1 | 8 | 2 | 1 | 1 | 8 | 8 | 8 |
| Percentage of SRI Funds | 11% | 89% | 22% | 11% | 11% | 89% | 89% | 89% |
| Number of Conventional Funds | 3 | 6 | 4 | 2 | 2 | 9 | 9 | 8 |
| Percentage of Conventional Funds | 33% | 67% | 44% | 22% | 22% | 100% | 100% | 89% |

## Table 5.11: Continued

| Bond | α | α | α | α | α | β | β | β |
|---|---|---|---|---|---|---|---|---|
| | + Positive | + Negative | + at the 10% Level | + at the 5% Level | + at the 1% Level | + at the 10% level | + at the 5% level | + at the 1% Level |
| Number of SRI Funds | 10 | 7 | 9 | 7 | 5 | 16 | 16 | 14 |
| Percentage of SRI Funds | 59% | 41% | 53% | 41% | 29% | 94% | 94% | 82% |
| Number of Conventional Funds | 10 | 7 | 11 | 11 | 6 | 16 | 16 | 15 |
| Percentage of Conventional Funds | 59% | 41% | 65% | 65% | 35% | 94% | 94% | 88% |
| | α | α | α | α | α | β | β | β |
| | -Positive | -Negative | - at the 10% level | -at the 5% level | -at the 1% Level | - at the 10% Level | - at the 5% Level | -at the 1% Level |
| Number of SRI Funds | 5 | 12 | 8 | 4 | 4 | 15 | 15 | 15 |
| Percentage of SRI Funds | 29% | 71% | 47% | 24% | 24% | 88% | 88% | 88% |
| Number of Conventional Funds | 1 | 16 | 13 | 13 | 7 | 12 | 12 | 9 |
| Percentage of Conventional Funds | 6% | 94% | 76% | 76% | 41% | 71% | 71% | 53% |

Table 5.11 reports the number and percentages of the funds' alphas and betas which were significant at the 10%, 5% and 1% significance levels and the number and percentage of the alphas which were positive and negative. The + notation indicates periods of economic expansion and the – notation indicates periods of market contraction. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

In summary, there is little evidence of statistically significant differences between the performance of SRI and conventional funds presented in this section. These results are consistent with those presented in previous sections, and the use of asymmetric cycle indicators in order to analyse the performance of the SRI funds across different stages of the economic and market cycle has not resulted in the discovery of significant performance differentials between the large cap, mid-small cap, balanced or bond SRI funds and their conventional counterparts. These results are consistent with those in Chapter 3 with respect to US SRI indices, which indicated that they do not perform significantly differently from their conventional counterparts over different stages of the US economic and market cycle, in general. These results are also consistent with the findings of Renneboog et al. (2008a) who also find little evidence of any statistically significant effects. The analysis in this section focused on analysing the performance of individual funds. This approach differs from that of more recent work in this area such as Bauer et al. (2005) and Renneboog et al. (2008a) who focus on analysing the performance of portfolios of SRI funds. Using both methodologies allows an analysis of whether the portfolio based methodology results in the averaging of any affects SRI screening has on the performance of SRI funds and therefore a loss of statistical

significance. Analysis which focuses on analysing the performance of portfolios of the SRI funds is performed in the following section.

## 5.5 Portfolio Based Analysis

In this section results from tests of the performance of equally-weighted portfolios of the fund samples are presented. Portfolios are constructed from the US SRI large cap, mid-small cap, balanced and bond funds. In addition, portfolios are constructed from the conventional large cap, mid-small cap, balanced and bond funds. The total sample period for the analysis in this section is January 1990 to January 2012 because prior to 1990 too few of the US SRI funds existed for this method of analysis to be robust. These tests analyse the performance of the SRI portfolios across the whole sample period and two subperiods, January 1990 to January 2001 and February 2001 to January 2012. This approach of grouping the SRI funds into portfolios to allow for an analysis of their performance as a group, follows the approach of Bauer et al. (2005) and Renneboog et al. (2008a), who analyse the performance of portfolios constructed from US SRI mutual funds. Subperiods are used in order to indicate whether the performance of the SRI funds has changed over time. In addition, the last robust analysis of the performance of US SRI funds is by Renneboorg et al. (2008a) with a sample period of 1987 to 2003. Therefore, the first subperiod is interesting because the period overlaps with the sample period of this study. Importantly, the performance of the SRI funds during most of the latter subperiod has not been robustly analysed and so it is important that the performance of the funds is analysed across this period. Table 5.12 shows results from tests of the SRI portfolios, which used the single and four factor models and in which portfolios of the equally-weighted returns of the conventional funds act as the market benchmarks. For example, for the large cap SRI fund portfolio the large cap conventional portfolio is the market benchmark. The results indicate that the large cap SRI portfolio did not perform significantly differently from the conventional fund portfolio over the periods analysed. These findings are echoed with respect to the mid-small cap, balanced and bond SRI portfolios because all of these portfolios are shown to have not performed significantly differently from their conventional counterparts. For the large cap, mid-small cap and balanced SRI funds the alphas for the whole period are negative when the Jensen alpha model is used. This indicates general underperformance by those SRI fund portfolios. The alphas for the bond fund portfolio are positive across all

periods and when both the single and four factor models are used indicating outperformance. However, again none of the alphas are significant and therefore the outperformance which is indicated by the positive alphas is not statistically significant.

**Table 5.12: The Symmetric Performance of the SRI Fund Portfolios VS Conventional Portfolios**

| Large Cap SRI | α | β | SMB | HML | MOM |
|---|---|---|---|---|---|
| whole of period | -0.0003 | **0.9684*** | | | |
| whole of period | 0.0001 | **0.9447**** | 0.0282 | 0.0412 | **-0.0921***** |
| 1990-2001 | -0.0002 | **0.9333*** | | | |
| 1990-2001 | 0.0006 | **0.9502*** | 0.0583 | 0.0704 | **-0.1134***** |
| 2001-2012 | -0.0004 | 1.0028 | | | |
| 2001-2012 | -0.0002 | 0.9720 | -0.0229 | 0.015 | **-0.0675***** |
| **Mid-Small Cap SRI** | **α** | **β** | **SMB** | **HML** | **MOM** |
| whole of period | -0.0001 | **0.8628**** | | | |
| whole of period | -0.0005 | **0.9139***** | -0.0268 | **0.2249***** | **-0.0637***** |
| 1990-2001 | 0.0005 | **0.7536**** | | | |
| 1990-2001 | 0.0007 | **0.8671*** | -0.036 | **0.2093***** | **-0.0942***** |
| 2001-2012 | -0.0003 | **1.0050*** | | | |
| 2001-2012 | -0.0006 | **0.9819**** | 0.0373 | **0.0938**** | -0.0156 |
| **Balanced SRI** | **α** | **β** | **SMB** | **HML** | **MOM** |
| whole of period | -0.0003 | **0.9731**** | | | |
| whole of period | -0.0052 | **0.9471**** | 0.0199 | **-0.1046***** | |
| 1990-2001 | -0.0002 | **0.9728*** | | | |
| 1990-2001 | 0.0001 | **0.8971**** | -0.0155 | **-0.1359***** | 0.0283 |
| 2001-2012 | -0.0003 | **0.9734**** | | | |
| 2001-2012 | -0.0004 | **0.9888**** | **0.0709***** | **-0.1180***** | 0.0105 |
| Bond SRI | α | β | SMB | HML | MOM |
| whole of period | 0.0009 | 0.9886 | | | |
| whole of period | 0.0001 | 0.9914 | 0.0057 | -0.0113 | -0.0023 |
| 1990-2001 | 0.0013 | **1.1160**** | | | |
| 1990-2001 | 0.0014 | **1.1290*** | 0.0076 | -0.0064 | -0.0141 |
| 2001-2012 | 0.0008 | **0.8425*** | | | |
| 2001-2012 | 0.0008 | **0.8483**** | 0.02131 | -0.0215 | -0.0052 |

Table 5.12 reports the results of estimations using the Jensen alpha and four factor performance measures. The estimations of the alphas are in monthly percentage terms. S.e are calculated according to Newey-West and so they are robust to heteroscedasticity and autocorrelation. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

Table 5.13 shows results from tests of the SRI and conventional fund portfolios, using the single and four factor models and in which the funds benchmark indices are the market benchmarks. For example, for the large cap SRI and conventional portfolios the Russell 1000 is the market benchmark. The results show that the large cap SRI and conventional fund portfolios, the mid-small cap SRI and conventional fund portfolios and the balanced SRI and conventional fund portfolios did not perform significantly differently than their respective benchmark indices, across any of the sample periods, when both the single and four factor models were used.

The bond SRI portfolio is shown to have outperformed the CGBI USBIG Overall Broad Investment Grade index over the period 1990 to 2001 at the 5% level of statistical significance. However, the bond conventional portfolio is also shown to have significantly outperformed the CGBI USBIG Overall Broad Investment Grade Index over this period, albeit only at the 10% level of significance. In addition, neither the SRI nor the conventional bond fund portfolio is shown to have performed significantly differently than the CGBI USBIG Overall Broad Investment Grade Index over the whole sample period or in the latter sample period. In general, the results presented in Table 5.13 indicate that there was little significant difference between the performance of the SRI fund portfolios and the conventional fund portfolios.

The results also show that the Fama and French (1993) and Carhart (1997) factors are significant for a number of the fund portfolios in certain periods. For example, the Fama and French (1993) Size factor is shown to be significant for both the large cap SRI and conventional funds over the whole sample period when the four factor model is used. In addition, the Fama and French (1993) Book to market factor is shown to be significant to both sets of balanced funds over the whole sample period. This indicates that there may have been differences between the exposures of both sets of funds and their benchmark indices and that the use of the four factor model may have improved the accuracy of the analysis.

## Table 5.13: The Symmetric Performance of the SRI Portfolios vs Benchmark Indices

| Large Cap SRI | α | β | SMB | HML | MOM |
|---|---|---|---|---|---|
| whole of period | 0.0007 | **0.7877**** | | | |
| whole of period | -0.0002 | **0.8485**** | **0.1251***** | **0.3445***** | **-0.0757**** |
| 1990-2001 | 0.0012 | **0.6822***** | | | |
| 1990-2001 | -0.0004 | **0.8751***** | **0.1964***** | **0.4581***** | -0.0804 |
| 2001-2012 | 0.0008 | 0.9480 | | | |
| 2001-2012 | 0.0001 | 0.9006 | **0.0627*** | **0.2228***** | **-0.0589***** |
| Large Cap Con | α | β | SMB | HML | MOM |
| whole of period | 0.0021 | **0.9813*** | | | |
| whole of period | 0.0005 | **0.9646**** | **0.5174***** | **0.1827***** | 0.0263 |
| 1990-2001 | 0.0024 | **0.9246***** | | | |
| 1990-2001 | 0.0007 | **0.9765***** | **0.5450***** | **0.2409***** | 0.0445 |
| 2001-2012 | 0.0023 | **1.0669**** | | | |
| 2001-2012 | 0.0000 | **0.9773**** | **0.5208***** | **0.0972***** | 0.0079 |
| Mid-small Cap SRI | α | β | SMB | HML | MOM |
| whole of period | 0.0010 | 0.6748 | | | |
| whole of period | 0.0003 | 0.8368 | **-0.2910***** | **0.3320***** | **-0.0468**** |
| 1990-2001 | 0.0039 | 0.5125 | | | |
| 1990-2001 | 0.0025 | 0.7658 | **-0.2994***** | **0.2927***** | **-0.0805**** |
| 2001-2012 | -0.0012 | **0.8709*** | | | |
| 2001-2012 | -0.0010 | **0.8992*** | **-0.1513***** | **0.1271***** | -0.0038 |
| Mid-small Cap Con | α | β | SMB | HML | MOM |
| whole of period | 0.0008 | **0.7985*** | | | |
| whole of period | 0.0007 | **0.9010*** | **-0.2554***** | **0.0891***** | -0.0012 |
| 1990-2001 | 0.0030 | **0.7455*** | | | |
| 1990-2001 | 0.0022 | **0.8828*** | **-0.2700***** | 0.0689 | -0.0142 |
| 2001-2012 | -0.0008 | 0.8617 | | | |
| 2001-2012 | -0.0003 | 0.9080 | **-0.1816***** | 0.0334 | 0.0091 |
| Balanced SRI | α | β | SMB | HML | MOM |
| whole of period | 0.0016 | **0.9748***** | | | |
| whole of period | 0.0015 | **0.9612***** | **0.0544*** | **-0.0439**** | 0.0178 |
| 1990-2001 | 0.0026 | **1.0027***** | | | |
| 1990-2001 | 0.0025 | **0.9745***** | 0.0580 | -0.0243 | 0.0134 |
| 2001-2012 | 0.0008 | **0.9512**** | | | |
| 2001-2012 | 0.0006 | **0.9582**** | **0.0920***** | **-0.0870***** | 0.0172 |
| Balanced Con | α | β | SMB | HML | MOM |
| whole of period | 0.0028 | 1.7518*** | | | |
| whole of period | 0.0023 | **1.6190***** | **0.4481***** | **-0.1645***** | 0.0278 |
| 1990-2001 | 0.0040 | **1.7988***** | | | |
| 1990-2001 | 0.0048 | **1.5495**** | **0.3870***** | **-0.2208***** | 0.0166 |
| 2001-2012 | 0.0021 | **1.7117***** | | | |
| 2001-2012 | 0.0002 | **1.6197**** | **0.5806***** | **-0.2100***** | 0.0339 |

**Table 5.13 Continued**

| Bond SRI | α | β | SMB | HML | MOM |
|---|---|---|---|---|---|
| whole of period | -0.0004 | 0.9350* | | | |
| whole of period | -0.0004 | **0.9592**** | **0.0406***** | 0.0076 | **-0.0239**** |
| 1990-2001 | -0.0010 | 1.1308** | | | |
| 1990-2001 | **-0.0008**** | **1.1592***** | 0.0263* | -0.0066 | -0.0192* |
| 2001-2012 | 0.0004 | **0.7176*** | | | |
| 2001-2012 | 0.0001 | 0.7332 | **0.0546***** | 0.0169 | **-0.0377***** |
| Bond Con | α | β | SMB | HML | MOM |
| whole of period | -0.0012 | **0.8905**** | | | |
| whole of period | -0.0013 | **0.9090***** | **0.0325***** | 0.0192 | **-0.0208**** |
| 1990-2001 | **-0.0020*** | **0.9795**** | | | |
| 1990-2001 | **-0.0020*** | **0.9883***** | **0.0150*** | -0.0003 | -0.0027 |
| 2001-2012 | -0.0003 | **0.7887**** | | | |
| 2001-2012 | -0.0005 | 0.7906 | **0.0320*** | **0.0478**** | **-0.0392***** |

Table 5.13 reports the results of estimations using the Jensen alpha and four factor performance measures. The estimations of the alphas are in monthly percentage terms. S.e are calculated according to Newey-West and so they are robust to heteroscedasticity and autocorrelation. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1.

### 5.5.1 Asymmetric Performance Analysis

Table 5.14 shows results from tests of the SRI fund portfolios which used the asymmetric single and four factor models and the Conference Board Coincident Index as the economic cycle indicator, in which portfolios of the equally-weighted returns of the conventional funds are the market benchmarks. For example, for the large cap SRI fund portfolio the large cap conventional fund portfolio is the market benchmark. The results indicate that none of the SRI fund portfolios significantly under or outperformed their matched conventional fund portfolios during the periods analysed apart from the bond SRI portfolio during periods of economic expansion between 2001 and 2012, when the Jensen alpha model is used. During this period the SRI bonds portfolios alpha is 0.0006 and therefore the indication is that the SRI bond portfolio outperformed the conventional bond portfolio over this time period. These results are broadly consistent with what would be expected from the results presented previously in this chapter with respect to the performance of the individual funds.

**Table 5.14: The Asymmetric Performance of the SRI Fund Portfolios VS the Conventional Portfolios when the Conference Board Coincident Index is the Cycle Indicator**

| Large cap | **α +** | **α -** | **B +** | **B -** | SMB | **HML** | **MOM** |
|---|---|---|---|---|---|---|---|
| whole of period | -0.0010 | -0.0029 | **0.6453*** | 0.3216 | | | |
| whole of period | -0.0009 | -0.0036 | **0.6601**** | 0.2796 | 0.0304 | 0.0365 | **-0.0971***** |
| 1990-2001 | 0.0056 | -0.0114 | **2.1186**** | -1.1806 | | | |
| 1990-2001 | 0.00397 | -0.0085 | **1.5956*** | -0.6444 | 0.0549 | 0.0648 | **-0.1146**** |
| 2001-2012 | -0.0015 | -0.0003 | **0.6370*** | 0.3688 | | | |
| 2001-2012 | -0.0006 | -0.0015 | **1.1518**** | -0.1827 | -0.0183 | 0.0113 | **-0.0728***** |
| Mid-small cap | **α +** | **α -** | **B +** | **B -** | SMB | **HML** | **MOM** |
| whole of period | 0.0012 | -0.0012 | **0.8356*** | **0.8864*** | | | |
| whole of period | -0.0002 | -0.0009 | **0.9118**** | 0.8852 | 0.0045 | **0.2243***** | **-0.0697***** |
| 1990-2001 | 0.0021 | -0.0012 | **0.7506*** | **0.7592**** | | | |
| 1990-2001 | 0.001 | -0.0011 | **0.8610**** | 0.8415 | -0.0395 | **0.1753***** | **-0.0980***** |
| 2001-2012 | -0.0005 | 0.0009 | 0.9784 | **1.0262**** | | | |
| 2001-2012 | -0.0013 | 0.0005 | 0.9316 | 0.9636 | **0.1594*** | **0.1091*** | -0.0164 |
| Balanced | **α +** | **α -** | **B +** | **B -** | SMB | **HML** | **MOM** |
| whole of period | 0.0001 | -0.0015 | **0.9965***** | **0.9521*** | | | |
| whole of period | 0.0006 | -0.0017 | **0.9548***** | **0.9729***** | 0.0145 | **-0.0981***** | 0.0204 |
| 1990-2001 | 0.0005 | -0.0018 | **1.0158*** | **0.9235***** | | | |
| 1990-2001 | 0.0012 | -0.0018 | **0.9246*** | **0.8789** | -0.0364 | **-0.1475***** | 0.0351 |
| 2001-2012 | 0.0003 | 0.0009 | **0.9917** | **0.9182***** | | | |
| 2001-2012 | 0.0001 | -0.0012 | **0.9322*** | **0.9961**** | 0.1077 | **-0.0999***** | 0.0088 |
| Bond | **α +** | **α -** | **B +** | **B -** | SMB | **HML** | **MOM** |
| whole of period | 0.0009 | 0.001 | **1.0120***** | **0.9530***** | | | |
| whole of period | 0.0009 | 0.001 | **1.0135**** | **0.9551***** | 0.0003 | -0.0082 | 0.0005 |
| 1990-2001 | 0.0003 | -0.0006 | **1.0936*** | 1.1673 | | | |
| 1990-2001 | 0.0014 | -0.0006 | **1.0969**** | **1.1678***** | -0.0029 | -0.0056 | -0.0041 |
| 2001-2012 | **0.0006*** | 0.0016 | **0.8406*** | **0.8477*** | | | |
| 2001-2012 | 0.0005 | 0.0015 | **0.8575**** | **0.8398**** | 0.01791 | -0.0161 | -0.0063 |

Table 5.14 reports the results of estimations using the asymmetric Jensen alpha and four factor performance measures. The estimations of the alphas are in monthly percentage terms. S.e are calculated according to Newey-West and so they are robust to heteroscedasticity and autocorrelation. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1. Where the coefficients are statistically significant they are denoted in bold. The + notation indicates periods of market expansion and the – notation indicates periods of market contraction.

Table 5.15 shows results from tests of the SRI and conventional fund portfolios, using the asymmetric single and four factor models and in which the funds benchmark indices are the market benchmarks. For example, for the large cap SRI and conventional fund portfolios,

the Russell 1000 is the market benchmark. The results show that the large cap SRI and conventional fund portfolios, the mid-small cap SRI and conventional fund portfolios and the balanced SRI and conventional fund portfolios did not perform significantly differently from their respective benchmark indices, across any of the sample periods in either the periods of economic expansion or contraction, apart from the mid-small cap conventional fund portfolio in periods of economic expansion between 1990 and 2001, and the balanced conventional fund portfolio in periods of economic expansion across the whole sample period. In both of these cases the conventional fund portfolios are shown to have significantly outperformed their respective market benchmark indices. However, this outperformance is only at the 10% level of significance. The alpha for the mid-small cap conventional fund portfolio is 0.0040 and the alpha for the balanced conventional fund portfolio is 0.0014.

The conventional bond fund portfolio is shown to have underperformed its market benchmark between 2001 and 2012, in periods of economic contraction, when both models are used, while the SRI bond fund portfolio is shown to have outperformed the same market benchmark during this period when the single factor model is used. There is therefore an indication that the conventional bond portfolio may have underperformed the SRI bond portfolio in periods of economic contraction, between 2001 and 2012, from the single factor asymmetric tests. During this period the SRI fund portfolios alpha is 0.0001 and the conventional fund portfolios alpha is -0.0013. However, neither alpha is statistically significant. Over the period 1990 to 2001 the results indicate that the conventional bond portfolio significantly underperformed its market benchmark when both models are used and across both periods of economic expansion and contraction. The results indicate that across the same period the bond SRI fund portfolio also underperformed its market benchmark when both models are used. For this period all of the SRI fund portfolios alphas are significant apart from the contraction period alpha, when the single factor model is used. All of the alphas for both bond portfolios are negative over the whole period and this indicates that both fund portfolios underperformed their market benchmark. However, none of the alphas for either portfolio are significant and this indicates that over this period the performance of both portfolios was not significantly different from their market benchmark.

## Table 5.15: The Asymmetric Performance of the SRI Fund Portfolios VS the Benchmark Indices When the Conference Board Coincidence Index is the Cycle Indicator

| Large Cap SRI | α + | α - | β + | B - | SMB | HML | MOM |
|---|---|---|---|---|---|---|---|
| whole of period | 0.0028 | -0.0050 | **0.9436*** | -0.1605 | | | |
| whole of period | 0.0008 | -0.0041 | **0.7754**** | 0.0661 | **0.1246***** | **0.3340***** | **-0.0824***** |
| 1990-2001 | 0.0081 | -0.0106 | 1.9854 | -1.3020 | | | |
| 1990-2001 | 0.0047 | -0.0101 | **1.9086**** | -1.0354 | **0.1902***** | **0.4477***** | -0.0829 |
| 2001-2012 | 0.0007 | -0.0011 | 0.3223 | 0.6227 | | | |
| 2001-2012 | 0.0006 | -0.0023 | **0.6665*** | 0.2270 | **0.0680**** | **0.2152***** | **-0.0653***** |
| Large Cap Con | α + | α - | B + | B - | SMB | HML | mom |
| whole of period | 0.0029 | -0.0039 | **0.9147**** | -0.1094 | | | |
| whole of period | 0.0001 | -0.0030 | **0.7260**** | 0.1519 | **0.1051**** | **0.3032***** | 0.0076 |
| 1990-2001 | 0.0017 | -0.0018 | 0.4577 | 0.2667 | | | |
| 1990-2001 | -0.0007 | -0.0036 | 0.8132 | 0.0765 | **0.1348***** | **0.3689***** | 0.0264 |
| 2001-2012 | 0.0019 | -0.0019 | 0.4182 | 0.5115 | | | |
| 2001-2012 | 0.0004 | -0.0021 | 0.2804 | 0.6254 | **0.1020***** | **0.2042***** | -0.0010 |
| Mid-small SRI | α + | α - | β + | B - | SMB | HML | MOM |
| whole of period | 0.0036 | -0.0011 | **0.6624**** | **0.6699**** | | | |
| whole of period | 0.0009 | -0.0004 | **0.8466***** | **0.7715***** | **-0.2283***** | **0.3466***** | **-0.0613***** |
| 1990-2001 | 0.0078 | 0.0010 | **0.5444***** | **0.4576***** | | | |
| 1990-2001 | 0.0045 | 0.0004 | 0.7830* | 0.6908 | **-0.2680***** | **0.2771***** | **-0.0941***** |
| 2001-2012 | -0.0009 | -0.0004 | **0.8366*** | **0.9044*** | | | |
| 2001-2012 | -0.0015 | -0.0005 | 0.8412 | 0.8794 | 0.0028 | 0.1327*** | -0.0036 |
| Mid-small Con | α + | α - | B + | B - | SMB | HML | MOM |
| whole of period | 0.0025 | -0.0010 | **0.8061**** | **0.7834***** | | | |
| whole of period | 0.0014 | -0.0002 | **0.9041***** | **0.8564***** | **-0.1963*** | **0.1036***** | -0.0115 |
| 1990-2001 | 0.0056 | 0.0010 | **0.7733***** | **0.7013***** | | | |
| 1990-2001 | **0.0040*** | 0.0013 | **0.8874*** | **0.8277**** | **-0.2426***** | 0.0491 | -0.0257 |
| 2001-2012 | -0.0003 | -0.0014 | 0.8529 | **0.8729*** | | | |
| 2001-2012 | -0.0004 | -0.0012 | 0.8674 | **0.8758*** | -0.0398 | 0.0450 | 0.0047 |
| Balanced SRI | α + | α - | B + | B - | SMB | HML | MOM |
| whole of period | 0.0017 | 0.0006 | **1.0187***** | **0.9296***** | | | |
| whole of period | 0.0017 | 0.0006 | **0.9929**** | **0.9353***** | 0.0514* | -0.0329 | 0.0171 |
| 1990-2001 | 0.0031 | 0.0000 | **1.0357*** | **0.9638***** | | | |
| 1990-2001 | 0.0031 | 0.0001 | **1.0025***** | **0.9311***** | 0.0318 | -0.0349 | 0.0178 |
| 2001-2012 | 0.0004 | 0.0009 | 0.9917 | 0.9182 | | | |
| 2001-2012 | 0.0000 | 0.0007 | **0.9531**** | **0.9337**** | **0.1263***** | **-0.0671*** | 0.0137 |
| Balanced Con | α + | α - | B + | B - | SMB | HML | MOM |
| whole of period | **0.0014*** | 0.0028 | **0.9589***** | **0.9020***** | | | |
| whole of period | 0.0009 | 0.0027 | **0.9839*** | **0.8944**** | 0.0293 | **0.0673***** | -0.0010 |
| 1990-2001 | 0.0024 | 0.0048 | **0.9430**** | **0.7886*** | | | |
| 1990-2001 | 0.0020 | 0.0045 | **0.9802**** | **0.8261*** | 0.0169 | 0.0504 | -0.0017 |
| 2001-2012 | 0.0004 | 0.0020 | 0.9808* | 0.9406 | | | |
| 2001-2012 | 0.0000 | 0.0016 | **0.9584**** | **0.9010***** | 0.0617 | **0.0593*** | -0.0050 |

**Table 5.15 Continued**

| Bond SRI | α + | α - | B + | B - | SMB | HML | MOM |
|---|---|---|---|---|---|---|---|
| whole of period | -0.0001 | -0.0003 | 0.9601 | 0.8644 | | | |
| whole of period | -0.0002 | -0.0004 | **0.9867*** | **0.8777**** | **0.0336**** | 0.0083 | **-0.0203**** |
| 1990-2001 | **-0.0013***** | -0.0019 | **1.1361**** | **1.1073**** | | | |
| 1990-2001 | **-0.0011**** | **-0.0021**** | **1.1353***** | **1.1362**** | 0.0168 | -0.0053 | -0.0092 |
| 2001-2012 | 0.0012 | 0.0001 | 0.6978 | **0.7063**** | | | |
| 2001-2012 | 0.0009 | -0.0001 | **0.7176*** | **0.7131**** | **0.0427**** | 0.0186 | **-0.0388***** |
| Bond Con | α + | α - | B + | B - | SMB | HML | MOM |
| whole of period | -0.0010 | -0.0009 | **0.9368*** | **0.8184*** | | | |
| whole of period | -0.0011 | -0.0011 | 0.9563 | **0.8285*** | 0.0278** | 0.0196 | -0.0178 |
| 1990-2001 | **-0.0024***** | **-0.0017**** | **1.0172*** | **1.0216*** | | | |
| 1990-2001 | **-0.0025***** | **-0.0017**** | **1.0157***** | **1.0156**** | 0.0067 | -0.0002 | 0.0066 |
| 2001-2012 | 0.0007 | -0.0013 | **0.8301*** | 0.7068 | | | |
| 2001-2012 | 0.0005 | -0.0015 | 0.8261 | 0.7127 | 0.0241 | **0.0454*** | **-0.0407***** |

Table 5.15 reports the results of estimations using the asymmetric single and four factor performance measures. The estimations of the alphas are in monthly percentage terms. S.e are calculated according to Newey-West and so they are robust to heteroscedasticity and autocorrelation. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1. Where the coefficients are statistically significant they are denoted in bold. The + notation indicates periods of market expansion and the – notation indicates periods of market contraction.

Table 5.16 shows results from tests which use the asymmetric single and four factor models and the Fama and French US Market Portfolio as the stock market cycle indicator, in which portfolios of the equally-weighted returns of the conventional funds are the market benchmarks. For example, for the large cap SRI fund portfolio the large cap conventional portfolio is the market benchmark. The results again show that the large cap, mid-small cap and balanced SRI fund portfolios did not perform significantly different from their conventional counterparts. However, there is an indication that the SRI bond fund portfolio outperformed its conventional counterpart at a statistically significant level between 2001 and 2012, during periods in which the US stock market expanded. However, the alphas for the portfolio over this period are only significant at the 10% level. For this period the SRI bond fund portfolios alpha is 0.0013 when the single factor model is used and 0.0011 when the four factor model is used. There is no other evidence of statistically significant differences between the performance of the SRI bond fund portfolio and its conventional counterpart presented in Table 5.16.

**Table 5.16: The Asymmetric Performance of the SRI Portfolios VS the Conventional Fund Portfolio is Where the Fama and French US Portfolios Is The Cycle Indicator**

| Large Cap | α + | α - | β + | β - | SMB | HML | MOM |
|---|---|---|---|---|---|---|---|
| whole of period | -0.0039 | 0.001 | 0.3289 | 0.6751 | | | |
| whole of period | -0.0052 | 0.003 | 0.4143 | **0.3893**** | 0.0410 | **0.0610*** | **-0.0946***** |
| 1990-2001 | -0.0171 | 0.0142 | **0.436**** | **0.4810***** | | | |
| 1990-2001 | -0.0159 | 0.0144 | **0.534***** | **0.6604***** | 0.0601 | **0.0825*** | **-0.1081***** |
| 2001-2012 | -0.0026 | 0.0008 | **0.8643**** | 0.1747 | 0.9756 | | |
| 2001-2012 | -0.0021 | 0.0004 | **0.6736*** | 0.3225 | -0.0119 | 0.0092 | **-0.0667***** |
| Mid-Small Cap | α + | α - | β + | β - | SMB | HML | MOM |
| whole of period | 0.0047 | 0.0005 | **0.7702***** | **0.8984***** | | | |
| whole of period | 0.0012 | 0.0005 | **0.8759** | **0.9352*** | -0.0206 | **0.2184***** | **-0.0649***** |
| 1990-2001 | 0.0058 | 0.0005 | **0.6704*** | **0.7682***** | | | |
| 1990-2001 | 0.0012 | 0.0001 | **0.8501***** | **0.8627***** | -0.0307 | **0.2058***** | **-0.0952***** |
| 2001-2012 | -0.0005 | 0.002 | 0.9878 | **1.0486**** | | | |
| 2001-2012 | 0.0005 | 0.0018 | 0.9531 | **1.0234*** | 0.0476 | **0.0879***** | -0.0206 |
| Balanced Funds | α+ | B - | α+ | β- | SMB | HML | MOM |
| whole of period | 0.0009 | -0.0011 | **0.9342*** | **0.9563**** | | | |
| whole of period | 0.0006 | 0.0002 | **0.9273**** | **0.9756**** | 0.0158 | **-0.1024***** | 0.015531 |
| 1990-2001 | 0.0006 | -0.0004 | **0.9447***** | **0.9801**** | | | |
| 1990-2001 | 0.0010 | 0.0018 | **0.8710**** | **0.9540*** | -0.0198 | **-0.1399***** | 0.028776 |
| 2001-2012 | 0.0003 | -0.0018 | 0.925 | 0.9394 | | | |
| 2001-2012 | 0.0004 | -0.0006 | 0.9487 | **0.9886*** | **0.0678***** | **-0.1189***** | 0.006803 |
| Bond Funds | α + | α - | β + | β - | SMB | HML | MOM |
| whole of period | 0.0016 | 0.0005 | **0.9829*** | **0.9682*** | | | |
| whole of period | 0.0016 | 0.0001 | 0.9858 | **0.9711**** | 0.0009 | -0.0076 | 0.0001 |
| 1990-2001 | 0.0018 | -0.0004 | **1.0750**** | **1.0751*** | | | |
| 1990-2001 | 0.0019 | -0.0004 | **1.0804***** | **1.0955***** | 0.0079 | 0.0059 | -0.0111 |
| 2001-2012 | **0.0013*** | 0.0008 | **0.8066**** | **0.8693*** | | | |
| 2001-2012 | **0.0011*** | 0.001 | **0.8126**** | **0.8745***** | 0.0184 | -0.0204 | -0.0063 |

Table 5.16 reports the results of estimations using the Asymmetric Jensen Alpha and Four Factor Jensen Alpha performance measures. The estimations of the alphas are in monthly percentage terms. S.e are calculated according to Newey-West and so they are robust to heteroscedasticity and autocorrelation. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1. Where the coefficients are statistically significant they are denoted in bold. The + notation indicates periods of market expansion and the – notation indicates periods of market contraction.

Table 5.17 shows results from tests of the SRI and conventional fund portfolios, using the asymmetric single and four factor models and in which the funds benchmark indices are the market benchmarks. For example, for the large cap SRI and conventional portfolios the

Russell 1000 is the market benchmark. The results show that the large cap SRI and conventional fund portfolios, the mid-small cap SRI and conventional fund portfolios and the balanced SRI and conventional fund portfolios did not perform significantly differently than their respective benchmark indices apart from the mid-small cap conventional portfolio between 2001 and 2012 in periods of US stock market contraction. In these periods the mid-small cap conventional portfolio is shown to have underperformed the Russell index 2500, although only at the 10% level of significance.

The SRI bond fund portfolio is shown to have significantly underperformed its market benchmark index between 1990 and 2001 during periods of US market contraction, while the conventional bond fund portfolio is shown to have significantly underperformed the same benchmark between 1990 and 2001 in periods of both market expansion and contraction. However, over the whole sample period there is no evidence in Table 5.17 that either bond fund portfolio significantly under or outperformed their market benchmark. In general, Table 5.17 does not provide evidence of significant differences between the performance of the SRI and conventional fund portfolios. These results are consistent with those presented throughout this chapter.

**Table 5.17: The Asymmetric Performance of the SRI Portfolios Vs the Benchmark Indices Where the Fama and French US Portfolios Is The Cycle Indicator**

| Large Cap SRI | α + | α - | β + | β- | **SMB** | HML | MOM |
|---|---|---|---|---|---|---|---|
| whole of period | 0.0077 | -0.0099 | **1.9583**** | -1.2312 | | | |
| whole of period | -0.0034 | 0.0004 | -0.4056 | **1.2484**** | **0.1322***** | **0.3590***** | **-0.0802**** |
| 1990-2001 | -0.0069 | 0.0050 | -2.8447 | 3.4282* | | | |
| 1990-2001 | -0.0111 | 0.0078 | **-2.2146*** | **3.0575**** | **0.1872***** | **0.4473***** | -0.0792 |
| 2001-2012 | 0.0028 | -0.0029 | **1.6415***** | -0.7172 | | | |
| 2001-2012 | -0.002 | 0.0011 | 0.0471 | **0.8682**** | **0.0727**** | **0.2289***** | **-0.0598***** |
| Large Cap Conventional | | | | | | | |
| whole of period | 0.0108 | -0.0129 | **2.2015***** | **-1.4859***** | | | |
| whole of period | 0.0022 | -0.0058 | 0.6509** | 0.1773 | **0.0922***** | **0.2842***** | 0.007 |
| 1990-2001 | 0.0093 | -0.0124 | 0.9878 | -0.3691 | | | |
| 1990-2001 | 0.0045 | -0.0110 | **1.3021**** | -0.4782 | **0.1190***** | **0.3390***** | 0.0244 |
| 2001-2012 | 0.0057 | -0.0057 | **1.5158***** | -0.6502 | | | |
| 2001-2012 | 0.0007 | -0.0016 | 0.1695 | 0.7195 | **0.0909***** | **0.2089***** | -0.0003 |

## Table 5.17: Continued

| Mid-small Cap SRI | α + | α - | β + | β- | **SMB** | HML | MOM |
|---|---|---|---|---|---|---|---|
| whole of period | 0.0157 | -0.0049 | **0.4785*** | **0.6606**** | | | |
| whole of period | 0.0059 | -0.0018 | **0.7499**** | 0.8122 | **-0.2518***** | **0.3165***** | **-0.0488**** |
| 1990-2001 | 0.0232 | -0.0039 | 0.3035 | 0.5049*** | | | |
| 1990-2001 | 0.0111 | -0.0017 | **0.6493***** | **0.7221**** | **-0.2344***** | **0.2868***** | **-0.0748**** |
| 2001-2012 | 0.0008 | 0.0003 | **0.8328*** | **0.8988***** | | | |
| 2001-2012 | -0.0007 | 0.0004 | **0.8913**** | **0.9160**** | **-0.1485***** | **0.1256***** | -0.0054 |
| Mid-small Cap Conventional | | | | | | | |
| whole of period | 0.0092 | -0.0037 | 0.6884 | **0.7775***** | | | |
| whole of period | 0.0035 | -0.0014 | **0.860*** | **0.8753***** | **-0.2354***** | **0.0807***** | -0.0025 |
| 1990-2001 | 0.0155 | -0.0036 | 0.6093 | **0.7285*** | | | |
| 1990-2001 | 0.0069 | 0.0013 | **0.8188***** | **0.8599*** | **-0.2344***** | 0.0657 | -0.0109 |
| 2001-2012 | 0.0018 | **-0.0020*** | **0.8231*** | **0.8513***** | | | |
| 2001-2012 | 0.0004 | -0.0017 | 0.9033 | **0.8880*** | **-0.1813***** | 0.0340 | 0.0096 |
| Balanced SRI | α + | α - | β + | β- | **SMB** | HML | MOM |
| whole of period | 0.0043 | 0.0006 | 0.8770 | 0.9714 | | | |
| whole of period | 0.0035 | 0.0014 | **0.8881***** | **0.9735***** | **0.0494*** | **-0.0468**** | 0.0141 |
| 1990-2001 | 0.0057 | 0.0022 | **0.8787*** | **1.0297*** | | | |
| 1990-2001 | 0.0048 | 0.0027 | **0.8878**** | **1.0024**** | 0.0523 | -0.0268 | 0.0115 |
| 2001-2012 | 0.0032 | -0.0002 | **0.8639*** | **0.9442*** | | | |
| 2001-2012 | 0.0023 | 0.0014 | **0.8832*** | **0.9829*** | **0.0900***** | **-0.0921***** | 0.0105 |
| Balanced Conventional | | | | | | | |
| whole of period | 0.0043 | 0.0012 | **0.8493*** | **0.9196*** | | | |
| whole of period | 0.0039 | 0.0006 | **0.8602**** | **0.9142***** | 0.0254 | **0.0500**** | -0.0051 |
| 1990-2001 | 0.0066 | 0.0017 | **0.7618***** | **0.8843**** | | | |
| 1990-2001 | 0.0061 | 0.0011 | 0.8104 | **0.9155*** | 0.0348 | **0.0602*** | -0.0100 |
| 2001-2012 | 0.0026 | 0.0003 | 0.9114*** | **0.9401*** | | | |
| 2001-2012 | 0.0022 | 0.0002 | 0.9028 | 0.9236 | 0.0227 | 0.0358 | -0.0026 |
| Bond SRI | α + | α - | β + | β- | **SMB** | HML | MOM |
| whole of period | 0.0013 | -0.0025 | **0.9401*** | **0.8909***** | | | |
| whole of period | 0.0010 | -0.0023 | **0.9577**** | **0.9191***** | **0.0296**** | 0.0154 | **-0.0180**** |
| 1990-2001 | -0.0006 | **-0.0028**** | 1.1273 | 1.0387** | | | |
| 1990-2001 | -0.0008 | **-0.0027**** | **1.1474***** | **1.0852***** | **0.0263*** | 0.0057 | -0.0156 |
| 2001-2012 | 0.0024 | -0.0016 | **0.7200**** | 0.7591 | | | |
| 2001-2012 | 0.0015 | -0.0008 | **0.7044*** | **0.7701**** | **0.0363***** | 0.0164 | **-0.0340***** |
| Bond Conventional | | | | | | | |
| whole of period | -0.0001 | **-0.0022** | 0.9174 | **0.8262**** | | | |
| whole of period | -0.0004 | -0.0021 | **0.9310**** | **0.8493**** | **0.0254***** | **0.0242*** | **-0.0164**** |
| 1990-2001 | **-0.0020**** | **-0.0021***** | **1.0107***** | **0.9304*** | | | |
| 1990-2001 | **-0.0021**** | **-0.0020*** | **1.0198***** | **0.9472***** | **0.0149*** | 0.0011 | -0.0019 |
| 2001-2012 | 0.0013 | -0.0021 | **0.8724*** | **0.7438**** | | | |
| 2001-2012 | 0.0006 | -0.0012 | **0.8425*** | **0.7446*** | 0.0164 | 0.0479 | **-0.0326***** |

Table 5.17 reports the results of estimations using the asymmetric Jensen alpha and four factor performance measures. The estimations of the alphas are in monthly percentage terms. S.e are calculated according to Newey-West and so they are robust to heteroscedasticity and autocorrelation. *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The t-tests on the alphas test the null hypothesis that the alphas are equal to zero, while the t-tests on the betas test the null hypothesis that the betas are equal to 1. Where the coefficients are statistically significant they are denoted in bold. The + notation indicates periods of market expansion and the – notation indicates periods of market contraction.

In summary, the results from the fund portfolio based analysis indicate that the SRI fund portfolios did not perform significantly differently from the conventional fund portfolios in general. These results are consistent across the Jensen alpha and four factor tests and the single and four factor asymmetric tests, in which the Conference Board Coincident Index and the Fama and French US Market portfolio are used as the cycle indicators[21]. These results are also consistent with those from the individual fund analysis and with those in Chapter 3 with respect to US SRI indices, but contrast to those presented within Chapter 4 that relate to UK SRI funds which indicate that UK SRI funds underperform their conventional counterparts, in general. The likely reason for this contrast is that UK SRI funds are more affected by their screening practices because they use negative screening to a greater extent than US funds and negative screening is likely to have more of an effect on fund performance than positive and restricted screening methodologies.

## 5.6 Sector Exposure Analysis

Sector exposure analysis measures SRI fund portfolios' levels of sector exposure relative to those of conventional funds. This is important because similar sector exposure levels of SRI and the conventional funds indicate that the SRI screening practices used in the construction of the SRI funds do not significantly affect their equity holdings relative to their conventional counterparts. The symmetric sector exposure analysis in this chapter follows Sharpe (1992) who analyses the sector exposure of a group of conventional mutual funds and Benson et al. (2006) who analyse the sector exposures of a group of US SRI mutual funds relative to a group of conventional mutual funds. This approach is also used in Chapters 3 and 4. The essence of the approach is to regress the funds' returns on the individual sector returns, in order to establish the extent to which the funds' returns are exposed to each sector.

[21] Tests were also performed in which the ERSC economic cycle indicator was used. The results from these tests were broadly consistent with the results reported in this section when the Conference Board economic cycle indicator was used and therefore these results are not presented in this chapter.

The bond funds are not included in the sector exposure analysis because they do not hold equities. In this analysis, a set of coefficients (gamma) for each sector are estimated for each fund, representing each sector according to the S&P500 classification. The measure of the exposure of each index to each respective S&P500 sector is captured by gamma. The model is expressed as:

$$\alpha_i + \sum_{n=1}^{10} \gamma_{n,t} S_{n,t} = R_{p,t} \quad (11)$$

$R_p$ is the monthly return on the SRI or conventional fund, $S_n$ is the value weighted monthly return on the sector index *n* (n = 1,…,10). $\gamma_n$ refers to the coefficients on the sector *n* return of the regression. The sector returns are weighted by sector market capitalization so that the returns of each sector are assigned their appropriate weight according to the percentage of the total market cap of the S&P500 which the specific sector represents. Equation (11) is estimated for each SRI and conventional US fund.

In addition to symmetric sector exposure analysis this chapter also uses a novel methodology to analyse the asymmetric sector exposure of the US SRI funds across different stages of the US stock market and economic cycle. This is the first work to use this methodology. The sector exposure of the SRI funds is therefore analysed over the whole sample period and over subperiods. There are a number of reasons why SRI and conventional funds may have different sector exposures in expansion and contraction periods, examples of which are provided in the contribution section of this chapter. For the asymmetric analysis, the Conference Board Coincident Index and the Fama and French US Market Portfolio are the cycle indicators. Table 5.18 presents the ten S&P500 sectors.

**Table 5.18: S&P500 Sectors**

| | | | |
|---|---|---|---|
| Sector 1 | Consumer Discretionary | Sector 6 | Industrials |
| Sector 2 | Consumer Staples | Sector 7 | Information Technology |
| Sector 3 | Energy | Sector 8 | Materials |
| Sector 4 | Financials | Sector 9 | Telecommunication Services |
| Sector 5 | Health Care | Sector 10 | Utilities |

Table 5.19 shows that the large cap SRI funds and the large cap conventional funds had significantly different exposures to the Financials and Materials sectors. Table 5.19 also shows that the mid-small cap SRI and conventional fund portfolio have significantly different exposures to the Consumer Staples and Utilities sectors and that the balanced SRI fund portfolio had significantly different exposures to the Utilities sector. There is therefore evidence that the screening of the SRI funds may have affected their sector exposures. However, Table 5.19 shows that the SRI funds and the conventional funds do not have significantly different exposures to the majority of sectors and this indicates that screening did not affect the majority of the SRI funds' sector exposures.

**Table 5.19: T-tests Between the SRI and Conventional Funds Sector Exposures**

| Large Cap | Sector1 | Sector2 | Sector3 | Sector4 | Sector5 | Sector6 | Sector7 | Sector8 | Sector9 | Sector10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Mean SRI | 0.0507 | 0.0202 | 0.1347 | 0.0499 | 0.2123 | 0.0646 | 0.0782 | 0.073 | 0.0089 | 0.1974 |
| Mean Con | 0.0197 | 0.0125 | 0.1634 | 0.0979 | 0.2115 | 0.0444 | 0.0907 | 0.098 | 0.0316 | 0.1568 |
| t-tests between means | 1.1843 | 0.7353 | -1.0763 | **-3.3694*** ** | 0.0353 | 1.3186 | -0.6401 | **-1.7207*** | -1.2852 | 1.3507 |
| Mid-Small Cap | Sector1 | Sector2 | Sector3 | Sector4 | Sector5 | Sector6 | Sector7 | Sector8 | Sector9 | Sector10 |
| Mean SRI | 0.0036 | 0.1232 | 0.1393 | 0.1289 | 0.292 | 0.0284 | 0.1733 | 0.1383 | -0.0338 | -0.0224 |
| Mean Con | -0.0762 | 0.0179 | 0.1694 | 0.1055 | 0.3513 | 0.0446 | 0.1923 | 0.1195 | 0.0216 | 0.05631 |
| t-tests between means | 1.5966 | **3.8882*** ** | -0.6747 | 1.3946 | -1.057 | -0.4747 | -0.525 | 0.38111 | -1.0923 | **-2.2323** ** |
| Balanced | Sector1 | Sector2 | Sector3 | Sector4 | Sector5 | Sector6 | Sector7 | Sector8 | Sector9 | Sector10 |
| Mean SRI | 0.0282 | 0.0147 | 0.0746 | 0.04091 | 0.1609 | 0.0355 | 0.0643 | 0.0576 | 0.0613 | 0.0517 |
| Mean Con | 0.059 | 0.0271 | 0.0937 | 0.0514 | 0.0963 | 0.0461 | 0.0412 | 0.0394 | 0.0183 | 0.1073 |
| t-tests between means | -0.9641 | -0.9464 | -0.5631 | -0.4206 | 1.1041 | -0.5172 | 1.0702 | 0.7475 | 1.5806 | **-1.8030*** |

Table 5.19 reports the results of t-tests between the mean gammas of the SRI and conventional funds . *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold.

Table 5.20 shows results from asymmetric sector exposure tests where the Conference Board Coincident Index is the economic cycle indicator. The results show that there were significant differences between the large cap funds' exposures to the Consumer Discretionary and Financials sectors, during periods of economic growth and the Energy, Materials and Utilities sectors during periods of economic contraction. Table 56 also shows that there were significant differences between funds' exposures to the Materials sector during periods of economic growth and the Consumer Staples and Telecommunication Services sectors during periods of economic contraction. With respect to the balanced funds, Table 5.20 shows that

there were significant differences in their exposures to the Consumer Staples sector during periods of economic expansion and the Consumer Discretionary, Telecommunication Services and Utilities sectors during periods of economic contraction.

**Table 5.20: T-tests Between the Asymmetric SRI and Conventional Fund's Sector Exposures Where the Conference Board Coincident Index is the Cycle Indicator**

| Large Cap Funds | sector1+ | sector 1- | sector 2+ | sector 2- | sector 3+ | sector 3- | sector 4+ | sector 4- | sector 5+ | sector 5- |
|---|---|---|---|---|---|---|---|---|---|---|
| Mean SRI | 0.0569 | 0.0179 | 0.0411 | 0.0223 | 0.106 | 0.051 | 0.0425 | 0.0844 | 0.2306 | 0.2047 |
| Mean Con | 0.0171 | -0.0376 | 0.0134 | 0.0156 | 0.1311 | 0.1441 | 0.1125 | 0.0877 | 0.1921 | 0.2276 |
| t-tests between means | **1.7146*** | 0.8697 | 1.3703 | 0.2409 | -0.5723 | **-1.6874*** | **-2.9163***** | -0.1009 | 1.5909 | -0.7140 |
| | sector 6+ | sector 6- | sector 7+ | sector 7- | sector 8+ | sector 8- | sector 9+ | sector 9- | sector 10+ | sector 10- |
| Mean SRI | 0.04175 | 0.0524 | 0.0952 | 0.1131 | 0.0726 | 0.0638 | 0.0148 | 0.0352 | 0.1798 | 0.2679 |
| Mean Con | 0.07344 | 0.0553 | 0.0631 | 0.0633 | 0.0965 | 0.1449 | -0.0038 | 0.0705 | 0.1970 | 0.1570 |
| t-tests between means | -1.5561 | -0.124 | 0.9883 | 1.4843 | -0.9387 | **-2.2811**** | 0.4821 | -1.1218 | -0.4016 | **2.2975**** |
| Mid-Small Cap Funds | sector 1+ | sector 1- | sector 2+ | sector 2- | sector 3+ | sector 3- | sector 4+ | sector 4- | sector 5+ | sector 5- |
| Mean SRI | -0.0603 | 0.0053 | 0.0748 | 0.2786 | 0.0588 | 0.0597 | 0.0847 | 0.2266 | 0.3124 | 0.2726 |
| Mean Con | -0.1104 | -0.073 | 0.0135 | 0.0922 | 0.2028 | 0.0498 | 0.0834 | 0.1531 | 0.3456 | 0.3972 |
| t-tests between means | 0.7219 | 1.1616 | 1.2599 | **4.3675***** | -1.4367 | 0.0964 | 0.0669 | 1.6103 | -0.6267 | -1.5188 |
| | sector 6+ | sector 6- | sector 7+ | sector 7- | sector 8+ | sector 8- | sector 9+ | sector 9- | sector 10+ | sector 10- |
| Mean SRI | 0.08019 | 0.0101 | 0.2526 | -0.0100 | 0.0068 | 0.3563 | 0.0701 | -0.1756 | 0.0676 | -0.1049 |
| Mean Con | 0.0439 | 0.0458 | 0.2043 | 0.0992 | 0.0823 | 0.2147 | 0.0731 | -0.0047 | 0.0597 | 0.0128 |
| t-tests between means | 0.7157 | -0.5567 | 0.8941 | -1.2605 | **-1.7305*** | 1.4017 | -0.0671 | **-2.0697**** | 0.1677 | **-2.1041**** |
| Balanced Funds | sector 1+ | sector 1- | sector 2+ | sector 2- | sector 3+ | sector 3- | sector 4+ | sector 4- | sector 5+ | sector 5- |
| Mean SRI | 0.0717 | -0.0747 | -0.0081 | 0.0493 | 0.072 | 0.0964 | 0.0353 | 0.0398 | 0.1638 | 0.1643 |
| Mean Con | 0.0795 | 0.0192 | 0.0370 | 0.0134 | 0.0711 | 0.0940 | 0.0464 | 0.0494 | 0.1045 | 0.0911 |
| t-tests between means | -0.2281 | **-1.9300*** | **-2.1583**** | 1.3429 | 0.0188 | -0.0623 | -0.6528 | -0.2244 | 1.1846 | 0.9064 |
| | sector 6+ | sector 6- | sector 7+ | sector 7- | sector 8+ | sector 8- | sector 9+ | sector 9- | sector 10+ | sector 10- |
| Mean SRI | 0.0151 | 0.0355 | 0.0484 | 0.0437 | 0.0364 | 0.0979 | 0.0408 | 0.0905 | 0.1194 | 0.0130 |
| Mean Con | 0.0378 | 0.0245 | 0.0206 | 0.0726 | 0.0293 | 0.0510 | 0.0115 | 0.0161 | 0.1296 | 0.1338 |
| t--tests between means | -0.9038 | 0.2812 | 1.1452 | -0.8955 | 0.3264 | 0.8656 | 1.0107 | **2.3184**** | -0.3079 | **-2.4641**** |

Table 5.20 reports the results of t-tests between the mean gammas of the SRI and conventional funds . *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The + notation indicates periods of economic expansion and the – notation indicates periods of economic contraction.

Table 5.21 shows results from asymmetric sector exposure tests where the Fama and French US Portfolio is the US stock market cycle indicator. The results show that there are significant differences between the large cap funds' exposures to the Financials and Materials sectors in the periods of stock market expansion and the Materials sector during periods of market contractions. The results also show that there were significant differences between the exposures of the balanced funds to the Consumer Staples sector during periods of stock

market expansion and the Consumer Staples and Industrials sectors in contraction periods. In addition, with respect to the balanced funds, Table 5.21 shows that there were only significant differences between the sector exposures of the balanced SRI and conventional funds to the Information Technology sector and this was during periods of US stock market expansion.

**Table 5.21: T-tests Between the Asymmetric SRI and Conventional Funds Sector Exposures When the Fama French US Market Portfolio is the Cycle Indicator**

| Large Cap Funds | sector 1+ | sector 1- | sector 2+ | sector 2- | sector 3+ | sector 3- | sector 4+ | sector 4- | sector 5+ | sector 5- |
|---|---|---|---|---|---|---|---|---|---|---|
| Mean SRI | 0.0531 | 0.1271 | 0.0198 | 0.0042 | 0.1103 | 0.1077 | 0.042 | 0.0562 | 0.2198 | 0.2276 |
| Mean Con | 0.0281 | 0.1051 | 0.0215 | 0.0061 | 0.1216 | 0.1349 | 0.1167 | 0.0711 | 0.1997 | 0.2159 |
| t-tests between means | 0.9831 | 0.3384 | -0.1101 | -0.1067 | -0.2091 | -0.8041 | **-3.1674*** ** | -0.7147 | 0.6845 | 0.4431 |
| | sector 6+ | sector 6- | sector 7+ | sector 7- | sector 8+ | sector 8- | sector 9+ | sector 9- | sector 10+ | sector 10- |
| Mean SRI | 0.0566 | 0.0902 | 0.1028 | 0.0726 | 0.0417 | 0.1278 | 0.0075 | -0.0683 | 0.2376 | 0.1718 |
| Mean Con | 0.0062 | 0.1162 | 0.1067 | 0.0665 | 0.1203 | 0.0395 | 0.0267 | 0.0084 | 0.1865 | 0.1678 |
| t-tests between means | 1.6145 | -0.5040 | -0.1373 | 0.1846 | **-3.5796*** ** | **2.3634** ** | -0.7912 | **-1.8014*** | 1.1145 | 0.0816 |
| Mid-Small Cap | sector 1+ | sector 1- | sector 2+ | sector 2- | sector 3+ | sector 3- | sector 4+ | sector 4- | sector 5+ | sector 5- |
| Mean SRI | -0.0434 | -0.002 | 0.1035 | 0.1323 | 0.1086 | 0.1423 | 0.1376 | 0.1311 | 0.2811 | 0.3264 |
| Mean Con | -0.0287 | -0.1098 | 0.0085 | 0.0464 | 0.1988 | 0.1225 | 0.1179 | 0.0997 | 0.3427 | 0.3873 |
| t-tests between means | -0.1716 | 1.7898* | **2.4536** ** | **3.1831*** ** | -1.5442 | 0.2964 | 0.6173 | 1.4062 | -1.0135 | -0.9127 |
| | sector 6+ | sector 6- | sector 7+ | sector 7- | sector 8+ | sector 8- | sector 9+ | sector 9- | sector 10+ | sector 10- |
| Mean SRI | 0.0888 | -0.0181 | 0.2203 | 0.1235 | 0.0621 | 0.1754 | -0.0602 | 0.0106 | -0.0814 | 0.0537 |
| Mean Con | 0.0180 | 0.0645 | 0.2518 | 0.1109 | 0.0739 | 0.1142 | -0.0032 | 0.0407 | -0.0339 | 0.1157 |
| t-tests between means | 1.3580 | **-2.0170*** | -0.5274 | 0.2865 | -0.2635 | 0.8641 | -0.7977 | -0.4715 | -1.0538 | -1.0601 |
| Balanced | sector 1+ | sector 1- | sector 2+ | sector 2- | sector 3+ | sector 3- | sector 4+ | sector 4- | sector 5+ | sector 5- |
| Mean SRI | 0.0196 | 0.0354 | 0.0149 | 0.0263 | 0.0988 | 0.0579 | 0.0254 | 0.0551 | 0.1548 | 0.1656 |
| Mean Con | 0.0522 | 0.0735 | 0.0422 | 0.0281 | 0.0847 | 0.0802 | 0.0455 | 0.0753 | 0.0934 | 0.1016 |
| t-tests between means | -0.8904 | -0.7146 | -1.5081 | -0.0659 | 0.2593 | -0.3492 | -0.7829 | -0.7259 | 1.2388 | 0.9142 |
| | sector 6+ | sector 6- | sector 7+ | sector 7- | sector 8+ | sector 8- | sector 9up | sector 9- | sector 10+ | sector 10- |
| Mean SRI | 0.0138 | 0.054 | 0.0640 | 0.0701 | 0.0727 | 0.0402 | 0.0652 | 0.0543 | 0.0347 | 0.0499 |
| Mean Con | 0.0399 | 0.0425 | 0.0063 | 0.0797 | 0.0734 | -0.0002 | 0.0157 | 0.0123 | 0.0982 | 0.1097 |
| t-tests between means | -0.9138 | 0.5436 | **3.0824*** ** | -0.2060 | -0.0252 | 1.4777 | 1.3086 | 1.5866 | -1.3262 | -1.4253 |

Table 5.21 reports the results of t-tests between the mean gammas of the SRI and conventional funds . *, ** and *** stand for the significance levels at the 10%, 5% and 1% thresholds respectively. Where the coefficients are statistically significant they are denoted in bold. The + notation indicates periods of market expansion and the – notation indicates periods of market contraction.

In summary, the tests of the sector exposures of the SRI large cap, mid-small cap and balanced funds show that there were some significant differences between the SRI funds' sector exposures and those of their conventional counterparts. However, the results presented show that the SRI funds and the conventional funds do not have significantly different

exposures to the majority, of sectors and this indicates that screening did not affect the majority of the SRI funds sector exposures. These results are consistent when the symmetric and asymmetric sector tests are performed. This lack of difference may partly explain the lack of significant performance differentials between the SRI and conventional funds presented in previous sections of this chapter. For example, there was far greater evidence of differences between the sector exposures of the UK SRI funds and their conventional counterparts presented in Chapter 4 and also far more evidence of the UK SRI funds' performance being affected by screening. These findings are consistent with the UK SRI funds being more affected by their screening practices because they use negative screening to a greater extent than the US funds and negative screening may have more of an effect on fund performance than positive and restricted screening[22]. Interestingly, these results are consistent with those of Benson el al. (2006) who also analyse whether US SRI funds exhibit different sector gammas and find no consistent appearance of specific sectors in which SRI funds take a relatively higher weight as the result of SRI screening.

## 5.7 Shareholder Activism of the SRI Funds

The work analyses the proxy voting records of US SRI mutual funds and compares their voting to that of conventional matched funds. The work investigates whether US SRI funds have higher levels of shareholder activism and whether SRI funds provide an additional psychological return through their proxy voting. If the findings indicate that SRI funds provide psychological returns in addition to their financial returns, this is an important finding, and suggests that SRI funds may provide a higher total return than conventional funds where performance is not significantly different and where investors value the SRI funds psychological return. The analysis focuses on voting at the individual fund level instead of the family level and focuses on shareholder proposals because shareholder proposals tend to be more controversial and varied than management proposals (Morgan et al. 2011). The work follows the approach of Morgan et al. (2011) by grouping the proposals into five broad categories: board, compensation, governance, environmental, and social proposals and distinguishes potentially wealth-increasing proposals from wealth-decreasing proposals, using the same seven specific wealth-increasing items used in Morgan et al. (2011) and found in the previous literature (Davis and Kim, 2007) to impact shareholder wealth. These are

[22] Asymmetric Sector exposure analysis was also performed which used the ERCI Coincident Index as the cycle indicator. The results from these tests were consistent with those in which the Conference Board index is used. These results are not presented in this thesis. In addition idiosyncratic volatility analysis was performed on the funds and their conventional counterparts. These results did not show any significant difference between the idiosyncratic volatilities of the SRI funds and the conventional funds. These results are not presented in this chapter.

declassifying the board, allowing cumulative voting, establishing an independent chairman, seeking shareholder input on golden parachutes, expensing stock option, repealing poison pills and proposals that require majority vote for election of directors. These proposals are defined as being within three broad categories by the ISS and these are the board, governance, and compensation categories. For each fund vote, it is recorded whether the fund votes for the proposal, votes against the proposal, or abstains from voting. For each type of shareholder proposal the percentage of SRI and conventional funds that voted for, against or abstained from voting are recorded. T-tests are performed between the percentage of the SRI fund votes for a specific type of proposal and the percentage of conventional fund votes for the same type of proposal in order to establish whether there are statistically significant differences in the funds affirmative voting. These tests analyse whether SRI funds support specific types of shareholder proposals more or less often than conventional funds. In addition, the percentage of SRI and conventional funds votes with management on a specific type of proposal are also available and t-tests are performed in order to establish whether SRI funds voted with management more or less often than conventional funds.

The results in Panel 1 of Table 5.22 show the t-tests between the proxy voting records of the SRI funds and their conventional counterparts. In Panel 1 the results show that the large cap SRI funds tended to vote with shareholder proposals more than their conventional counterparts. Overall, they voted affirmatively on 82% of shareholder proposals while the conventional large cap funds only voted affirmatively on 41% of proposals. In addition, they voted more often on wealth maximising proposals, specifically on board, compensation and governance issues. The large cap SRI funds voted affirmatively on 82% of wealth maximising proposals and the conventional large cap funds voted affirmatively on 66% of wealth maximising proposals. Importantly, the results show that the SRI funds supported shareholder proposals which related to environmental and social issues to a far greater extent. The large cap SRI funds voted affirmatively on 87% of proposals on environmental issues and 80% of proposals on social issues. In comparison, the conventional funds voted affirmatively on 12% and 18% of the same types of proposals. Examples of environmental issues shareholders made proposals on include proposals on the corporate reporting of greenhouse gas emissions and on genetically engineered products. Examples of social issues include proposals to report on political contributions and proposals to prepare sustainability reports. Many SRI mutual funds outline their proxy voting principles in their fund prospectuses and state that they will vote to support social and environmental policies. These

results show that US large cap SRI funds vote consistently with what would be expected from their prospectuses on these issues. These results are consistent with the findings of Morgan et al. (2011) who found that SRI funds are likely to vote more affirmatively than conventional funds for environmental and social proposals. These results are also consistent with SRI funds providing a psychological return through their proxy voting. The results in Panel 1 also show that the large cap SRI funds voted significantly less often with the management of firms on shareholder proposals than their conventional counterparts. The SRI large cap funds voted with management on 32% of shareholder proposals and the conventional funds voted with management on 57% of proposals. This indicates that large cap US SRI funds are less likely to vote with the management of the firms they invest in than conventional large cap funds. The large cap SRI funds are also shown to vote less with management on wealth maximising proposals. The results show the conventional large cap funds to be more likely to vote with management on board issues, compensation and governance issues than SRI funds. This indicates that the conventional fund manager's views on these topics are more in line with management's than the large cap SRI fund managers. In addition, the results in Panel 1 also show that large cap SRI funds are far less likely to vote with management on environmental and social issues than conventional large cap funds. The large cap SRI funds voted with management on 11% on environmental issues and 19% on social issues, while the conventional funds voted with management 69% and 62% on the same issues. The indication from the results is that both types of large cap funds are reasonable corporate monitors as both types of funds regularly vote against management. As the SRI funds do so more often they can be viewed as more active corporate monitors than their conventional counterparts, particularly when it relates to the actions of companies which effect the environment and society. The conventional large cap funds vote more often with management than large cap SRI funds but the SRI funds vote more often with the shareholders who sponsor the proposals. The results in Panel 2 of Table 5.22 show findings from t-tests between the proxy voting records of the SRI and conventional mid-small cap funds. The results show that mid-small cap SRI funds voted more affirmatively on shareholder proposals than their conventional counterparts overall and in relation to wealth maximising proposals. The mid-small cap SRI funds voted affirmatively on 89% of shareholder proposals and 92% of wealth maximising proposals. The mid-small cap conventional funds voted affirmatively on 56% of shareholder proposals and 79% of wealth maximising proposals. In addition, the mid-small cap SRI funds, vote affirmatively more often on environmental and social issues as would be consistent with what would be expected from SRI funds. The SRI funds voted affirmatively

on 78% of proposals on environmental issues and 75% of proposals on social issues. In comparison the conventional funds voted affirmatively on 12% and 29% of the same types of proposals. These findings are broadly consistent with those for large cap SRI funds. In addition, in Panel 2 the mid-small cap SRI funds are shown to have voted with corporate management significantly less often in general and specifically less often on environmental and social issues. The SRI funds voted with management on 22% of proposals on environmental issues and 25% on social issues, while the conventional funds voted with management on 80% of proposals on environmental issues and 71% on social issues. The results in Panel 3 show findings from t-tests between the voting records of the balanced funds. The results are again consistent. They show that the SRI balanced funds voted with shareholder proposals far more often than the conventional funds. Overall, they voted affirmatively on 77% of shareholder proposals while the conventional balanced funds only voted affirmatively on 40% of proposals. Importantly, the results show that the balanced SRI funds supported shareholder proposals which related to environmental and social issues to a far greater extent. The SRI funds voted affirmatively on 70% of proposals on environmental issues and 64% of proposals on social issues. In comparison, the conventional funds voted affirmatively on 11% and 18% of the same types of proposals. The balanced SRI funds also voted with company management on shareholder proposals less often than their conventional counterparts, overall and on wealth maximising proposals, and specifically on proposals relating to board, compensation, governance, environmental and social issues. Examples of compensation issues include proposals on performance-based compensation and proposals to submit severance agreements to shareholder voting. Examples of governance issues include proposals to provide for confidential voting and proposals to prohibit auditors from providing non-audit services. Examples of board issues include shareholder proposals on separating the Chairman and CEO positions and proposals for the provision of cumulative voting. The SRI balanced funds voted with management on 36% of shareholder proposals and the conventional funds voted with management on 63% of proposals. In addition, the balanced SRI funds voted with management on 30% of proposals relating to environmental issues and 40% on proposals relating to social issues, while the conventional funds voted with management on 61% and 66% of the same types of proposals.

In summary, many SRI funds outline both their screening criteria and shareholder activism (proxy voting) methodologies within their fund prospectuses. Morgan et al. (2011) find that SRI funds are more likely to vote affirmatively for environmental and social

proposals than conventional funds. Using a more robust matching methodology the analysis in this chapter finds results which are consistent. The work finds that large cap, mid-small cap and balanced SRI funds are more likely to vote affirmatively with shareholder proposals which relate to social and environmental issues than their conventional counterparts and that they are more likely to vote against company management on these issues than conventional funds. These findings indicate that SRI funds provide a psychological return through their proxy voting.

**Table 5.22: T-tests Between the Proxy Voting of the large Cap SRI and Conventional Funds**

| Large Cap Funds | | | | | | | |
|---|---|---|---|---|---|---|---|
| Voted Affirmative | Overall Affirmative | Wealth Maximising Proposals | Board Issues | Compensation Issues | Governance issues | Environmental issues | Social issues |
| SRI Average | 82% | 82% | 79% | 94% | 79% | 87% | 80% |
| Con Average | 41% | 66% | 67% | 64% | 64% | 12% | 18% |
| **T-test** between means | **14.4941*** ** | **4.4775*** ** | **2.3660** ** | **4.6528*** ** | **1.8595*** | **13.8962*** ** | **13.9641*** ** |
| Voted with Management | Overall With Management | Wealth Maximising Proposals | Board Issues | Compensation Issues | Governance issues | Environmental issues | Social issues |
| SRI Average | 32% | 41% | 43% | 13% | 65% | 11% | 19% |
| Con Average | 57% | 51% | 54% | 37% | 59% | 69% | 62% |
| T-test between means | **-8.6957*** ** | **-2.4094** ** | **-1.7936*** | **-3.4847*** ** | 0.8165 | **-8.6395*** ** | **-8.3021*** ** |
| Mid-small Cap Funds | | | | | | | |
| Voted Affirmative | Overall | wealth Maximising Proposals | Board Issues | Compensation Issues | Governance issues | Environmental issues | Social issues |
| SRI Average | 89% | 92% | 96% | 80% | 92% | 78% | 75% |
| Con Average | 56% | 79% | 79% | 75% | 81% | 12% | 29% |
| T-tests between means | **6.5138*** ** | **3.0344*** ** | **2.7990*** ** | 0.3376 | 1.5701 | **4.9654*** ** | **3.6253*** ** |
| Voted with Management | Overall | Wealth Maximising Proposals | Board Issues | Compensation Issues | Governance issues | Environmental issues | Social issues |
| SRI Average | 41% | 46% | 38% | 20% | 65% | 22% | 25% |
| Con Average | 54% | 41% | 45% | 25% | 42% | 80% | 71% |
| T-test between means | **-2.32** ** | 0.8086 | -0.75 | -0.3 | **1.92*** | **-3.69*** ** | **-3.68*** ** |
| Balanced Funds | | | | | | | |
| Voted Affirmative | Overall | Wealth Maximising Proposals | Board Issues | Compensation Issues | Governance issues | Environmental issues | Social issues |
| SRI Average | 77% | 86% | 82% | 86% | 93% | 70% | 64% |
| Con Average | 40% | 57% | 58% | 50% | 66% | 11% | 18% |
| T-tests between means | **7.2841*** ** | **4.9491*** ** | **2.7750*** ** | **3.1691*** ** | **2.5064** ** | **4.6235*** ** | **4.8402*** ** |
| Voted with Management | Overall | Wealth Maximising Proposals | Board Issues | Compensation Issues | Governance issues | Environmental issues | Social issues |
| SRI Average | 36% | 36% | 32% | 19% | 61% | 30% | 40% |
| Con Average | 63% | 61% | 63% | 52% | 72% | 61% | 66% |
| T-test between means | **-4.9273*** ** | **-3.6625*** ** | **-3.3266*** ** | **-2.6524** ** | -0.7434 | **-2.0218*** | **-2.5973** ** |

Table 5.22 shows t-tests between the mean percentage of the SRI fund votes for a specific type of proposal and the mean percentage of conventional fund votes for the same proposal. In addition, Table 5.22 shows t-tests between the mean percentage of SRI fund votes with management on a specific type of proposal and the mean percentage of conventional funds votes with management on the same proposal.

## 5.8 Conclusion

The results presented in this chapter show that the risk-adjusted performance of US SRI funds is not significantly different from conventional funds. These results are consistent with the findings of Renneboog et al. (2008a) who found that US SRI fund's risk-adjusted performance is not statistically different from their conventional counterparts. The results are also consistent with Derwall and Koedijk (2009) with respect to bond funds. However, these results contrast with Derwall and Koedijk (2009) with respect to balanced funds as they found that US balanced SRI funds outperform their conventional counterparts at statistically significant levels. The work in this chapter is the first work to analyse the performance of different types of SRI funds in order to establish whether SRI screening effects different types of SRI funds differently. The analysis finds that SRI screening affects different kinds of SRI funds similarly. In general, the results are consistent with Hypothesis 3. These results contrast to those presented in Chapter 4, which indicate that UK SRI funds are detrimentally affected by their requirement to screen. The likely reason for this is that UK SRI funds are more affected by their screening practices because they use negative screening to a greater extent than US SRI funds and negative screening has more of an effect on fund performance than other screening methodologies. Goldreyer and Diltz (1999) find that SRI equity funds using positive screening techniques, outperform those which do not at statistically significant levels and the findings of Goldreyer and Diltz (1999) would suggest that the psychological returns achieved through negative screening may come at a greater financial cost then the psychological returns achieved through positive or restricted screening.

In addition, there is little evidence of statistically significant differences between the performance of SRI and conventional funds during different stages of the US market and economic cycle presented in this chapter. The use of asymmetric cycle indicators in order to analyse the performance of the SRI funds across different stages of the economic and market cycle has not resulted in the discovery of significant performance differentials between the large cap, mid-small cap, balanced or bond SRI funds and their conventional counterparts. These results are consistent with those in Chapter 3 with respect to US SRI indices, which

indicated that US SRI indices do not perform significantly differently from their conventional counterparts over different stages of the US economic and market cycle, in general. The results support Hypothesis 5 and reject Hypothesis 4 because they indicate that changing stock market and economic conditions affect US SRI and conventional portfolios similarly. The use of asymmetric models in the analysis constituents another contribution to this area of academia because it is the first work to use these models in order to analyse the performance of the US SRI funds in different stages of the US market and economic cycle. There have been two significant studies which have analysed the performance of US SRI funds in different investment conditions. Renneboog et al. (2008a) perform an analysis of the effects of changes in publicly available macroeconomic information on the performance of SRI mutual funds and find little evidence of any significant effect. Nofsinger and Varma (2014) analyse the performance of SRI funds during normal and crisis periods using asymmetric models. They find that socially responsible mutual funds outperform during periods of market crises, but that this dampening of downside risk comes at the cost of underperforming during non-crisis periods. This chapter builds on the work of Renneboog et al. (2008a) and Nofsinger and Varma (2014). It uses a more accurate fund matching methodology and asymmetric models, which incorporate economic and stock market indicators, to allow for the risk-adjusted performance of the SRI funds to be analysed across different stages of the US stock market and economic cycle. This differs from the analysis in Nofsinger and Varma (2014) which focuses on market crisis and non-crisis periods. For US SRI investment managers and investors it is important to establish that, SRI screening has little effect on the performance of funds over different stages of US market and economic cycles because this data may potentially change their asset selection across the cycles.

The findings from the tests of the sector exposures of the SRI large cap, mid-small cap and balanced funds in this chapter show that there were some significant differences between the SRI funds' sector exposures and those of their conventional counterparts. However, the results presented show that the SRI funds and the conventional funds do not have significantly different exposures to the majority, of sectors and this indicates that screening did not affect the majority of the SRI funds' sector exposures. These results are consistent when the symmetric and asymmetric sector tests are performed. This lack of difference may partly explain the lack of significant performance differentials between the SRI and conventional funds presented in this chapter. For example, there was far greater evidence of differences between the sector exposures of the UK SRI funds and their

conventional counterparts presented in Chapter 4 and also far more evidence of the UK SRI funds' performance being affected by screening. These findings are consistent with the UK SRI funds being more affected by their screening practices because they use negative screening to a greater extent than the US funds and negative screening may have more of an effect on fund performance than positive and restricted screening. Interestingly, these results are consistent with those of Benson el al. (2006) who also analyse whether US SRI funds exhibit different sector gammas and find no consistent appearance of specific sectors in which SRI funds take a relatively higher weight as the result of SRI screening. Importantly, the analysis in this chapter uses a novel methodology to analyse the asymmetric sector exposure of the US SRI funds across different stages of the US stock market and economic cycle. This is the first work to use this methodology.

With respect to the voting analysis, this chapter finds that large cap, mid-small cap and balanced US SRI funds are more likely to vote affirmatively with shareholder proposals which relate to social and environmental issues and that they are more likely to vote against company management on these issues than conventional funds. In addition, SRI funds vote less often in general with corporate management than conventional funds. These findings indicate that SRI funds provide a psychological return through their proxy voting. Investors in SRI funds should be aware that SRI funds vote differently on shareholder resolutions than conventional funds and specifically that they use proxy votes to promote environmental and social agendas. Interestingly, if investors value these voting strategies and view them as an additional psychological return, an SRI fund can provide a higher total return than a conventional fund even if the financial performance is the same. These findings are consistent with Morgan et al. (2011) who find that US SRI funds are more likely to vote affirmatively for environmental and social proposals than conventional funds. The voting work in this chapter makes three contributions to this area of academia. The first of this chapter's contributions is the use of an extended sample period for the voting analysis. To date, Morgan et al. (2011) is the only work which analyses the proxy voting practices of US SRI funds. However, Morgan et al. (2011) only analyse shareholder proposals made over a two year sample period (between 2003 and 2005). The voting analysis work in this chapter uses voting data from a 9 year period (2003 to 2012) and therefore has more potential to provide findings that can be generalised. In addition, the last votes analysed in Morgan et al. (2011) were in 2005 and as a large proportion of US SRI funds only came into existence in the early 2000's and therefore the majority of their voting records have not yet been analysed, so

definitive conclusions as to the level of their shareholder activism has not yet been possible. This chapter is the first work which has the potential to provide any such conclusions.

The third contribution of the voting work in this chapter is the use of a superior fund sample than has been previously been used and more accurate fund matching of the US SRI and conventional funds within the voting analysis. The analysis in Morgan et al. (2011) does not focus on investigating the voting of SRI funds specifically and as a result the SRI funds used are not robustly matched with conventional funds for accurate comparison between their voting patterns. Morgan et al. (2011) do not match the SRI funds with conventional funds but instead include them as part of a larger fund sample which includes conventional funds. In order to analyse whether they vote differently from the conventional funds in the sample, Morgan et al. (2011) use a model in which the social fund characteristic is a dummy variable. The analysis within Morgan et al. (2011) is therefore potentially subject to a number of matching biases including fund age, size and investment objective. The SRI funds used in this chapter are matched against an equally weighted portfolio of conventional funds using fund age, end-of period fund size, and investment objective as matching criteria in order to ensure that there are no biases which may affect the analysis of the voting patterns of the SRI and conventional funds.

The final contribution of the voting work in this chapter is the manner in which the voting analysis within the chapter distinguishes between different types of SRI funds, while previous studies have not. The fund sample used in Morgan et al. (2011) does not include closed-end funds. However, it does include all other types of funds that vote on shareholder resolutions. Morgan et al. (2011) do not distinguish between the types of funds included in their sample such as index funds, large cap funds, and small-mid cap funds. This is despite the fact that the relationship between these funds and the firms held within the fund portfolios are likely to be very different. Therefore, different types of funds may have different voting practices as a result of the relationships they have with the firms they hold, and the failure of the methodology in Morgan et al. (2011) to control for these differences allows for these differences to potentially bias the findings of the work. This chapter excludes funds which invest internationally (invest a proportion of their capital outside the US stock markets), equity speciality funds (have customised benchmarks and asset holdings), index funds (trackers) and distinguishes between the remaining large cap, mid-small cap and balanced funds in order to ensure that there are no potential biases in the voting analysis and to allow

for comparison between the voting practices of different types of SRI funds. For example, whether large cap SRI funds vote differently to mid-small cap SRI funds.

In addition, the analysis in this chapter was designed to contribute to the literature which has evaluated the financial and ethical performance of SRI funds by investigating the importance of two potential SRI risks: risk C, the type of screening or the combination of types being used by an SRI portfolio and risk E, the types of asset portfolios most affected by SRI screening. With respect to these two risks the investigation within this chapter has found the following:

With respect to the type of screening or the combination of types being used by an SRI portfolio, the performance analysis in Chapter 3 found that US SRI indices do not perform significantly worse than their conventional counterparts and similarly the work in this chapter has found that US SRI funds do not perform significantly worse than US conventional funds. However, the performance analysis in Chapter 4 found that UK SRI funds do perform worse than their conventional counterparts in general. One likely reason for this is that UK SRI funds are more affected by their screening practices because they use negative screening to a greater extent than US SRI indices and funds, and negative screening has a greater effect on fund performance than other screening methodologies. Goldreyer and Diltz (1999) find that SRI equity funds using positive screening techniques outperform those which do not, which suggests that the psychological returns achieved through negative screening may come at a greater financial cost than the psychological returns achieved through positive or restricted screening. The psychological returns achieved through negative screening come from the exclusion of investments in the stock or bonds of companies engaged in a particular activity or industry such as tobacco manufacturers. The psychological returns achieved through positive screening come from the seeking of investments in the stock or bonds of companies which have a positive impact in a specific industry or area, and the psychological returns achieved through restricted screening comes from avoiding investment in the stock or bonds of poorer ethical performers in a particular industry or area, but including the stock and bonds of firms whose social performance ranks high within a particular industry or area. Positive and restricted screening does not necessarily result in entire industries being screened out and consequently do not necessarily affect the exposures of SRI funds, while negative screening does. It is therefore possible that negative screening has more of an effect on the ability of a fund manager to select desirable assets and diversify effectively. A comparison of the

performance results presented in Chapters 3, 4 and 5 of this thesis supports the findings of Goldreyer and Diltz (1999) and indicate that it is likely that negative screening methodologies effect performance more than positive and restricted screening strategies.

With respect to the types of asset portfolios most affected by SRI screening, there is no indication from the work in this chapter that any particular type of asset portfolio is more affected by SRI screening because the large cap, mid-small cap, balanced and bond funds all perform similarly to their conventional counterparts. Therefore, the indication is that the type of asset contained within an SRI portfolio is not a factor which needs to be considered when analysing the potential risk associated with investing in an SRI portfolio.

The work in this chapter also analyses the extent to which SRI funds provide one of the two additional psychological returns associated with this form of investment, the shareholder activism of SRI funds (F):

The work analyses whether US SRI funds have higher levels of shareholder activism and whether US SRI funds provide an additional psychological return through their proxy voting. The indication from the analysis is that SRI funds do provide this additional psychological return. When these findings are combined with those of Kempf and Ostoff (2008) who find that the holdings of SRI funds have significantly higher ethical rankings than standard funds, there is a clear indication that SRI funds provide psychological returns in addition to their financial returns. This is an important finding and suggests that SRI funds may provide a higher total return than conventional funds where performance is not different and where investors value the SRI funds psychological return.

The implication for US SRI investors from the findings in this chapter is that they can be confident that by investing in SRI funds as opposed to conventional funds, they are not necessarily going to receive significantly worse returns on a risk adjusted basis and investors can be confident that the screening performed by the US SRI funds does not have a significantly detrimental effect on funds' returns. In addition, because the work finds that SRI funds are more likely to vote affirmatively with shareholder proposals which relate to social and environmental issues than their conventional counterparts and that they are more likely to vote against company management on these issues than conventional funds. These findings indicate that SRI funds can provide a psychological return through their proxy voting to their

investors where they value these voting practices. US SRI investors should be aware that the findings of this chapter indicate that this potential psychological return does necessarily come at a financial cost.

The following chapter provides a conclusion and includes a summary of the findings of this thesis. The conclusion also includes a discussion of possible future research which could be performed in this area and which could provide further insight into the performance and risk levels of SRI portfolios.

# 6: Chapter 6 Thesis Conclusion

## 6.1 Introduction

A recent trends report estimates that the total value of US-domiciled assets under management using SRI strategies is $6.57 trillion. This represents more than one out of every six dollars under professional management in the United States and a rise of more than 928% percent from $639 billion in 1995 (Forum for Sustainable and Responsible Investment, 2014). The trend has been echoed in the UK and the rest of Europe and the importance of SRI has increased year on year in these areas. Consequently, the importance of SRI to financial practitioners and academics is considerable. The growth in the importance of SRI has motivated academic research in this area and the majority of academic research to date has focused on investigating the effect that the incorporation of environmental, social and governance (ESG) factors into portfolio construction has on investment portfolio performance. There are three broad hypotheses which address whether the screening of SRI portfolios should affect their performance. These are that the risk-adjusted returns of SRI portfolios should be lower than, more than and not significantly different from conventional portfolios. The majority of research to date has found that the risk-adjusted returns of SRI portfolios are not significantly different from conventional portfolios.

This thesis provides an innovative, comprehensive and robust analysis of the performance, risk and exposures of US SRI indices, UK SRI equity funds (domestic and global) and US SRI funds (large cap, mid-small cap, balanced and bond) in order to highlight and examine a number of key issues relating to SRI portfolio performance. In addition, the work highlights and examines the potential psychological returns which may be related to investing in SRI funds and discusses the relationship between the potential risks and returns that are associated with this form of investing.

## 6.2 Summary of Findings

In Chapter 3, the results from the single, three and four-factor tests generally support Hypothesis 3 (“no effect”), and suggest that the risk-adjusted returns of US socially responsible indices are not statistically significantly different from their benchmark indices in the majority of cases. However, there are a few cases were the alphas are statistically

significant and these alphas are mostly negative. In general, these results are consistent with other studies which have also used risk-adjusted performance analysis methodologies to analyse the performance of SRI indices. The analysis in Chapter 3 benefits from a number of contributions made by this work to this area of academia. The work is the first to analyse the performance and exposures of all of the 14 major US SRI indices relative to carefully selected conventional benchmarks. Previous work uses a mixture of official and unofficial conventional benchmarks. Official benchmarks are those that the index companies believe to be most accurate and are the benchmark the index company's measure index performance against. In addition, the analysis uses an updated sample period. The most recent robust study of the performance of US SRI indices was by Schröder (2007) with a sample period between 1992 and 2003. Also, the work in this chapter benefits from the use of three and four factor models to study the risk-adjusted performance of SRI indices relative to their benchmark indices. The work is the first to use the three and four factor models to study the risk-adjusted performance of SRI indices relative to their benchmark indices. The use of these models, allows for a more accurate measurement of the risk-adjusted returns of the SRI and conventional portfolios.

The results from the asymmetric tests in Chapter 3 indicate that there were some differences between the risk-adjusted performance of the SRI and conventional indices during the periods analysed but that in the majority of cases these differences were not statistically significant. There is no indication that the relative performance of the SRI indices is different during periods of market and economic expansion than during periods of market and economic contraction. The results support Hypothesis 5 and reject Hypothesis 4 because they indicate that changing stock market and economic conditions affect US SRI and conventional portfolios similarly. The use of asymmetric models to analyse the performance of the US SRI indices across different stages of the US economic and market cycles constitutes another contribution of the work. For SRI fund managers and investors it is important to establish what effects, if any, SRI screening has of the performance of equity SRI indices over different stages of market and economic cycles because this data may potentially change their asset selection across the cycles.

The results from the work in this Chapter 3 also indicate that there were some significant differences between the industry exposures of the US SRI indices and their conventional benchmark indices, but not for the majority of indices. This suggests that the

SRI indices screening practices may have had some effect on their ability to include stocks from some industries and that these practices may have resulted in the SRI indices being skewed towards including stocks in specific industries. However, for the majority of industries there is no significant difference and these results emphasise that SRI screening practices may not significantly affect the holdings of the SRI indices. The sector and industry exposure work in chapter 3 contributes to this area of academia because it is the first work to analyse SRI indices' levels of sector and industry exposure relative to conventional indices.

In addition, the results from the work in Chapter 3 also indicate that the idiosyncratic volatilities of the SRI indices are higher generally than those of their benchmark indices. These results are consistent with the practice of SRI screening limiting the potential stock universes of SRI funds and consequently their levels of diversification relative to conventional portfolios. These findings are consistent with Rudd (1981), who predicts a higher level of extramarket covariation for screened portfolios. It is important for SRI investors that they know that the SRI screening of a portfolio can result in lower levels of diversification and higher levels of idiosyncratic risk. This is because higher levels of risk may result in greater volatility and worse returns. The use of idiosyncratic volatility analysis constituents the final contribution of the work in Chapter 3 and this is the first work to analyse the idiosyncratic volatility levels of US SRI indices.

The performance analysis work in this Chapter 4 builds on Bauer et al. (2005) and Gregory and Whittaker (2007) by splitting the UK SRI funds into those which only invest domestically and those which invest globally. The results from the performance analysis indicate that the practice of ethically screening is associated with a detrimental risk-adjusted performance, particularly for those SRI funds which can only invest in the UK stock market. These results are not consistent with Bauer et al. (2005) or Gregory and Whittaker (2007) who find no statistically significant difference in performance between UK ethical and UK conventional mutual funds (for both domestic and global funds). These results are partially consistent with Renneboog et al. (2008a) who find some evidence of SRI investors paying a price for their ethics, but the difference between the risk-adjusted returns of UK SRI and conventional funds are not statistically significant in their study. The evidence presented shows that the practice of ethical screening affects the performance and composition of the SRI funds available to the UK retail market and supports Hypothesis 1. These effects are more pronounced for those funds that can only invest in the UK stock market than for those

that can invest globally. This is likely to be because global SRI funds have a greater investment choice and therefore it is easier for the global SRI fund manager to select a portfolio of attractive investments than it is for the domestic SRI fund manager, even after screening has limited the funds' potential investment universe. These results clearly show that the size of an SRI funds investment choice is an important factor that should be considered by investors. Those SRI funds with smaller investment universes are likely to be affected detrimentally by their requirement to screen ethically compared to those with larger investment choices.

Interestingly, the mean betas of the domestic SRI funds from the individual fund analysis are shown to be higher and closer to one than the conventional funds. This suggests that the SRI funds carry more systematic risk and that their performances are closer to the performance of the FTSE All Share Index. This finding indicates that the constraint of having to screen ethically results in the SRI fund manager's performance being similar to the market. This is consistent with SRI fund manager's holdings stocks that are representative of the index's performance. This may be because their choice is limited by the constraints imposed by the requirement to screen or because SRI fund managers are more inclined to track the benchmark index more closely since their investors are achieving an additional psychological return and may therefore be less demanding on the financial performance of SRI funds. In addition, the results from the four factor tests indicate that the practice of ethically screening may result in both sets of SRI funds (global and domestic) having different exposures to the Fama and French (1993) and Carhart (1997) factors than their conventional counterparts. In particular, there is evidence that they are less exposed to the size (SMB) factor than their conventional counterparts and this finding would be consistent with them having more exposure to large stocks. This result supports the theory that SRI fund managers hold stocks that are more representative of their benchmark indices since their investors are achieving an additional psychological return and may therefore be less demanding on the financial performance of the SRI funds. Therefore, the UK SRI funds managers are not as pressured to achieve alpha as their conventional counterparts and are consequently less inclined to hold more risky smaller cap stocks.

The results from the individual fund, single factor asymmetric Jensen alpha tests in Chapter 4 indicate that the domestic SRI funds significantly underperform conventional funds

during both contraction and expansion periods. In addition, the results also indicate that global SRI funds underperformed their conventional counterparts during market expansion and contraction periods. However, the findings indicate that this underperformance was less severe for the global SRI funds. Therefore, these results indicate that the relative performance of the SRI funds and the conventional funds is similar during periods of stock market expansion and contraction. These findings support Hypothesis 5. The use of asymmetric models to analyse the performance of UK SRI funds relative to conventional UK funds is a contribution to this area of academia. Renneboog et al. (2008a) perform an analysis of the effects of changes in publicly available macroeconomic information on the performance of UK SRI mutual funds. However, the methodology used in Renneboog et al. (2008a) only allows for tests as to whether macroeconomic information is a significant driving factor of SRI fund returns and does not analyse what effect, if any, changes in UK stock market cycles have on SRI funds. For investors, the effect of stock market cycles on investments is likely to be more important and profound than the effects of macro-economic data.

In addition, the results in Chapter 4 indicate that the sector and industry exposures of the domestic SRI funds differ significantly from their conventional counterparts. These differences may be the result of SRI funds' practice of screening. As SRI funds screen out stocks on the basis of unethical activities and positively focus on screening in stocks on the basis of certain ethical activities it is logical that this could affect their sector and industry exposures and that these exposures could therefore differ from those of conventional funds, which have the same investment objectives and investment universes but do not have the constraints caused by the requirement to ethically screen. Interestingly, the evidence in relation to the global SRI funds and their conventional counterparts is different. At both the sector and industry level, there is little evidence that SRI screening significantly affects the sector or industry exposures of the global SRI funds. This contrast between the effect of SRI screening on the exposures of the domestic SRI funds, and the global SRI funds, may be the result of the global SRI funds being less affected by their requirements to screen because their potential investment choice is much bigger. Therefore, even after screening, fund managers have substantial levels of stocks to choose from allowing them to greater maintain their desired allocations and exposures. The sector and industry exposure analysis in Chapter 4 represents a contribution to this area of academia because it is the first work to analyse the sector and industry exposures of UK SRI funds. This chapter is the first to use sector exposure analysis to investigate the sector exposure of UK SRI funds relative to conventional

funds. In addition, it is also the first work to use industry exposure analysis in relation to mutual funds in any capacity. The use of industry level data as opposed to sector level data allows for a more comprehensive examination because each sector is made up by a number of industries.

In addition, the findings presented in Chapter 4 indicate that the domestic SRI funds had lower levels of idiosyncratic risk than their conventional counterparts during the period analysed and that this difference was statistically significant. These results are consistent with the domestic SRI fund managers taking on more exposure to stocks which are representative of the index performance. This may be because their choice is limited by the constraints imposed by the requirement to screen. The SRI fund managers may also track the market to a greater extent than their conventional counterparts, because their investors achieve an additional psychological return and therefore may be less demanding in relation to the financial performance of the SRI funds. The findings also indicate that global SRI funds also had lower levels of idiosyncratic risk than their conventional counterparts, but that the difference between the levels of idiosyncratic volatility of the two types global funds are not statistically significant. This finding is consistent with the global SRI fund managers not selecting representative stocks to same extent as the domestic SRI fund managers. The analysis of the idiosyncratic volatility levels of the UK SRI funds represents another contribution of the work in Chapter 4 to this area of academia because this work is the first to analyse UK SRI funds levels of idiosyncratic volatility.

The principal implication for UK ethical investors from the results presented in Chapter 4 is the indication that the performance of their investments is likely to be detrimentally affected by their decision to purchase ethical funds as opposed to conventional funds and that the psychological benefits they receive through investing ethically come at a financial cost. Importantly, the indication is also that this cost is more severe if ethical investors purchase funds that can only invest in the UK than if they purchase funds that have larger investment universes such as global SRI funds. Therefore, ethical investors may wish to focus more on investing in global SRI funds if it is feasible to do so and in keeping with their attitude to risk and investment objectives.

The results presented in this Chapter 5 show that the risk-adjusted performance of US SRI funds is not significantly different from conventional funds. These results are consistent with

the findings of Renneboog et al. (2008a) who found that US SRI fund's risk-adjusted performance is not statistically different from their conventional counterparts. The results are also consistent with Derwall and Koedijk (2009) with respect to bond funds. However, these results contrast with Derwall and Koedijk (2009) with respect to balanced funds as they found that US balanced SRI funds outperform their conventional counterparts at statistically significant levels. The work in this chapter is the first work to analyse the performance of different types of SRI funds in order to establish whether SRI screening effects different types of SRI funds differently. The analysis finds that SRI screening affects different kinds of funds similarly. In general, the results in Chapter 5 are consistent with Hypothesis 3. These results contrast to those presented in Chapter 4, which indicate that UK SRI funds are detrimentally affected by their requirement to screen. The likely reason for this is that UK SRI funds are more affected by their screening practices because they use negative screening to a greater extent than US SRI funds and negative screening has more of an effect on fund performance than other screening methodologies. Goldreyer and Diltz (1999) find that SRI equity funds using positive screening techniques, outperform those which do not at statistically significant levels, and the findings of Goldreyer and Diltz (1999) would suggest that the psychological returns achieved through negative screening may come at a greater financial cost then the psychological returns achieved through positive or restricted screening.

In addition, there is little evidence of statistically significant differences between the performance of SRI and conventional funds during different stages of the US market and economic cycle presented in Chapter 5. The use of asymmetric cycle indicators in order to analyse the performance of the SRI funds across different stages of the economic and market cycle has not resulted in the discovery of significant performance differentials between the large cap, mid-small cap, balanced or bond SRI funds and their conventional counterparts. These results are consistent with those in Chapter 3 with respect to US SRI indices, which indicated that they do not perform significantly differently from their conventional counterparts over different stages of the US economic and market cycle, in general. In addition, these findings support Hypothesis 5. The use of asymmetric models in the analysis constituents another contribution to this area of academia because it is the first work to use these models in order to analyse the performance of the US SRI funds in different stages of the US market and economic cycle.

The findings from the tests of the sector exposures of the US SRI large cap, mid-small cap and balanced funds show that there were some significant differences between the SRI funds' sector exposures and those of their conventional counterparts. However, the results presented show that the SRI funds and the conventional funds do not have significantly different exposures to the majority, of sectors and this indicates that screening did not affect the majority of the SRI funds sector exposures. These results are consistent when the symmetric and asymmetric sector tests are performed. This lack of difference may partly explain the lack of significant performance differentials between the SRI and conventional funds presented in this Chapter 5. For example, there was far greater evidence of differences between the sector exposures of the UK SRI funds and their conventional counterparts presented in Chapter 4 and also far more evidence of the UK SRI funds' performance being affected by screening. These findings are consistent with the UK SRI funds being more affected by their screening practices because they use negative screening to a greater extent than the US funds and negative screening may have more of an effect on fund performance than positive and restricted screening. Interestingly, these results are consistent with those of Benson el al. (2006) who also analyse whether US SRI funds exhibit different sector gammas and find no consistent appearance of specific sectors in which SRI funds take a relatively higher weight as the result of SRI screening. Importantly, the analysis in this chapter uses a novel methodology to analyse the asymmetric sector exposure of the US SRI funds across different stages of the US stock market and economic cycle. This is the first work to use this methodology.

With respect to the voting analysis in Chapter 5, the work finds that large cap, mid-small cap and balanced US SRI funds are more likely to vote affirmatively with shareholder proposals which relate to social and environmental issues and that they are more likely to vote against company management on these issues than conventional funds. In addition, SRI funds vote less often in general with corporate management than conventional funds. These findings indicate that SRI funds provide a psychological return through their proxy voting. Investors in SRI funds should be aware that SRI funds vote differently on shareholder resolutions than conventional funds and specifically that they use proxy votes to promote environmental and social agendas. Interestingly, if investors value these voting strategies and view them as an additional psychological return, an SRI fund can provide a higher total return than a conventional fund even if the financial performance is the same. The voting work in Chapter 5 represents a considerable contribution to this area of academia.

With respect to the analysis within this thesis, which analyses the significance of a number of risks that are associated with SRI portfolios, in general, the risks analysed and findings are as follows:

A) The screening areas that different screening methods are applied to
B) The intensity of screening
C) The type of screening or the combination of types being used by an SRI portfolio
D) The size of the investment universe of the portfolio
E) The type of assets held within the portfolio

With regard to whether the specific areas in which a portfolio screens is a significant factor, the work in Chapter 4 finds little evidence that this is a significant factor that should be considered when appraising the potential risk of an SRI portfolios screening methodology. In relation to whether the intensity of a portfolios SRI screening is a risk factor, the work in Chapter 4 finds that more screening intensity is associated with worse risk-adjusted performance and that this is particularly the case for portfolios that have a small investment universe such as those that can only invest in the UK stock market. With regard to whether the type of screening or the combination of types being used by an SRI portfolio is a significant factor with respect to its performance, a comparison of the results presented in Chapters 3, 4 and 5 of this thesis indicates that it is likely that negative screening methodologies carry a greater risk than positive and restricted screening strategies and consequently the findings presented within this thesis indicate that the type of screening or the combination of types being used by an SRI portfolio is a significant factor with respect to its performance.

With regard to whether the size of the investment universe of an SRI portfolio is a significant factor with respect to its performance, the analysis in Chapter 4 finds that the smaller the investment choice available to an SRI portfolio manager the more likely it is that portfolio performance will be detrimentally affected by its requirement to screen. In addition, the findings presented in Chapter 5 indicate that no particular type of asset portfolio is more affected by SRI screening and therefore that this is not a factor that needs to be considered when analysing the potential risks associated with SRI screening. The work in this thesis also

analyses the extent to which SRI funds provide a psychological return through their proxy voting and the results presented in Chapter 5 indicate that they do.

The findings presented within this thesis significantly contribute to this area of academia and enhance the body of academic knowledge which relates to the performance and risks of socially responsible investing. Importantly, these findings also have practical implications for SRI fund managers and those investors who invest in their funds. For example, these findings indicate that SRI fund managers should be aware that the more intensely they screen their portfolios the more likely that portfolio performance will be detrimentally affected by the screening. While, investors in SRI funds should be aware that SRI funds vote differently on shareholder resolutions than conventional funds and specifically that they use proxy votes to promote environmental and social agendas. Interestingly, if investors value these voting strategies and view them as an additional psychological return, an SRI fund can provide a higher total return than a matched conventional fund even if the financial performance is the same.

### 6.3 Further Research

There is considerable scope for additional, interesting and significant research in this area of academia in the future. The work in this thesis investigates the significance of one of the two psychological returns that are potentially provided through investing in SRI funds and this is the psychological return provided by their proxy voting strategies. The second psychological return is the potential that SRI fund portfolios hold the stocks or bonds of more ethical companies than conventional funds. Kempf and Ostoff (2008) investigate the existence of this return and find that the holdings of US SRI equity funds have a significantly higher ethical ranking than those of conventional funds. Analysis of this nature does not form part of this thesis. However, there is scope for a more detailed and comprehensive analysis of the holdings of SRI funds which includes a comparison of the ethicalness of their holdings with those of their conventional counterparts over a longer time period and using monthly portfolio data. The data period used in Kempf and Ostoff (2008) is 1991 to 2004 and the holdings data used are only semi-annual. In addition, this analysis could look at funds from different SRI markets and not only US SRI funds. Also, it would be interesting to analyse whether SRI funds herd more than their conventional counterparts and therefore whether the holdings of SRI funds are more similar to each other than would normally be the case. It is

likely that SRI fund managers may herd more than conventional counterparts because they may be under less pressure to achieve superior abnormal returns as a result of the psychological returns they provide their investors.

Also, Fama and French (2015) have recently developed a five factor model directed at capturing the size, value, profitability, and investment patterns in average stock returns, which they state perform better at describing stock returns than their three-factor model (Fama and French, 1993). It would be interesting to use this model to analyse the performance of SRI funds and the use of this model should allow for additional explanation as to what factors drive SRI fund returns. In addition, it would be interesting to use this model to analyse the performance of SRI funds relative to conventional funds because this would allow for analysis once Fama and French's (2015) size, value, profitability, and investment pattern factors are controlled for. This may allow for a more accurate performance comparison and a more accurate analysis of the effects of screening on the performance of SRI funds.

Finally, it would be very interesting to expand on the voting analysis work within this thesis and to analyse the proposals that SRI funds sponsor as well as their votes on the proposals by other shareholders. Analysis of the proposals that SRI funds sponsor would be interesting because this analysis would indicate how they aim to directly affect the behaviour and management of companies by proposing resolutions for shareholders to vote on. In addition, it would be interesting to analyse what effect, if any, the shareholder activism of SRI funds has on the financial and ethical performance of the companies whose stocks they hold within their portfolios.

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