

Recent Evidence on the Performance of UK SRI Funds

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Abstract

This study focuses on the exploration of the performance of the UK SRI funds. The current research occupied the recent data ranging from 2001 to 2013, including the "UK and Global economic recession periods". The data set was mainly based on the returns of the 227 screened SRI funds of 70 fund managers on monthly basis. Moreover, it employed more than one estimation model in a research with the aim of finding recent evidence and reaching more robust conclusions. The research focused on the five hypotheses developed. The first finding indicates that there is no difference in the performance between the SRI funds and market. The second finding implies that the performance of the SRI funds is indifferent not considering whether they are grouped by "large-size" firms or "small-size" firms. The third finding is similar to the previous ones, as it cannot be concluded that the performance of the SRI fund portfolios differs from each other by various values of a book-to-market ratio. The result implies that the SRI fund portfolios grouped by their sector weighting significantly underperform the market. And the final finding is that SRI fund managers have positive selective ability, yet this skill does not assist to have a "right market timing" ability. The investigation reveals some recent evidence that draws immediate attention to the special characteristics of the SRI funds. Another feature of the study is highlighted by the demonstration of a negative correlation among risk factors, thereby it shed light on the fact that, when the SRI funds tend to outperform the market, volatility lowers, the "small-firm" effect swaps for "large-firm", the tendency for "growth-orientation" strengthens, and the momentum strategy weakens.

Finally, it is concluded that the SRI funds could mainly be used as an "insurance" tool rather than an "investment" instrument.

Keywords: Performance; Volatility; UK SRI funds; Market

Introduction

SRI? What is it about?

The classical theory of economics stating "in competition individual ambition serves the common good" has not been working since the second half of the 20th century [1]. In order to succeed in the group, individuals should do what is the best for themselves and for the group. For this reason, those who are concerned only with the maximization of their own interests are limited by failure of their reputation [2].

The growing awareness that pure materialism gradually loses its momentum at this stage of development of civilization cannot always provide reasonable answers to the questions facing the humankind, led to the fact that the investors are increasingly abandoning the principle of "money does not smell" in favour of socially important values and personal moral beliefs.

Today, investment attractiveness of the companies is caused not only by financial criterion but, a social, an ethical or an environmental component of the activities of an organization. More and more portfolio managers are taking into account these factors and thus prefer to invest only in companies that, in their view, do not have a negative impact on the key aspects of life in the society. The "Socially Responsible Investment" (SRI) funds are noticeably growing and are distinct parts tackle to invest in bonds and stocks of companies that do not participate in unsavoury actions. One good example for the SRI funds is "the carrot and the stick" proposition, by working in a different way as the investor remunerates those that have been agreed by investing in their company (the carrot), still denying to buy the shares of those companies that contradicts with the investor's values (the stick).

The key reasons for SRI funds being different from the conventional (traditional) funds are the facts and beliefs considered the key components to be employed while investing. Some investors believe

that generating extra income and becoming rich is not sufficient. Instead they understand the social responsibility of their investments, such as safety of nature, alternative energy and standards of living as they generate the income from society and nature.

Timeline: The UK's socially responsible investments

Socially responsible funds are increasing in a geometrical order in comparison to the conventional ones. The first ethically screened unit trust that was initiated in the UK in 1984 by Friends Provident was called the "Stewardship Fund". In 2000, the UK law on the pension schemes was amended and in 2001, "Ethical Investment Research and Information Service" (hereinafter, EIRIS) team launched an FTSE4Good Indices. After 2007, as the consumers began to be interested in fair trade, globalisation, environment, and the human rights, the investment fund in favour of ethically investing have been increased tremendously, approximately reaching 600% in the last decade. As a result, the first non-profit, independent client website (www.yourethicalmoney.org) was launched in 2009. EIRIS reported that the investment in the UK's socially responsible investment funds in 2001 was £4 billion, which has fallen during the UK and global economic recessions and has dramatically increased to £12.2 billion by 30th of June, 2013.

Nowadays, the UK government created the first investment bank

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in the world named “Green Investment Bank” with the initial £3.8 billion of public funds. The target of the bank is investing £330 billion in the UK’s green economy that aims to create new energy and waste infrastructure across the UK. Investing in the alternative projects, namely, in energy efficiency, and offshore wind and bioenergy, is the double bottom line in the business plan of the investment bank. Moreover, the most important and admirable project by the UK government is to de-carbonise the whole energy industry by 2030.

Trends in the literature: Do the socially responsible funds perform well?

There is not any dogmatic answer to the question as there are plenty of papers contradicting each other. Some researchers state that the performance of the socially responsible funds is almost flat and moves in the same direction with the market [3]. Additionally, Kreander et al. [4], suggest that performance of the socially responsible funds is indifferent unlike the origin of country and financial market. Luther et al. argue that there is unconvincing evidence that the SRI funds outperforming the market and their traditional peers [5]. Bauer et al. concluded that the SRI funds do not significantly underperform the UK, the Australia and the German markets, respectively [6-8]. Benson and Humphrey [9] confirmed previously made suggestions by emphasizing that the SRI funds are less concerned with the performance. However, Nofsinger and Varma [10] suggested that the SRI funds could obtain negative returns as they can perform well during the financial crisis period.

The performance of the SRI funds is impacted by different factors, such as, “small-firm”, “large-firm”, and “growth-orientation”, “value-orientation, sector-weighting. Bauer et al. suggested that the SRI funds tend to be less volatile in comparison to the traditional funds [6]. Oikonomou et al. argue that the market beta and the performance of the SRI funds are inversely correlated, which draws an attention to the investigation of other factors [11]. By referring to a “small-firm” effect Gregory et al. [3], suggested that the performance of SRI funds is predominantly affected by this factor. However, Belkaoui and Karpik argue that the performance of SRI funds is mainly affected by a “large-firm” effect [12]. Other evidence is provided by Bauer et al. implying that the SRI funds are basically “growth-oriented” rather than being “value-oriented” [3].

Other findings that raise attention are about the selective and market timing ability of the SRI funds. Liljeblom and Löflund suggested that the SRI funds lack selective and market timing ability [13]. Moreover, Kreander et al. concluded that there is either selective nor market timing ability of the SRI funds [4]. However, Schröder debates that some SRI funds have positive, whereas some have negative market timing ability [14].

Occupying the “Niche”

The researchers studying the performance of the SRI funds have mainly used the old data with different time spans in their researches. A considerably large data set was used by Geczy et al. covering the years 1963-2001 [15]. The most recently used data includes the year 2003. Furthermore, the recent studies investigating the performance of SRI funds have focused on a small sample of funds ranging from 8 to 103. However, there is a study by Renneboog et al. focusing on 440 SRI and 16036 non-SRI funds [16].

It draws attention that those mentioned estimation studies have used only few models in their research.

Hence, in order to occupy the “niche” in the literature, the current research mainly focuses on the recent data ranging from 2001 to 2013, including the “UK and Global economic recession periods”. Moreover, it employs more than one estimation model in one research with the aim of finding recent evidence and reaching more robust conclusions.

Recent findings of the research

Based on the results obtained from all estimation models, it was concluded that the SRI funds do not demonstrate a significant performance. The performance of the SRI funds did not change even after having constructed different portfolios based on the small and large size funds. The two SRI fund portfolios with different book-to-market ratio do not differ significantly from each other and the performance is also neutral compared to the market. However, the portfolio constructed with the SRI funds investing in the financial sector and the portfolio constructed with the SRI funds investing in the industrial sector demonstrates significant underperformance. Moreover, despite the SRI funds have predominantly positive selective ability, almost half of the SRI funds suffer from a negative market timing ability. In addition, it is suggested that the SRI funds are lack of market timing ability as the majority of SRI funds are not statistically significant.

According to the findings the SRI funds are considered as a good depository tool. In other words, volatility of the SRI funds is inversely related to the market, thereby behaving as a “gold stock” in the market. The “small-firm” effect was affecting the performance of SRI funds based on the results of all the estimation models. Moreover, the results conclude that the SRI funds are mainly growth-oriented. However, no evidence is found regarding the “momentum effect”.

Layout

The rest of the study is constructed as follows; firstly, the relevant literature is discussed focusing on the different conclusions on the performance of the SRI funds, factors affecting the performances and recent evidence from the different financial markets. In addition, the interpretation of the specific terms related to the SRI funds is provided. The discussion is followed by information on collection of the data, the hypotheses developed, and the methodology used. The following chapter describes the empirical results and findings on the performance of SRI funds. Finally, the last chapter includes the main conclusions of the research, as well as limitations and recommendations.

Literature Review

Introduction

A critical literature review is composed of several subsections. First subsection introduces a term of “social responsible investment funds”, a brief history of being an SRI investor. Following subsections discuss the hitherto literature studying the performance of the socially responsible investment funds, factors affecting the performance, empirical studies and findings on the performance of the social responsible investment funds. Then the screening technique is characterized. Last subsection discusses and criticizes the mostly applied empirical models to estimate the performance of socially responsible investment funds.

The uniqueness of the “Socially Responsible Investment Funds”

Nowadays, it is not compulsory to call them, social funds [17], socially responsible funds, SRI funds, divergent funds [18], ethical funds [19,20], the green funds [21], or a sustainable and responsible

investment. For that reason, those terminologies will be used interchangeable throughout the research. The reason why those funds are different is determined by the two key elements: conscience and belief. The “ethical funds” may come from the time when religions were still dominant. History is the same as all the rules involved in investing in these kinds of funds are identical in major world religions such as Judaism, Christianity and Islam. Historically, the restrictions and limitations were put on the loans and investment based on the traditional beliefs. In all those times, some areas of investing were considered as a “Sin” investing, which is outlawed now. During the recent years, i.e., about 10-20 years of time span-investing ethically is about conscience and belief of the investors. Although, all European countries as well as the US, the UK, Japan, Australia refer to the international ethical rules, some middle-east countries basically refer to the “Islamic Sharia Law”, “Islamic Finance”, and “Islamic Investment”.

Hence, the sphere of influence of socially responsible funds has been under debate over last few decades.

The performance of “Socially Responsible Investment Funds”

Considerable amounts of literature have been published regarding the performance of the socially responsible investment funds. Generally speaking, while the scopes of the research do not differ significantly, the methods and style used are usually divergent. Most of the papers are about comparing the financial performance of the individual funds advocating social responsibility versus those funds that are less socially responsible [22,23]. Yet other researchers are interested in studying the performance of indices by removing the funds with a lower social responsibility [24,25]. Finally, the majority of the recent papers are conducted by comparing the performance of the socially responsible investment funds with the conventional ones [26]. Moreover, the research objectives vary across the investigated regions and financial markets. A significant number of studies examined and analysed the performance of the socially responsible investment funds in the US and UK markets as well as in other European countries, whereas only handful of studies have been conducted for the non-European countries [7,8].

By delving a bit deeper, Luther et al. find that there is a weak manifestation that the socially responsible investment funds outperform the conventional (traditional) ones in the UK market [5]. Gregory and Whittaker on the other hand, conclude that both socially responsible and conventional investment funds underperform the UK market [27]. In another study, Gregory et al. suggest that the performance of SRI funds and non-SRI funds in the UK market are not statistically different [3]. Kreander et al. conduct a research for a lavish number of European countries (i.e., Germany, the Netherlands, Belgium, Sweden, Switzerland, Norway, and the UK) discovering that the performance is similar for different types of investment funds [4]. A study by Scholtens deduces that the socially responsible investment funds of the Dutch market outperform the conventional ones [28]. However the result is not significant. Schröder has focused on the German and the Swiss funds and Bauer et al. studying the UK and the German funds recommended that the social responsible investment funds underperform their traditional peers [5,14]. The research conducted for the Australia market concluded that the performance of socially responsible funds is insignificant [6]. Moreover, another study by Bauer et al. on the Canadian fund market has also ended up with the negligible results about the performance of SRI funds [7]. Hamilton et al. and Statman studying the US market suggested that the performance of socially responsible investment funds are not significantly different from the traditional funds [29,30]. Capelle-Blancard and Monjon have attempted

to examine the financial performance of the socially responsible funds' association with the features of non-financial screening process [31]. Unlike the precedent researchers, by using different approaches, they have found significant differences in risk-adjusted returns between SRI and non-SRI funds. Nofsinger and Varma studied the performance of the socially responsible investment funds during the market crisis [10]. By giving a clear interpretation they have claimed that even though the socially responsible investment funds might generate negative abnormal returns, they hedge well during the global financial crisis. The results are justified by denoting that the disastrous pollutions are less likely to happen with the socially responsible investment funds than their unscreened peers. Moreover, Glode et al. and Kacperczyk et al. have also suggested that investment funds managed actively tend to perform well during economic recessions [32,33]. Innes and Sam have revealed that the socially responsible investment funds suffer relatively less from the legal prosecutions and governmental fines [34]. Another interesting argument was suggested by Verwijmeren and Derwall that the investment companies with a high employee satisfaction show less bankruptcy risk [35]. To sum up, if an investment fund follows a strong corporate governance practice, it will pay low agency costs. Since this strategy seems to be an effective one, the investors should pay a strict attention to it, specifically during the periods of the financial crisis. Therefore, the economists, investors and researchers have paid more attention to the obstacles during the bear markets than the bull markets. In another recent study, Oikonomou et al. find that a responsible behaviour of the market participants is negatively related with the market risk and vice versa [11]. Glode [36] questions whether the investors are eager to hand over more or less return in the non-crisis period to earn higher returns during the crisis period?! In addition, he finds that active managers perform better during the bad times than during good times. Cox et al. [37], on the other hand, concluded that as the 600 largest UK companies manifested the pension funds, life insurers support a strong corporate social performance. According to the weak-market efficiency theory, investors rely on the idea that the past performance as well as returns are the key components affecting the current situation of the performance. A good point raised by Benson and Humphrey is that the socially responsible investment funds are less concerned with the performance than the conventional funds [9]. Unlikely, some studies have concluded that the socially responsible investment funds are more inclined to growth-oriented stocks than their peers on the one hand. On the other hand, some prefer the socially responsible investment funds are more inclined to value-oriented ones. In contrast to the all above mentioned research papers, Mill argues that the performance of the portfolio pooled with the socially responsible investment funds is relatively higher than the portfolio with the traditional funds [38]. Since research papers come up with the dissimilar results, it cannot be definitely concluded that if the SRI funds' performance beat the performance of market and non-SRI funds.

Factors affecting the performance of “Socially Responsible Investment Funds”

There are various factors influencing the performance of socially responsible investment funds. Renneboog et al. stated that behaviour of investors is one of factors that affect the performance of socially responsible investment funds [16]. A cash flow is another factor related to the performance of the funds. More precisely, there is a discrepancy with the cash flow and the performance of the socially responsible investment funds. A socially responsible investment fund performing well tends to acquire a cash inflow, whereas a fund

performing badly is compensated with cash outflows. However, James and Karceski argued that this inequality is not associated with all types of investment funds [39]. Bollen investigated the factors of the money-flows and concentrated on past returns. He concluded that the risk of money-flow of the socially responsible investment funds is lower than the traditional investment funds. Moreover, he suggested that without gaining the utility from externalities of investing by the investors, the SRI funds generate negative abnormal returns despite the increasing popularity. Moreover, Renneboog et al. confirm that the utility somewhat depends on the other members of externalities [16]. A similar research by Renneboog et al. postulated that as their colleagues working with the socially responsible and conventional investment funds [40], the investors of the socially responsible investment funds foremost concentrate on past returns and remarkably on past performance. It is evidenced that the investors no depending on their experience level respond to past returns in order to effectively evaluate the current performance [41,42]. In order to arrive at higher returns and productivity, the stakeholders' interests should be maximised [43]. A recent stance is known as a "good management theory". Waddock and Graves postulated that by creating merit for stockholders of the fund, social responsibility will result with a higher return [44]. This evidence, however, was presented by Freeman based on the "stakeholder theory" [45]. In practice, it is not the case as the conflict arises between the stockholders and the managers (including employees, and customers) and as they have interests in the company. Likewise, another researcher investigating the stakeholder issue suggests that:

"In a nutshell, management can almost always rationalize any action by invoking its impact on the welfare of some stakeholder. An empire builder can justify a costly acquisition by a claim that the purchase will save a couple of jobs in the acquired firm; a manager can choose his brother-in-law as supplier on the grounds that the latter's production process is environmentally friendly" [46].

Recently, Cortez et al. suggested that not only conventional investment funds [47], but also socially responsible investment funds can perform explicitly well, if the precise diversification is conducted. Girard et al. suppose that the size and age factors do not affect the performance of the socially responsible investment funds straightforwardly [48]. This evidence is supported by Renneboog et al. [49]. Belkaoui and Kaprik suggest that investors accept outlays for the large portfolios [12]. In contrast, Luther et al. argue referring to small portfolios and conclude that it is hard to determine as there is not a standard for market capitalization measure [5]. The small market capitalization has been also considered as a factor affecting the performance by Luther and Matatko [5]. The idea was previously suggested by Starks that the investors are willing to use portfolios with a small fund size in to make a good return [50]. They concluded that the small market capitalization factor significantly improves the performance. The large capitalization market is another significant factor that vastly affects the performance of the socially responsible investment funds. In 2004, Berk and Green published a paper, in which they explained that the behaviour of the investors is one of the many factors that impacting the performance [42]. Another factor that affect the performance of socially responsible investment funds is "growth-orientation" of the funds. Hence, Chen et al. concluded that the SRI funds with "growth-orientation" tend to perform better [51]. However, Cuthbertson et al. argued that there is no evidence regarding the "growth-orientation" effect of the SRI funds for the UK market [52]. Furthermore, Benson et al. argued that the performance of the socially responsible investment funds is affected differently by the sector weighting factor [9]. To be more concise, the socially responsible investment funds behave differently across the

sectors. Not only the individual funds, but also the portfolio behaves differently while being affected by this kind of factors. For instance, it is postulated that there are some costs such as an operation fee and management fee in order to hold the socially responsible investment funds within the portfolio. However as a result of those costs, the investors are not reluctant to keep in the portfolio as fear of financial loss [53,54].

Empirical studies and findings on the performance of SRI funds

A principal issue in finance has been correctness and a more precise calculation method of the "performance" of the portfolios. The main concern of the investors is both to increase returns of a portfolio and to minimize (diversify) the risk encountering with return taken. The researchers investigating the performance of the SRI funds have been used different calculation methods alongside with the various benchmarks, indices.

Evidence from the US: Hamilton et al. collected SRI funds and non-SRI funds for the period of 1981-1985 in quantity of 32 and 320, respectively [29]. They have used the Jensen's alpha and calculated the average alphas before the year of 1985 and after. Hence, 17 SRI funds found before 1985, present an average alpha of (-0.06%), which is greater than the average alpha (-0.14%) of the relevant 170 non-SRI funds. Consequently, 15 SRI funds after year of 1985, show an average alpha of (-0.28%), which is lower than the average alpha (-0.04%) of the relevant non-SRI ones. A study by Goldreyer et al. covered the period of 1981-1997 and studied 49 SRI funds and 180 similar SRI funds combined on fund size, investment objective, and market beta bases [55]. Their estimations that are also based on the Jensen's alpha indicate that the average alpha is (0.49%) annually for the 29 SRI funds, whereas the average alpha for 20 non-SRI funds is 2.78% and the difference is statistically insignificant. The evidence is that the SRI funds using positive screening are superior to their peers by average alpha of (-0.70%). Statman accumulated 31 SRI and 62 non-SRI funds matched by fund size for the period of 1990-1998 [30]. He used a "Sharpe ratio" and draw the conclusion that the average expense ratios is the same about 1.50% and 1.56%, whereas a mean alpha is respectively (-0.42%) and (-0.62%) for SRI funds and non-SRI ones. However, the difference between alphas is not significant. Unlike the research mentioned earlier, a detailed examination by Geczy et al. analysed a diversification cost of the investors venturing in the 35 SRI funds and 894 non-SRI ones covering the period of 1963-2001 [15]. The research was conducted by using the CAPM and multi-factor models suggested by Fama and French three factor and Carhart four factor models, respectively [56,57]. Geczy et al. pointed out that the cost of the SRI funds is upon the investors' pre-existing beliefs and investors supporting the CAPM leave out selections skills that suffer from five basis points of financial costs, on monthly basis [15]. Moreover, the financial cost increases up to 30 basis points for the investor, who believe in multi-factor models. The average expense ratio of SRI funds is higher than that of non-SRI by 0.23% being 1.33% and 1.10%, respectively. The average alpha of SRI funds is greater than that of non-SRI ones each being 0.21% and 0.08%, respectively. To conclude, the socially responsible investment funds deceive large costs as 1.5% per month and the screening restrictions lift a monthly cost by 10 basis points up. Barnett and Salomon conducted a research on yearly basis (1995, 1996, and 1999) with 67 SRI funds without any comparison [58]. They employed expected returns instead of risk-adjusted returns in their research and concluded that when the screening is increased by the SRI fund, the annual return decreases at first round, but springs back as the number of screenings is maximising.

Evidence from the UK: A few studies are dedicated to the SRI funds in the UK market without the comparison. Luther et al. collected 15 SRI funds for the period of 1984-1990 and used a Jensen's alpha for their estimations [5]. The mean result of the Jensen's alpha is 0.03% per month and it is not statistically different from zero, implying that the performance of SRI funds is the same with the performance of market. They also concluded that the portfolio weight of the SRI funds is relatively high on the ones with the small market capitalization. In contrast, Luther and Matatko advocate the previously postulated theory by concluding that there is a bias of the SRI funds regarding the small market capitalization [5]. They have used only 9 SRI funds for the years of 1984-1992. Mallin et al. compared 29 SRI and non-SRI funds matched by fund size and age for the period of 1986-1993 [59]. In spite of the significantly similar results, the alpha of the SRI funds ranges from (-0.28%) to 1.21% and the alpha of non-SRI funds ranges from (-0.41%) to 1.56% per month. A small scale study by Gregory et al. uses a subsample of 9 SRI and non-SRI funds for the period of 1986-1994 [3]. A value of the alpha ranges from (-0.28%) to 0.24%, but it is a statistically insignificant. The SRI and non-SRI funds do not differ significantly from each other based on fund size, age and market risk.

International evidence: Several studies have revealed various results regarding the socially responsible investment funds in the different countries. A performance study by Schröder examining 46 SRI funds from the US, Germany and Switzerland for the period of 1990-2002 came to the conclusion that the SRI funds do not significantly underperform or outperform the benchmarks used [14]. The benchmarks are consisted of the stocks with small and large market capitalization. The application was conducted on a two-factor model. A monthly alpha range varies from (-2.06%) to 0.87% where only four out of the 46 alphas are significant and the values of the rest 38 are negative. Kreander et al. (2005) studied the performance of the 40 SRI and 40 non-SRI funds in the countries, namely the Belgium (one fund), Germany (four funds), the Netherlands (two funds), Norway (two funds), Sweden (11 funds), Switzerland (two funds) and the UK (18 funds) covering the weekly data for the period of 1996-1998 matching fund size, country, age, and investment universe [4]. The average SRI and non-SRI funds' alpha is 0.20% and 0.12%, respectively. The market-timing coefficients for SRI and non-SRI funds are identical being (-0.29%) and (-0.28%) at significance level of 95%, respectively. Bauer et al. (2005) studied the performance of the funds in Germany, the UK and the US [6]. The data are substantially large covering 103 SRI and 4384 non-SRI funds (Germany 114, the UK 396, and the US 3874) for the period of 1990-2001. They claim that the SRI funds are characterized with a smaller size and higher expense ratio in comparison to the conventional funds. The value of the alpha for Germany is 0.29%, for the UK is 0.09% and for the US is (0.05%). The US domestic SRI funds underperform the non-SRI funds, whereas the SRI funds of the UK significantly outperform the conventional funds. Renneboog et al. have conducted two different studies with the same purpose [16]. Renneboog et al. investigated 410 SRI and 680 non-SRI funds in the 17 countries around the world for the years of 1992-2003. They concluded that the SRI funds follow past returns unlike the non-SRI funds. The large portfolios of the SRI funds have higher flow volatility because of lower fees. In addition to this, Renneboog et al. have conducted a research covering the 17 countries with 440 SRI and 16036 non-SRI funds for the period of 1991-2003 [16]. They suggested that the SRI funds in the European and Asia-Pacific countries significantly underperform their domestic peers. Moreover, the risk-adjusted returns of the SRI funds in Belgium, France, Ireland, Japan, Norway, Singapore and Sweden averaged to (-5%) per annum. Ultimately, the screening significantly impacts the risk-adjusted returns and loadings of the SRI funds.

Investment screens of the “Socially responsible investment funds

The General Secretary of the UN, Kofi Annan invited 20 of the world's largest investors from 12 different countries to develop a set of international principles for responsible investment resulting in adaptation of the current six principles for responsible investment. Yet, the standards of a selection of the socially responsible funds to be included in the portfolio are not governed by any legally defined rules. There are various approaches to the selection procedure, which in turn differ from one another with their level of aesthetics. Most of the time when a portfolio is created, a selection of companies is carried out on the scope of their activities. Thus unacceptable cases for responsible investment are the manufacturers of products such as tobacco, alcohol, animal testing (pharma/medical/cosmetics), weapons, gambling, nuclear power, military/armaments, and pornography. Hard to analyse and evaluate, and therefore a slightly less popular criteria include socially responsible organizational culture of the company, charity and participation in local investment programs and failure of experiments on animals. Besides, a few managers in preparing portfolios take into account the factors such as the level of remuneration of the managers and the compliance with the international labour standards. Becht et al. stated that the subsidy of the managers could be conducted by using voting rights [60]. Screening is the method of eliminating the companies, working in the areas contradicting the investors' moral beliefs and non-financial criteria. Consequently, the investors who strictly care about the investment area, endeavour to remove the stocks and bonds of the companies which are engaged in one or another way to the list of screening.

Numerous studies have been conducted with the purpose of identifying the screening effect on the performance the SRI funds. In contrast to all above mentioned points, some researchers believe that even if the performances of the socially responsible investment funds are similar or just slightly different from the traditional ones, the result is insignificant. For instance, Lee et al. [61], in their paper identified the impact of screening intensity and highlight that there are three types of screenings, namely, the “Positive screening” includes investment in those companies which are involved to “green living” such as wind or solar power, the “Negative screening” excludes companies contradicting the non-financial criteria and the “Restricted screening” – includes the companies, in which the small part of activities are involved in the undesirable sectors.

Detailed information about the screening is provided in Table 1.

Some researchers as well as investors do not agree with the screening of the investment funds as it may result in underperformance and low return of investment funds. Fabozzi et al. [62] have attempted to explain that the “Sin” portfolios outperform in total return implying that there are costs in investing in the social standards, which is not with the “Sin” stocks. Nevertheless, it has been argued by Renneboog et al. [16] that the screening may also strengthen the performance of socially responsible investment funds. However, Sauer [24] have concluded that the statistically significant differences among revenues of the SRI and non-SRI funds do not exist. Barnett and Salomon [58] have also studied the screening intensity affection on the financial performance of the SRI funds for the US market for the period of 1972-2000. In their paper, they did not match the performance of the SRI and conventional funds. Instead, they introduced slightly different work by conducting a research with the aim of finding the evidence in the “curvilinear relationship” between the social responsibility and the financial

Screens	Definitions	Type
Tobacco	Avoid manufacturers of tobacco products	-
Alcohol	Avoid firms that produce, market, or otherwise promote the consumption of alcoholic beverages	-
Gambling	Avoid casinos and suppliers of gambling equipment	-
Defense/weapons	Avoid firms producing weapons for domestic or foreign militaries, or firearms for personal use	-
Nuclear power	Avoid manufacturers of nuclear reactors or related equipment and companies that operate nuclear power plants	-
Irresponsible foreign operations	Avoid firms with investments in government-controlled or private firms located in oppressive regimes such as Burma or China, or firms which mistreat the indigenous peoples of developing countries.	-
Pornography/adult entertainment	Avoid publishers of pornographic magazines; production studios that produce offensive video and audio tapes; companies that are major sponsors of graphic sex and violence on television.	-
Abortion/birth control	Avoid providers of abortion; manufacturers of abortion drugs and birth control products; insurance companies that pay for elective abortions (where not mandated by law); companies that provide financial support to Planned Parenthood.	-
Labour relations and workplace conditions	Seek firms with strong union relationships, employee empowerment, and/or employee profit sharing.	+
	Avoid firms exploiting their workforce and sweatshops	-
Environment	Seek firms with proactive involvement in recycling, waste reduction, and environmental clean-up.	+
	Avoid firms producing toxic products, and contributing to global warming	-
Corporate governance	Seek companies demonstrating "best practices" related to board independence and elections, auditor independence, executive.	+
	Avoid firms with antitrust violations, consumer fraud, and marketing scandals.	-
Business practice	Seek companies committed to sustainability through investments in R&D, quality assurance, product safety.	+
Employment diversity	Seek firms pursuing and active policy related to the employment of minorities, women, gays/lesbian, and/or disabled persons who ought to be represented amongst senior management.	-
Human rights	Seek firms promoting human rights standards.	+
	Avoid firms which are complicit in human rights violations.	-
Animal testing	Avoid firms with animal testing and firms producing hunting/trapping equipment or using animals in end products	-
	Seek firms promoting the respectful treatment of animals	+
Renewable energy	Seek firms producing power derived from renewable energy sources	+
Biotechnology	Seek firms that support sustainable agriculture, biodiversity, local farmers, and industrial applications of biotechnology. Avoid firms involved in the promotion or development of genetic engineering for agricultural application	+
		-
Community involvement	Seek firms with proactive investments in the local community by sponsoring charitable donations, employee volunteerism, and/or housing and educational programs	+
Shareholder activism	The SRI funds that attempt to influence company actions through direct dialogue with management and/or voting at Annual General Meetings	+
Non-married	Avoid insurance companies that give coverage to non-married couples	-
Healthcare/pharmaceuticals	Avoid healthcare industries (used by funds targeting the "Christian Scientist" religious group)	-
Interest-based financial institutions	Avoid financial institutions that derive a significant portion of their income from interest earnings (on loans or fixed income securities). (Used by funds managed according to Islamic principles).	-
Pork producers	Avoid companies that derive a significant portion of their income from the manufacturing or marketing of pork products. (Used by funds managed according to Islamic principles)	-

Note: The summarised version of investment screens used by SRI funds is presented. In the last column, the "-" refers to a negative screen, whereas "+" refers to positive one. The table is adapted from Renneboog et al. [49].

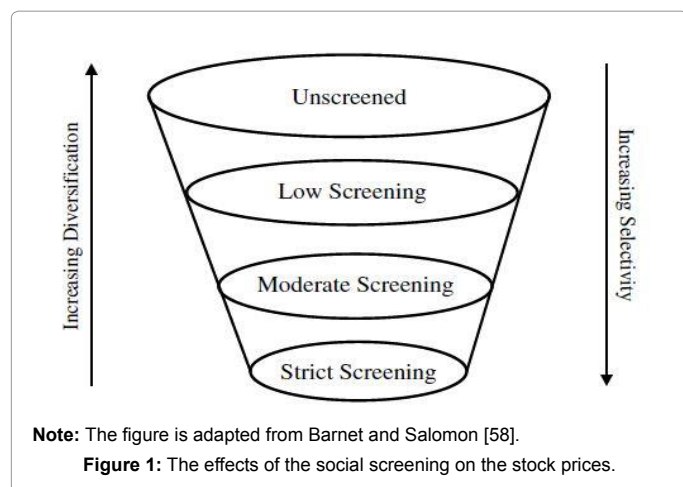
Table 1: List of screens with definitions and types of screening.

performance of the SRI funds. Moreover, this study makes it clear that the community relation's screening exerts the financial performance of the SRI funds positively, while the labour and environmental relations screening undermines the performance (Figure 1).

To boost the hypothesis about the effectiveness of social screening, another study was done by Renneboog et al. [16]. In their study, Renneboog et al. tried to explain the social screening effect on risk-adjusted returns. They also proved that some screening methods such as the sin screening and environmental screening do not have any significant impact. However, they did not test for a "curvilinear relationship". The important investigation conducted by Bieh et al. [63] where they stated that more the fund is screened socially; the

lower is its performance. Similarly, Capelle-Blancard and Monjon [31] argue that risk-adjusted return is decreased predominantly by the higher screening. Hence, the results are in line with the "best-in-class" approach.

Various types of screenings have their own impacts on performance of the SRI funds. For instance, environmental screening is highly correlated with the funds' future cash flows. Dowel et al. [64] postulate that a fund adopting high standards of environmental screening produces a much higher Tobin's Q than its peers. Derwall et al. [8] constructed a portfolio with the funds stringently screened on environmental basis and evaluated a performance. They concluded that the portfolios screened on the environmental basis tend to outperform



the ones that are not screened by 6% per annum. A distinctive study is conducted on the corporate governance theory by La Porta et al. [65] shows that there is a positive correlation between corporate governance and a firm's value.

Unfortunately, it is practically impossible to find a company that meets all criteria for the socially responsible investing. Therefore, managers often have to make compromises by including a portfolio of companies that do not quite meet the established selection criteria, but are in the spirit of the responsible investment. A specific example is the company performing a test on the animals with a cleaner production. The relatively opaque standards of the responsible investing lead to the objective interpretations by every manager resulting in individual profitability and the proportion of "social responsibility." While for some managers, it is acceptable to include a certain percentage of "bad" companies in the portfolio in order to improve its profitability, for others it is crucial to occupy the most principled position and rigidly screen out companies that do not meet the specified criteria.

Praise and Appraisal of models used to evaluate the performance of the SRI funds

When the portfolio is well diversified, the Jensen's alpha is generally used. Jensen [66] has found the model based on the direct application of the hypothetical results of the capital asset pricing model and the derivation by Sharpe, Lintner and Treynor (Undated) [67-69]. As the model was built on the CAPM, it is possible to notice the similar critiques as the CAPM encountered. According to Grinblatt and Titman [70], the Jensen's alpha has been under the criticism mostly. The reason is that it is the most preferably used tool in the academic studies related to the finance. As mentioned by Ross [71], the Jensen measure can assign negative performance to a market timer because it is constructed on an upwardly biased estimate of systematic risk. Roll noted that the Jensen's alpha measurement is mostly biased by the benchmarks [72]. The reason is that there is not any appropriately constructed benchmark. As a result, the calculated alpha bears no reliable relation to its true performance. However, Ippolito analysing the importance of a correct use of benchmarks commented oppositely and reported that the socially responsible investment funds can outperform the benchmark [73]. In contrast, Elton et al. [74] concluded that the Ippolito's results were different and unique because of inappropriate benchmarks. Meanwhile, the main arguments concerning the Jensen's alpha are based on the different views and measurement strategies applied by two types of managers, the passive managers and active

managers or uninformed and informed investors, respectively. Yet, another criticism has been raised by Verrecchia [75]. In his study, he has presented an example proving that informed investors could realize risk-adjusted returns, even when the returns are correctly adjusted for risk. In contrast, Grinblatt and Titman [70] showed that the example by Verrecchia [75] suffers from the unrealistic preferences. However, some recent studies mostly refer to the Fama-French and Carhart factor models and Fama-French-Carhart benchmarks to estimate the performance [57,76]. The three-factor model expands on the traditional capital asset pricing model and surpasses all the previously introduced theories. As the CAPM uses one variable in order to measure return of a portfolio against the risk taken, Fama and French recommend that two classes of stocks (risk factors) based on size and on a book-to-market ratio tend to do better than the whole market [56]. Daniel and Titman argues that the firms' characteristics explain the performance better compared to the risk factors [77]. Fama and French, however, doubt this conclusion by giving the evidence that it is merely a subsample result. However, Liew and Vasalou [78] state that the risk factors can predict only a future economic progress. As an extension to the Fama and French free factor model, Carhart [57] made a new equation by adding a "momentum factor". The Carhart's four factor model is frequently used in all recent studies on the performance of investment funds. Bauer et al. [6] have used above-mentioned models and factors in their paper in order to find the evidence on SRI funds' performances and investment styles. Barnett et al. [58] followed the same rules used. However, there are few studies applying the four factor model studying to the UK market. Treynor and Mazuy contribute to the literature with a model presenting investigating both the collection capability and the market timing of the funds [79]. More precisely, the model is divided into two parts:

The first part explains whether the fund underperforms or outperforms the market, the second part presents the prediction of fund's movement directions. The model was constructed by adding a quadric term to the model of Jensen's alpha. Wooldridge argues for the effect of the quadratic term in the model [80]. He claims that a steady regression is linear and presents linearity, yet as the model is not linear, it cannot explain the truth behind the assumption.

Conclusion

As discussed, the results of the studies investigating the performance of the SRI funds are so ambiguous and divergent that it is difficult to clearly understand the unique performance of SRI funds. Moreover, most of the studies have used so few number of SRI funds that it does not give a general idea about the performance of all SRI funds in the market. Besides, the data period is prior to the year of 2008, which is not recent. Due to different empirical models used, it is complicated to identify the most proper one to analyse a precise performance of the SRI funds and its exposure to the risk factors.

Referring to all above said, it is compelling to reinvestigate the performance of the UK SRI funds. A current research contributes to the literature with the recently collected data, hypotheses assumed. Moreover, the widely used empirical models will be employed in estimation process, in order to identify correct selection ability, market timing and risk factors impacting performance.

Data and Empirical methodology

Introduction

The first and foremost aim of the empirical methodology is to investigate performance of the socially responsible investment

funds, specifically traded in the UK market. As a result of several considerations, it was decided not to follow directly in the footsteps of a particular researcher and to apply a consolidated and recent study expecting to reach novel evidence on the performance of the socially responsible funds. The current work uses both the single and multi-factor models in the estimations as well as matches different types of portfolios against each other based on the several hypotheses developed. Before proceeding to the methodology part, the following subsections describe the data collected, screening of funds, the hypotheses developed and the assumptions made.

Data and descriptive statistics

Choosing the correct data is a crucial part of the empirical analysis to obtain the rigid unbiased results. The present part therefore focuses on the interpretation of the different types of the data used as well as on the explanation of their importance.

Vital data collection sources are Datastream and Bloomberg. The collected data covers the period of July 2001–December 2013. The privilege of the data period is that it is so recent in comparison to previous studies' ones. For instance, Luther et al. [5], Luther and Matatko, Mallin et al. [59], Gregory et al. [3], Kreander et al. [4], Bauer et al. [6], who covered the data periods of 1984–1990, 1984–1992, 1986–1993, 1986–1994, 1996–1998, and 1990–2001 respectively. The choice of the start date from the second half of the year 2001 is because of a creation date of the FTSE4Good Index. However, the FTSE4Good Index is not used in current research as the number of SRI funds showing statistically significant results could be tremendously decreased downwards [81]. Correspondingly, the closing date defined as the end of 2013 is mainly on account of the benchmarks created specifically for the UK market.

Benchmark: It was mentioned earlier that there did not exist a standardised risk-measurement factors (benchmarks) constructed exclusively for the UK market. Consequently, there are several papers discussing the specific factors constructed for the UK market with different methodologies and calculation algorithms. For example, by studying the properties of the expected returns in the UK, Miles and Timmerman have created the specific factors. Lui et al. [82] has constructed the risk-measurement factors while investigating the effectiveness of motion tactics in the UK. Gregory et al. [83] constructed a free factor model for the UK market in the contemplation of supplying the evidence regarding the cost-effectiveness of the value strategies and whether this cost-effectiveness can be explained by those factors. An interesting aspect is that all the above-mentioned researchers have used various techniques and time spans to calculate the risk-measurement factors. For instance, Miles and Timmermann [84] started to form the portfolios from May and obtained the market value data at the end of April of each year. Lui et al. [82] formulated the portfolios semi-annually and chose a start date as January and July, as well as used the market value date at the end of June and December. Finally, as there is not any standardised benchmark to be used the following subsection discusses the data and the data sources used in the estimation procedure.

Data and data sources: The data are mainly based on the returns of the 227 screened SRI funds on 70 fund managers on monthly arrangements calculated on the basis of the “adjusted-price” of each fund for the same period. The data also includes dead-funds as disregarding them may overestimate the performance result [85]. Moreover, as a benchmark, the adjusted-prices of FTSE All Share index data are obtained. Based on the adjusted prices, the returns for the

individual SRI funds and are calculated using the following equation:

$$\text{Return: } \frac{P_1 - P_0}{P_0}$$

Subsidiary data encompass the “NAV” and “market capitalization”. In addition, the UK three month Treasury bill rate (R_f), market return (R_m), market premium ($R_m - R_f$), and the risk factors (SMB, HML, and UMD) calculated by Tharayan and Christidis (2013) [86] were collected on a monthly basis as benchmarks to be used in the regressions.

To give a brief presentation on the benchmarks used, the following tables are put forward (Figure 2).

Screening

Collecting the list of “Socially Responsible Investment Funds” was one of the main obstacles as there is not any ready-made filtration function in Datastream. Even though, there is a simple screening function under the “FSRC” ticker in Bloomberg, it was useless to utilize it for the chosen research methods in the study. As a result, the list of SRI funds is taken from a credible website. The total list includes all highly rated 75 companies investing ethically. Hence, it is not necessary to use a screening methodology such as positive, negative or restricted screens in order to filter the ethical ones. Although every company (hereinafter “fund manager”) has several shares traded in the market, in order to make the research more specific and unique, the funds traded exclusively in the UK market with the UK Pound Sterling were chosen. The reason behind eliminating the funds not investing in the UK Pound Sterling is an unexpected change in the exchange rates that can affect the prices of the funds, and consequently their return and performance. Moreover, exactly five fund managers out of the 75 ones were excluded from the list and are not investigated under the current research for the following reasons:

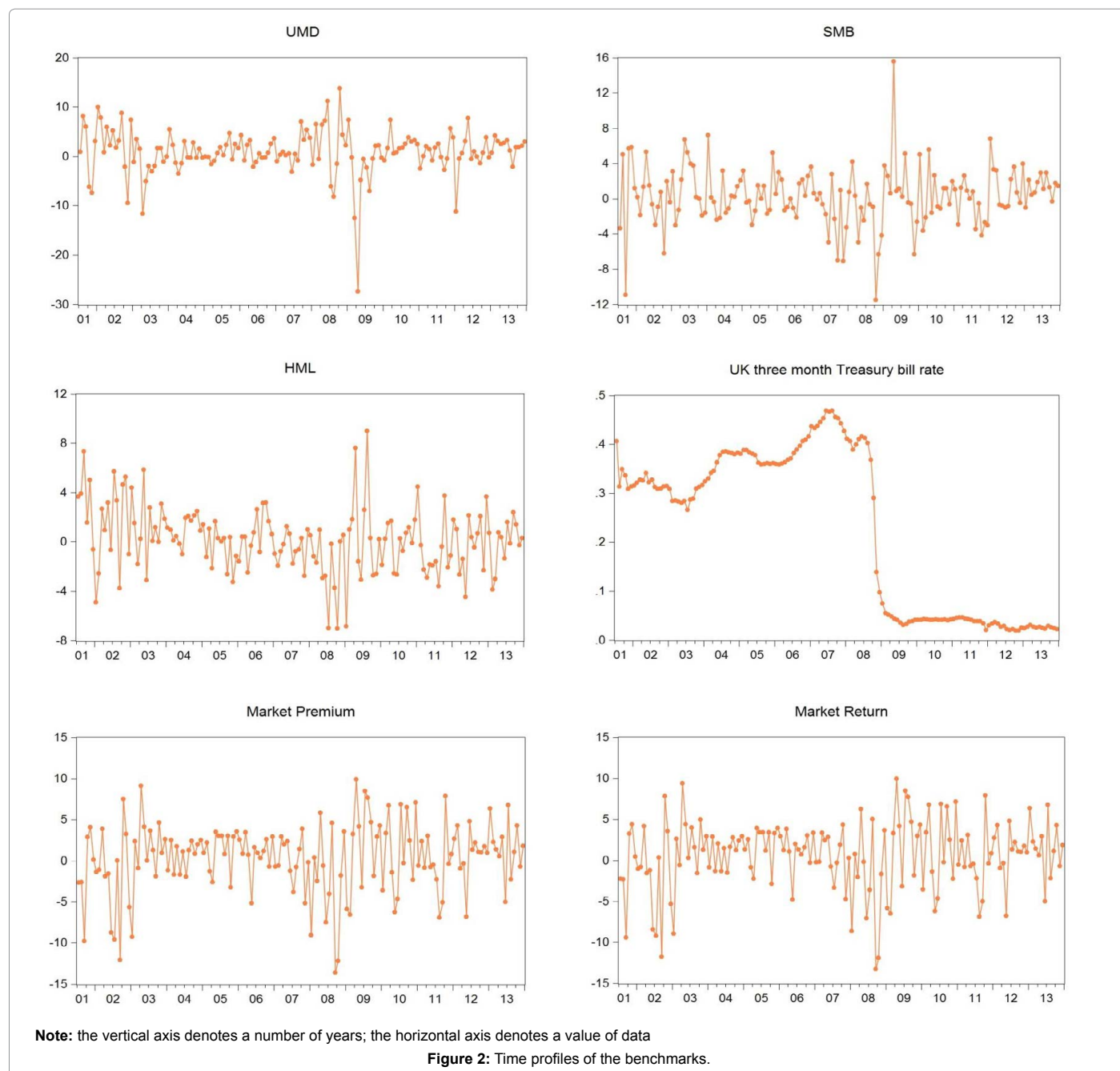
- “Clerical Medical Ethical”–Due to lack of information it was not possible to subgroup it under any category according to the methodology used.
- “HSBC Amanah Global Equity”–the funds of the fund manager is invested by HSBC Luxembourg, which contradicts the main concept of the research.
- “Impax Environmental Markets”–The fund is listed under the category of Ireland in the Datastream and it is not in line with the research method.
- “Ludgate Environmental”–The fund is trading in the “Channel Island Market”, which is listed differently in Datastream.
- “Standard Life UK Ethical”–the funds of the fund manager are listed under the fund manager of “Standard Life Ethical” in Datastream.

Besides the data sources noted, information about each fund is matched with different credible websites to compare the size, launch date, and sector weighting.

Meanwhile, the full list of fund managers and background information is provided in the appendix 3.3.

Hypotheses development

A considerable amount of the literature has been published on the performance of socially responsible funds in the UK. Researchers mostly compare the performance of SRI and non-SRI funds, with some referring specifically to the evaluation of the SRI funds sorted by fund size, age, investing area, fund and fund type. Thereby, different



estimation models such as CAPM, the Jensen [66] alpha, the Fama and French [56] three factors, the Carhart [57] four factors, and Treynor and Mazuy [79] market-timing models were employed by the authors. However, there are several points that are unclear. First, whether the performance of portfolios constructed with SRI funds depend on their sector weighting, fund size, or value (book-to-market ratio). Second, whether the performance of the individual funds discloses significant results against the benchmarks. To this end, based on the specific questions, respective hypotheses are assumed. Each hypothesis will be tested for the consistency of the econometric assumptions and regressed by using different estimation models.

Hypothesis 1. There is a significant (over or under) performance of the SRI funds.

The hypothesis is also conducted by Mallin et al. [59] for the period 1986-1993. Mallin et al. studied the performance of the SRI funds against the non-SRI funds and the market. Alongside the hypothesis, the results obtained from four different models will be interpreted and compared with the aim of finding the risk factor exposing more pressure on the performance. In order to test the hypothesis, the above mentioned multi-factor models will be regressed using 227 individual SRI funds.

The estimation will be performed in Eviews using fund returns as the dependent and the relevant benchmarks as the independent variables. The conclusion will be made based on the estimated risk-adjusted return (single-factor and multi-factor alphas), respective p-value, R^2 and similar coefficients for the remaining multi-factor model variables.

Hypothesis 2. There is a significant (over or under) performance of the SRI funds matched by fund size.

The hypothesis is the same as of Mallin et al. [59], who has also investigated the performance of the SRI funds matched by fund size comparing it non-SRI funds. However, this analysis is conducted merely on SRI funds. Moreover, Gregory et al. [3] have also matched SRI and non-SRI funds by fund size. Starks [50] argues that the investors mostly refer to the investment funds with small fund size. Hence, the direct effect of fund size has not been clearly investigated. For that reason, in order to test this hypothesis, the fund size of each 70 companies is obtained and sorted in a descending order. After calculating a median, the values above the median is considered “large-fund size fund managers” and the values below the median is considered as a “small-fund size fund managers”. Furthermore, in order to construct the “large” and “small” portfolios containing the SRI funds, returns of all funds within these categories are averaged on a monthly basis.

The estimation will be carried out in Eviews using the portfolio returns as a dependent variable and the relevant benchmarks as the independent variables. A decision will be drawn on the estimated risk-adjusted return (single-factor and multi-factor alphas), respective p-value, R^2 and the relevant coefficients for the remaining multi-factor model variables. It is worth mentioning that, some researchers still argue that the size effect has an equivocal upshot on the performance of the socially responsible funds.

Hypothesis 3. There is significant (over or under) performance of the SRI funds matched by book-to-market ratio.

There are several calculation hierarchies to be followed in order to test this hypothesis. First, the SRI funds are categorized by the “value” and “growth” funds. Unfortunately, due to a lack of information regarding about the book-to-market ratio per fund from Datastream, the NAV and fund size per fund are obtained in order to calculate the book-to-market ratios based on these two variables. Further, as it is stated in the previous hypothesis, the median of all values is estimated for the categorization. The values of the book-to-market ratio above the median are assumed to be “value” and below the median are regarded as “growth” funds. Finally, average of returns of each fund is found on monthly basis.

The estimation procedure and techniques of the regression is similar to previous hypothesis.

Hypothesis 4. There is significant (over or under) performance of the SRI funds matched by sector weighting.

The categorization of the funds is based on the value of investment percentage in different sectors. A sector weighting is categorized into two basic classification types, namely into the financial portfolio and industrial portfolio. Furthermore, returns of the funds in each group are averaged on a monthly basis. The estimation of regression is conducted as the evaluation of the previous hypotheses.

Hypothesis 5. The SRI funds have significant selective and market timing ability.

This hypothesis is analysed by using a market-timing model of Treynor and Mazuy [79]. The regression will be conducted by using return of every SRI fund on a monthly basis, which will be followed by the conclusion based on a p-value of the relevant coefficients.

Econometric assumptions

The data used in this analysis is time-series. Time-series data are

simply a series of numbers obtained in ordered intervals over a period of time. As the time-series data is random and volatile across time, it is difficult to analyse them as well as to conduct the proper statistical tests. However, before concluding any result about the time-series data, the relevant assumptions should be considered and statistically tested. If the assumptions do not hold or are difficult to test, appropriate comments will be made.

The below mentioned assumptions for time-series regressions are based on Gauss-Markov Theorem.

Linearity in parameters of Alpha and Beta: By linearity it is assumed that the coefficient of independent variable and the coefficients of the dependent variables should be in a linear relationship in the regressions used. In more detail, the coefficients should be linear:

$$Y_i = \beta_0 + \beta_{1i}X_{1i} + \beta_{2i}X_{2i} + \dots + \beta_{ki}X_{ki} + \varepsilon_i$$

On the other hand, it is not so compulsory that the variables of the model should be linear as well, because OLS estimation can be employed with equations, which are not linear in variables. As an example, the “Market Timing” model of Treynor and Mazuy is not linear [79]. The problem with the linearity assumption is a non-linearity, incorrect estimates, and erroneous determinants. Moreover, the rest of the financial models to be used in the current analysis are all based on the traditional CAPM. As discussed above, the research on CAPM shows that there is a linear relationship between beta and past returns of funds.

Besides, Eviews also estimates the model as if it is linear, even if it is not the case in real life. There are two types of betas in finance. One is the population, the real one, notated as “ β ” and the other is for sample notated as “ $\hat{\beta}$ ” and order to for the assumption to be unbiased, the following equation should be met $E(\hat{\beta}) = \beta$. Moreover, the betas calculated in this research will be based on past returns, and therefore it can be concluded that the relationship will be linear as of the assumption’s requirement. Hence, it can be concluded that the first assumption is condoned.

Multicollinearity or Perfect Collinearity: The assumption states that there are minimum two independent variables and the movement of one independent variable is coordinated precisely with the other independent variable and this case, the OLS will be ineffective of differentiating one variable from the other one. The perfect collinearity can also happen when the sum of two independent variables makes the third independent variable. Moreover, the multicollinearity takes place when the variance of one of explanatory variables is zero. In this case, the explanatory variable will be perfectly collinear with the constant. In order to solve the perfect collinearity problem one of the variables should be omitted from the model and it is considered as an excess variable. It would be irrational to test this assumption, as the Eviews or any other statistical software package is unable to estimate the model unless there is a variable, which causes collinearity. In the current research, there was a situation when a dummy variable was added to the model and Eviews did not estimate the equation giving the following error message: “Near singular matrix error. Regressors may be perfectly collinear.”

In conclusion, as the statistical test do not estimate the equation because of the above mentioned reasons for collinearity, it can be assumed that these assumptions is condoned, too.

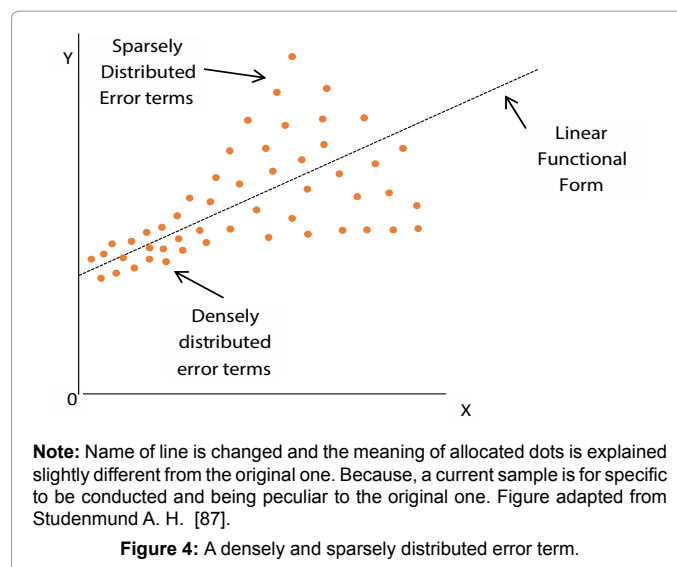
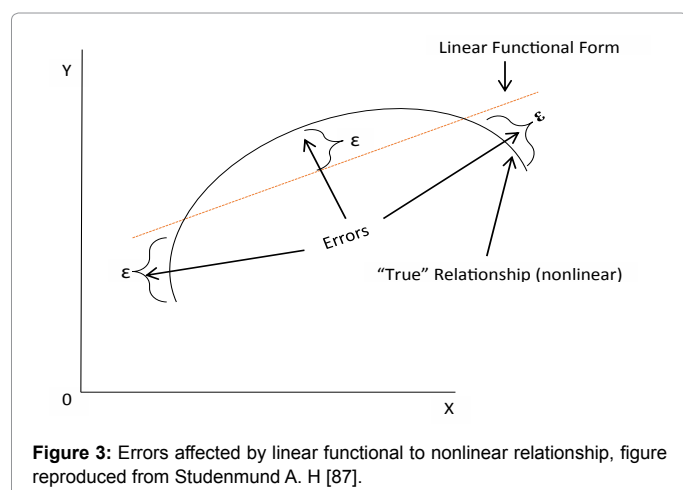
A zero population mean of Error term: Before interpreting this assumption, some basic information about the “Error term” should be explained. It is a rule of thumb that there is always a variation in

a dependent variable that is produced by the independent variables. In addition, there is another kind of source that may cause the independent variable to be varied over the time. In the meantime, there is always another problem with omitted variables that cause a variation of the independent variable. It does not mean that even after adding the maximum number of variables, the error in variation of the independent variable will disappear. Because there will still be a variation caused by different sources and this cannot be explained by the model. This kind of variation comes from measurement error, inappropriate functional form, neglected influences, and near random and changeable events. As it is impossible to get rid of these kinds of issues, econometricians added a new term to the regression equation and named it “stochastic error term” or “idiosyncratic term” and notated as “ ϵ ”. A stochastic error term introduces all the unexplained variations of the independent variable. Now, the assumption states that the mean of error term or the expectation of it should be zero over any given period of time. As the value of the error term of each observation is determined purely by chance, it is hardly possible that the mean of error term would be zero. The statistical notations is $E(\epsilon)=0$. However, it is more precise to note that the mean of error term is close to zero. Because, it is impossible to get the mean zero error term and this is explained above (Figure 3).

However, it is still possible to minimize it as much as possible. In order to hold this assumption, the error term should be self-determining of the observations of independent variables. It does not put any constraints on the correlation explanatory variables in the model. The assumption only postulates that the mean value of the error term should be distinct from the explanatory variables. The current assumption is almost the same with the normality assumption to be discussed further, so the test will be conducted at the same time for both the assumptions.

A constant variance of the error terms: The assumption states that the variance of observations of the error term should be constant over the time. If the variance of observations of the error term increase or decrease over the time, it strictly violates the assumption. To be detailed, while considering that all the observations of error terms are distributed normally, when in reality they are dispersed chaotically, then it would be hard to judge the independent variable for any changes occurring. The violation of the assumption is called “heteroscedasticity” (Figure 4).

The above Figure is just one example of error terms distribution.



In general, if the error terms are not distributed normally, it means that the estimates of standard errors are wrong. It is important to have precisely calculated standard errors as they are used in the model estimation showing whether the variables of model are significant or not. It is crucial to mention about the standard error because in next part of the research, the result of empirically estimated models will be presented and the standard errors will assist to conclude whether the funds perform significantly or perform neutral.

The hypothesis for the specific test is as follows:

$$H_0: \text{VAR}(\epsilon_i) = \sigma^2 \text{ (Homoskedasticity)}$$

$$H_1: \text{VAR}(\epsilon_i) \neq \sigma^2 \text{ (Heteroskedasticity)}$$

There are several tests conducted to check for the above mentioned hypothesis. The widely accepted once are “The Breusch-Pagan Test”, “The Godfield-Quandt Test”, and “The White Test”. The stated tests are so similar that it is not so important to differentiate them, for that reason “The Breusch-Pagan Test” is used for the current research. The results will be interpreted upon the P-value.

The correlation of the Error terms: The assumption specifies that the observation of the error term should not be correlated between each other. If the correlation exists, then the OLS cannot estimate the model exactly. It is worth to mention that this assumption is critically important in current research as the data obtained is time-series and the values are changing over the time period. For time series data, the observations of “ ϵ_{t+1} ” do not have to correlate with the observations of “ ϵ_t ”. If the case is not placed, then it is said that the observations of the error term is correlated and it is named as “serial correlation” or “autocorrelation”. Autocorrelation also causes the standard errors to be underestimated and in so doing, increases the t-statistic. Consequently, as the value of t-statistics increases, the value of R^2 is overstressing.

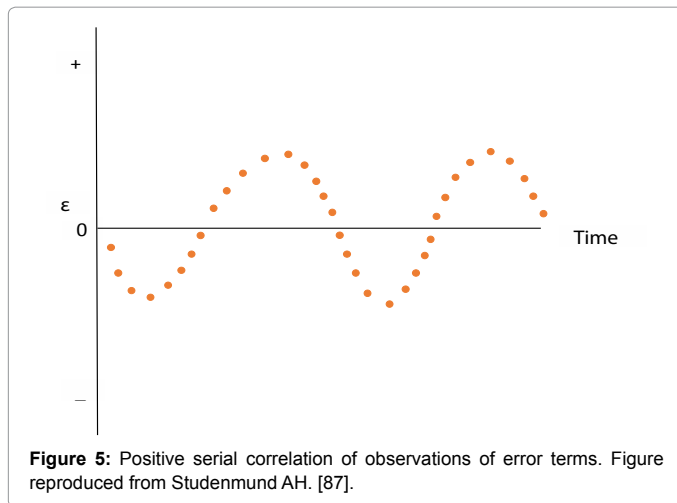
A statistical notation: $\text{COV}(\epsilon_i, \epsilon_j) = 0 \forall i \text{ and } j. i \neq j$ (Figure 5).

The following hypothesis assumed in order to test the autocorrelation effect of error terms:

$$H_0 = \text{No autocorrelation}$$

$$H_1 = \text{Serial correlation}$$

If the null the hypothesis is rejected upon the test result, it



considered that there is an autocorrelation. As of the tests for “heteroskedasticity” there are several methods to be used in order to test the autocorrelation. For instance, “Durbin-Watson” test, Durbin-Watson (H) test, Q Statistics of autocorrelation test and “Breusch-Godfrey” test. The problem with Durbin-Watson and Durbin-Watson (H) test is that they both test for the first order serial correlation in the residual series and formulation of hypothesis is hereunder:

$$\varepsilon_t = \rho \varepsilon_{t-1} + v_t$$

$+\rho$	$-\rho$
H0: $\rho=0$ / H1: $\rho>0$	H0: $\rho=0$ / H1: $\rho<0$

On the other hand, the Breusch-Godfrey test is more general and can be used for general higher order autocorrelation. The correspondent hypothesis is:

$\varepsilon_t = \phi_1 \varepsilon_{t-1} + \phi_2 \varepsilon_{t-2} + \dots + \phi_p \varepsilon_{t-p} + v_t$ (Durbin-Watson only tests the significance of ϕ_1).

Hence, in order to perform for the Breusch-Godfrey test, the error terms should be obtained, and on regressed on the lagged variables. Then, a computed TR^2 should be compared against $\chi^2_{(p)}$. So, all the regressions will be tested for autocorrelation referring to P-value and comparing it against the significance level of 5% and if the null hypothesis is rejected, it will be corrected by using the coefficient covariance matrix option named Newey West heteroskedasticity and autocorrelation (HAC) in the Eviews statistical software package.

A normal distribution of the error terms: Although, it was mentioned before about a zero mean distribution (assumption 3), the constant variance of the observation of error terms (assumption 4) and about the independently drawn observations of error terms (assumption 5), the shape of distribution was not considered. A normal distribution is symmetrical and follows a bell-shaped curve with parameters such as mean “ μ ” and the variance “ σ^2 ”. Normal distribution statistically takes the summary form as $N(\mu, \sigma^2)$. The way of testing this assumption is to use the Jarque-Bera test for normality.

Again, the p-value will be used to test and compared against the 5% significance level. If the null hypothesis is rejected, it means that errors are not normally distributed and skewed to right or to left upon the values of skewness. If there is an issue with normality, one way to correct is to use logarithmic function of the explanatory variables.

Using a logarithmic function would press the tail of the curve making it more similar to the bell-shaped one. Nevertheless, the logarithmic function will not be used in the regression under this research, because all the regressions have had been tested and formulated by the authors such as Fama and French, Jensen et al. and Carhart. For that reason, not any further tests will be conducted but significant comments will be provided.

Estimation models

Jensen’s alpha:

$$\text{Model: } r_{pt} - r_{ft} = \alpha_j + \beta_{MKT} (r_{mt} - r_{ft}) + \varepsilon_t \quad (1)$$

$$\text{Hence, } \alpha_j = r_{pt} - r_{ft} - \beta_{MKT} (r_{mt} - r_{ft}) + \varepsilon_t$$

Where,

α_j Jensen’s alpha (unconditional risk-adjusted return).

r_{pt} is a–return of specific portfolio or fund in a period t.

r_{mt} is a–market portfolio return in a period t.

r_{ft} is a–risk free rate in a period t.

β_{MKT} is a–estimated and diversifiable systematic risk of the investment fund.

$$\text{The expression for the systematic risk is: } \beta = \frac{\text{Cov}(r_p, r_m)}{\text{Var}(r_m)} = \rho_{p,m} (\sigma_p, \sigma_m)$$

ε_t –error term in period t.

The technique was used by Grinblat and Titman [70]. They have used eight benchmarks to be tested. However, in this research only one benchmark will be used. The whole equation implies that the expected return of any fund is the performance measurement of the fund summed by systematic risk multiplied to market return. In other words, the alpha is going to be estimated in Eviews by using the regression analysis. In order to check for correctness of the evaluation of the Jensen’s alpha, the calculations are made in excel by using the above-discussed equation. However, since the Eviews software enables the user to perform the multiple econometric tests simultaneously as well as provides the user with the t-statistics and p-values per the variable, it was decided to proceed with Eviews only.

The Jensen’s alpha can be both positive and negative. The main aspect in the interpretation process of the Jensen’s alpha is paying attention to the correspondent p-values. Having a positive alpha being significant according to the p-value implies that the funds notably outperform the market, namely the selected proxy or benchmark. Alternatively, if the alpha’s values are negative and the p-values are different from zero, then the fund underperforms the market. Finally, if the Jensen’s alpha is insignificant, unlike the sign of the value, then the investment fund has performed neutrally against the market.

Fama and French’s three factor model:

$$r_{pt} - r_{ft} = \alpha_3 + \beta_{MKT} (r_{mt} - r_{ft}) + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \varepsilon_t \quad (2)$$

Where,

α_3 – is the free factor unconditional risk-adjusted return.

$\beta_{MKT}, \beta_{SMB}, \beta_{HML}$ – are the slope coefficients or factor loadings.

SMB_t –is small minus big identifying whether smaller firms are inclined to outperform the larger firms is called as a “small firm effect”. Moreover,

HML_t – is high minus low. It quantifies the spread between the

“value stocks” and “growth stocks”. It is assumed that the “value stocks” outperform the “growth stocks”.

Carhart's four factor model

$$rp_t - rf_t = \alpha + \beta_{MKT}(r_{mt} - r_{ft}) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{UMD}UMD_t + \varepsilon_t \quad (3)$$

β_{MKT} , β_{SMB} , β_{HML} , β_{UMD} —are the slope coefficients or factor loadings.

SMB_t , HML_t —are the factors from the Fama and French free factor model and

UMD_t —is a supplement to the Fama and French three factor model and known as a momentum factor.

Treynor and Mazuy's market-timing model

$$\text{Model: } r_{pt} - r_{ft} = \alpha_{TM} + \beta_{MKT}(r_{mt} - r_{ft}) + (r_{mt} - r_{ft})^2 \gamma + \varepsilon_t \quad (4)$$

α_{TM} —is the selection ability of the fund. If “ α_{TM} ” shows up with a significant value, it means the current fund has a selective ability.

γ —is the timing ability of the fund. If “ γ ” shows up with a significant value, it means the current fund has market timing ability.

The model implies that if the SRI funds have an ability to time the market, then the portfolio managers or investors should control and adjust the beta of the portfolio at the same rate with the market itself. In other words, the investors should increase the beta when the market booms and decrease it when the market is under the recession or simply decreases in order to respectively magnify the return and smooth the losses.

It is a crucial part of measuring the performance of the SRI funds as every investor would like to be able to predict the times when the market is weak, semi-strong or strong and consequently decide when to buy and when to sell.

Conclusion

The current chapter discussed hypotheses assumed to in the testing procedure. First, the overall performances of the individual SRI funds are tested against their benchmarks, which are followed with the discussion of the assumptions testing the performance exposure on fund size, sector weighting and the managers' attitude on value premium. Finally, all individual SRI funds are examined according their market timing ability.

For that reason, the following chapter is going to introduce with the recent results and evidences on the performance of SRI funds in the UK market.

Empirical Results

Introduction

The chapter provides the results of empirically estimated models, discusses econometric assumptions, and compares and contrasts the results with the findings of other researchers studying the UK and different markets. Individual funds and portfolios matched by size, book-to-market ratio and their sector weighting of the investment will be tested by using single and multi-factor models. In this section, five hypotheses will be tested by using Jensen's alpha, Fama and French's [56] three factor model, Carhart's [57] four factor model and Treynor and Mazuy's [79] market timing model. The first four assumptions will be tested and the results will be concluded based on three different measurement models. The last assumption is separate from the previous ones and will be tested by using the “Market Timing” model only. Since

the full list of tables is considerably large, only the short-summary and the funds performing significantly is presented in a separate table and the full list of the results can be found in the appendix. However, the interpretations and comments are based on the full list of results. Finally, the conclusion determines the all significant findings and recent evidences.

Performance of the individual SRI funds (Hypothesis 1)

Results of the Jensen's alpha model: The explanation of the performance of the individual SRI funds starts with the interpretation of the Jensen's alpha output from the full list of results. The complete results of the three factors model are drawn in appendix 4.2.1. According to the full result, the sign of alpha enables the determination of a direction of the performance. Based on a sign of alpha, 84.14% (or 191 out of 227) SRI funds show outperformance to the market. Even though, the majority of the SRI funds tend to outperform the market, only 35.60% of outperforming funds show significant results. The results are opposite to Gregory et al. [3], who found that the majority of SRI funds have negative Jensen's alpha. However, the performance measures are not statistically significant, with the exception of the single SRI fund. Moreover, of the remaining 36 SRI funds demonstrating underperformance, only two SRI funds are statistically significant at 1% level.

Therefore, it could be concluded that the performance of the majority of SRI funds in comparison to the UK market is predominantly neutral, yet having 68 significantly outperforming SRI funds. There are some studies showing that there is not any evidence regarding the outperformance of the SRI funds. Meanwhile, the result of the research is in line with Luther et al. [5], who have found no SRI fund performing significantly, on one hand. On the other hand, Luther and Matatko [3], found weak evidence on the performance of the SRI funds. They found that 8 out of 9 Jensen's alphas are negative, but due, to the volatility of the funds, the result is not statistically significant. The comparison is made to those researchers, who employed a FTSE All Share index as a benchmark while using unconditional Jensen's alpha in their studies. Meanwhile, Luther and Matatko [3] suggest that no matter what data are used as benchmarks, the performance of the SRI funds is always indifferent from the market. Moreover, Robson [88] has reached the same conclusion while studying the Australian market. It is also found that the values of the unconditional risk adjustment return (alpha) are mostly biased upwards. Thus, a minimum value of alpha being negative indicates that the performance of the SRI funds are more skewed towards the ones with small market capitalization. Hence, as there is a small firm effect on the performance of the SRI funds, the Jensen's alpha may give a biased result regarding the direction (over or under) of the performance.

According to the sample, the risk factor loading “market beta” of the 84 SRI funds is negative indicating that the movement of those funds is related to the market inversely. Among the 84 SRI funds only 32 are statistically significant at 5% (6 funds) and 10% (26 funds) level. The result is extremely doubtful, however possible. As the result is unlikely to happen, the characteristics of the fund managers holding those funds are strictly examined and no evidence found about the individuality of the funds. Nevertheless, the result explicates the idea that some of the SRI funds may behave in an appropriate fashion such as gold stocks in the market. In other words, the performance of SRI increases when the market decreases and vice versa. Furthermore, the market betas of the 137 SRI funds range between “one” and “zero”, and hence indicate that the volatility of those funds is lower than the market. The results are important and in line with the recommendations of Luther et al. 1992

[5]. Furthermore, Bauer et al. [6] suggest that SRI funds tend to be less volatile than conventional funds. In the meantime, the beta values of the 6 SRI funds are very close to “zero”, revealing that the volatility of those funds is constant, regardless of which way the market moves. The statistical significance level of the market betas is proportional to 1% (two betas), 5% (19 betas) and 10% (13 funds) for positive betas. The estimation result of the significantly performing SRI funds are presented in ‘Table 2’ and followed by the bar chart demonstrating the volatility of the Jensen’s alphas and market risk factors. The maximum value of the R² statistic measure is 64.34%, which implies that Jensen’s alpha model is not that of a good measurement tool to be used for the estimation of the SRI funds.

The below table is based on the Jensen’s alpha model results merely denoting statistically significant performance at 1%, 5% and 10% levels (Table 2).

Notes: The table contains only significantly performing SRI funds. SRI funds’ short names, id numbers for Eviews, coefficients and R² statistics are provided. The estimation is conducted by using equation (1):

$$r_{pt} - r_{ft} = \alpha_j + \beta_{MKT} (r_{mt} - r_{ft}) + \varepsilon_t$$

The relevant tests regarding the assumptions are made. The tests are conducted by using Breusch-Pagan, Breusch-Godfrey (LM) and Jarque-Bera normality tests. Among 227 funds, 15 suffer from heteroscedasticity, 9 funds from autocorrelation and 121 ones from non-normality problem. The heteroscedasticity and autocorrelation problems are erased by using “White [89] heteroscedasticity-robust standard errors and Newey and West [90] heteroscedasticity and

autocorrelation consistent (HAC) tests. The problem with normality cannot be erased, so it is considered as an integral part of the results. There are 70 significantly performing SRI funds with the relevant 32 significant beta values.

The significance is decided upon the p-value of the coefficients.

*Significance at 10% level.

**Significance at 5% level.

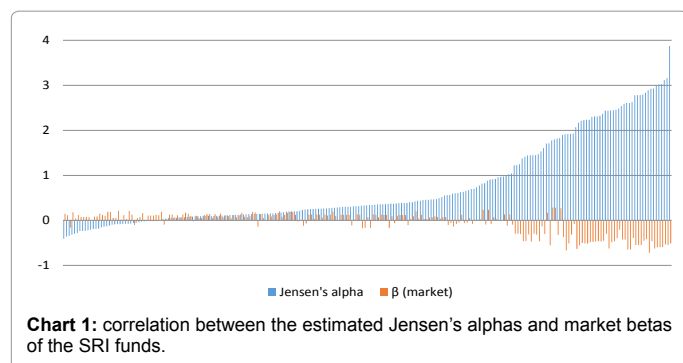
***Significance at 1% level.

Further, in order to provide a clear view of the correlation between the estimated Jensen’s alphas and market betas of the SRI funds, the below bar ‘Chart 1’ is provided. The chart clearly identifies that there is negative correlation between the Jensen’s alpha and the market beta. Hence, as the values of the Jensen’s alpha become positive and move in one direction, the values of the market beta also grow but move in an opposite direction. This implies that the outperforming SRI funds have lower volatility and vice-versa. The conclusion is in line with Oikonomou et al. [11].

The results of the Fama and French 3 factor model: This model is considered as a multi-factor model whose use has been suggested by several researchers as well as by Chen et al. [91] and Bauer et al. [6]. A Jensen’s performance measurement can generate a biased output regarding the evaluation of the performance of SRI funds. The problem arises when there is true performance impact to a “small firm” effect. There are some alternative methods that can be used in order to deal with that kind of problem. The solution to the problem under this

Name	Eviews ID	α_j	$R_{mt} - R_{ft}$	R ²
AI. TSF. UK. G. 4 ACC	8.4	2.7933*** [0.0049]	-0.4515* [0.0851]	21.52%
AI. T. UK. E. 4 ACC	9.4	2.8332*** [0.0052]	-0.4153 [0.1173]	25.00%
CIS. SLT. A INC	16.1	2.9976*** [0.0067]	-0.5995* [0.0503]	0.81%
CIS. SLT. C ACC	16.4	3.0221*** [0.0063]	-0.5976* [0.0503]	36.18%
CIS. SLT. D ACC	16.6	3.0291*** [0.0063]	-0.5922* [0.0521]	35.73%
FL SIL.	31.1	-0.2079*** [0.0000]	0.0076** [0.0177]	2.65%
J. RI. I ACC	48.2	2.5901*** [0.0027]	-0.4277* [0.0582]	26.75%
J. RI. I INC	48.3	2.4425*** [0.0071]	-0.4851* [0.0511]	28.11%
K. E. E. B INC	51.3	2.9246*** [0.0032]	-0.4612* [0.0539]	32.29%
K. E. E. D ACC	51.4	3.1177*** [0.0051]	-0.5333* [0.0729]	31.42%
R. E. B. INST INC	55.7	-0.0216*** [0.0000]	0.0008 [0.5002]	2.43%
S. GCC. I ACC	57.3	2.4370*** [0.0093]	-0.6260** [0.0291]	25.05%
SW. E. G ACC	60.3	2.5386*** [0.0061]	-0.4263* [0.0630]	30.42%
SL. E. UK. L. 1 Platform	64.3	3.1574*** [0.0022]	-0.5448* [0.0512]	26.19%
F&C SI. 2 ACC	27.3	2.4474*** [0.0048]	-0.4664** [0.0406]	32.86%
A. R. UK. E. I ACC	2.3	2.1692** [0.0245]	-0.5569** [0.0410]	32.74%
A. R. UK. E. I INC	2.4	1.9191** [0.0268]	-0.5115** [0.0380]	33.55%

Table 2: Jensen's alpha model.



research is to use the Fama and French's three factor model. Another reason is that of style investment strategy used in data collection. The complete results of the three factors model are drawn.

According to the full list of the output, on one hand, there is a 10.47% slight decrease in number of the positively performing SRI funds. On the other hand, a quantity of the negative alphas rose by 55.56%. However, as a majority of the coefficients' sign is positive, the previous conclusion about the performance is not changed in favour of underperformance being in place. Therefore, it indicates that SRI funds marginally outperform the market. As of Jensen's alpha, the results of the three factor model are not also in line with Gregory et al. [3], who suggested that SRI funds have a tendency to underperform both non-SRI funds and the market. Even though, results still support the outperformance tendency of the SRI funds, the numbers of the significantly outperforming funds decreased about eight times in comparison to the results of the Jensen's alpha. However, the conclusion about the neutral performance of the SRI funds remains. There is not any significant difference regarding the results of the market betas between the Jensen's alpha and three factor models. Hence, there are 151 SRI funds with betas value ranging between "one" and "zero", indicating that the volatility of the major SRI funds is low relative to the market. However, the last six market betas of the SRI funds range from 0.9609 to 0.9960, hence indicating that the SRI funds are able to move with the market at the same rate.

Now, it draws attention to check for the small firm and value-orientation effect of the SRI funds. According to the output of the Jensen's alpha, the majority of SRI funds are affected by small firm effect. In order to achieve more stabilized result, the following SMB factor is estimated and the signs of the coefficients are interpreted.

The SMB factor is proportionated with 190 positive and 37 negative signs of the coefficients. The positive SMB factors hold a total of 134 statistically significant coefficients. The significance of the positive SMB factors is proportioned respectively with 103 factors at 1%, 18 factors at 5%, and 13 factors at 10% significance level. Moreover, only one negatively signed SMB coefficient is significant at 10% level. Consequently, after employing the Fama and French three factor model, the values of alphas decreased, thereby, the result lends credence to the output of Jensen's alpha concerning the upward biased alphas. Now, the result is in line with Gregory et al. [3] regarding the small-firm effect. Gregory et al. have also used the Fama and French's three factor model in their research and concluded that a small firm effect plays an important role in explaining time-series returns of the UK unit trusts. The fact accords also with the results of Grinblatt and Titman in their US study [70]. However, the result contradicts the conclusion by Belkaoui and Karpik [12] that the performance is mostly impacted by large firm effect. The suggestion also contradicts Luther et al. [5], who

stated that it is difficult to unravel the SRI funds from small firm effect.

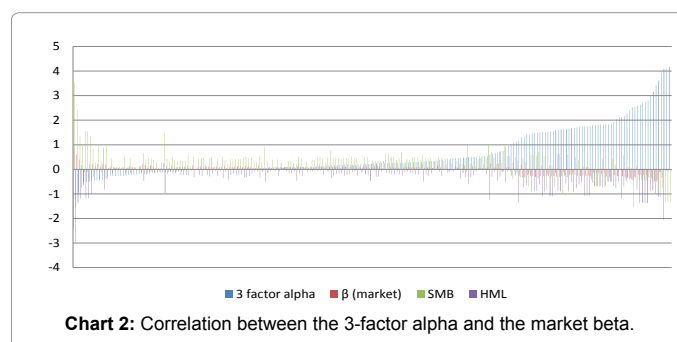
One note-worthy result is that concerns the HML factors being negative in the majority of the 207 SRI funds. The significance of the negative HML factors is respectively proportionated to 6 factors at 1%, 33 factors at 5% and 29 factors at 10% significance level, and no significance level for the positively signed 20 HML factors. Hence, it could be concluded that the growth stocks have outperformed the value stocks, therefore indicating that the managers of the SRI funds tend to be growth-oriented. By investigating the characteristics of funds showing growth-orientation, it is suggested that those SRI funds have high expenses, and smaller net asset values (NAV). The result is in line with Guerard [92] and Bauer et al. [6], who stated that the SRI fund portfolios are more growth-oriented and less value-oriented. Moreover, it is worth drawing attention to the fact that the value of R^2 statistic rose to 76%, hence suggesting that the three factor model is superior to the Jensen's single factor model.

The below Table 3 is based on the three factor model results merely denoting statistically significant performance at 1%, 5% and 10% levels.

Further, in order to provide a clear view of the correlation among the estimated 3-factor alpha, market beta, SMB and HML factors affecting the SRI funds, the below bar 'Chart 2' is provided. The chart clearly identifies that there is negative correlation between the 3-factor alpha and the market beta. The negative correlation effect between 3-factor alpha and market beta is the same as that of Jensen's measurement result. Hence, as the value of the 3-factor alphas becomes positive and moves in one direction, the value of the market beta moves in the opposite direction. This confirms the implication made earlier that as the SRI funds tend to outperform the market, the volatility becomes lower than the market, which is in place. The interesting finding is that there is a negative correlation between 3-factor alpha and the SMB. In other words, the SRI funds showing underperformance are associated with "small-firm" and the SRI funds outperforming the market are associated with "large-firm" effect. Moreover, the SRI funds performing positively are linked with the negative HML factors. Hence, the SRI funds outperforming the market are mainly growth-oriented and the SRI funds underperforming the market are value-oriented. According to the results, it can be concluded that the outperforming SRI funds are mostly large firms with growth-orientation and the underperforming SRI funds are mostly small firms with value-orientation (Table 3).

Notes: The table contains only significantly performing SRI funds. SRI funds' short names, id numbers used in

estimation, coefficients and R^2 (coefficient of determination) are provided. The estimation is conducted by using equation (2): $r_{pt} = \alpha_3 + \beta_{MKT}(r_{mt} - r_{ft}) + \beta_{smb}SMB_t + \beta_{hml}HML_t + \varepsilon_t$



Name	Eviews ID	α_3	$R_{mt} - R_{ft}$	SMB	HML	R ²
FL SIL.	31.1	-0.2121*** [0.0000]	0.0084* [0.0561]	0.0124*** [0.0073]	-0.0080 [0.4336]	6.93%
R. E. B. INST INC NAV	55.8	-0.0224*** [0.0003]	0.0003 [0.8137]	0.0012 [0.6278]	0.0018 [0.3964]	10.17%
FS. AP. S. B GBP ACC -	30.2	0.9536** [0.0276]	0.0830 [0.5088]	0.5341*** [0.0025]	0.0788 [0.8214]	16.49%
FS. AP. S. A GBP ACC -	30.1	0.9033** [0.0365]	0.0827 [0.5104]	0.5337*** [0.0025]	0.0776 [0.8241]	16.46%
CIS. SDT. C INC	15.5	1.8363* [0.0544]	-0.2951 [0.2124]	-0.4600 [0.3985]	-0.5200 [0.0101]	50.31%
CIS. SDT. D INC	15.7	1.8346* [0.0548]	-0.2945 [0.2134]	-0.4578 [0.3998]	-0.5211 [0.0100]	50.34%
AI. TSF. CB. 4 INC	4.4	1.5215* [0.0554]	-0.2762 [0.2778]	-0.8319* [0.0603]	-0.1958 [0.1336]	20.92%
CIS. SDT. B INC	15.3	1.7700* [0.0705]	-0.2873 [0.2412]	-0.4129 [0.4626]	-0.5453*** [0.0096]	50.15%
K. E. E. D ACC	51.4	2.8052* [0.0746]	-0.3339 [0.2323]	-0.1173 [0.8742]	-0.8778** [0.0308]	49.90%
CIS. SWT. A INC	17.1	0.7456* [0.0888]	-0.0622 [0.6218]	0.2738* [0.0956]	-0.1004 [0.6642]	8.44%
AI. TSF. CB. 3 INC	4.3	-0.2622* [0.0946]	0.0581 [0.1447]	0.1110** [0.0218]	0.0028 [0.9650]	6.38%
AI. TSF. CB. 1 INC	4.1	-0.2607* [0.0962]	0.0564 [0.1558]	0.1025** [0.0338]	0.0081 [0.8992]	5.81%
R. E. B. INC NAV	55.4	-0.3062* [0.0968]	-0.0477 [0.3253]	-0.0461 [0.4322]	-0.0338 [0.6829]	1.29%
AI. TSF. CB. 2 INC	4.2	-0.2600* [0.0986]	0.0557 [0.1629]	0.1022** [0.0351]	0.0092 [0.8867]	5.72%

Table 3: 3-Factor Fama and French Model.

The relevant tests regarding the assumptions are made. The tests are conducted using Breusch -Pagan,

Breusch-Godfrey (LM) and Jarque-bera for normality tests. Among 227 funds, 33 suffer from heteroscedasticity, 30 funds from autocorrelation and 106 from abnormality problem. The heteroscedasticity and autocorrelation problems are erased by using “White for heteroscedasticity-robust standard errors and Newey and West for heteroscedasticity and autocorrelationconsistent (HAC) tests. The problem with normality cannot be erased, so it is considered as an integral part of the results. There are 15 significantly performing SRI funds with the relevant 1 Beta, 8 SMB and 2 HML significant values. The significance is decided upon the p-value of the coefficients.

*Significance at 10% level.

**Significance at 5% level.

***Significance at 1% level (Chart 2).

Carhart 4 factor model: This model helps to explain the cross-sectional momentum effect in the performance of SRI funds. For that reason, in order to obtain more consistent results and provide a rational conclusion, the full results of the four factor model is obtained.

The full result shows that there is a 12.87% momentous decrease in a number of the positively performing SRI funds. An outcome does not change the previously made conclusion as the majority of the funds outperform the market. Although, the numbers of significantly outperforming funds are increased by 4 times in comparison to the three factor model, the majority of the SRI funds are insignificant. Meanwhile, 78 out of the 227 SRI funds demonstrate underperformance, yet only three of the negatively performing SRI funds are statistically significant at 1% (one fund), 5% (one fund) and 10% (one fund). Hence, 187 out of 227 SRI funds are not significant. This result gives an advantage that the conclusion about the neutral performance of the SRI funds

could remain. The decision is considered to be the final one as all of the models produces the same result. The finding is interesting and contradicts the decision made by Renneboog et al. [16]. They suggested that 4-factor alphas are significantly negative for the UK market.

There is not a significant break regarding the results of the market beta between three and four factor models. There are 148 positive beta values ranging between “one” and “zero”, hence signalling that a volatility of the SRI funds is mainly lower to the market. The result confirms the suggestion by Tippet and Leung, who have also obtained lower volatility of market risk for the Australia market. However, the last seven market betas of the SRI funds range from 0.9546 to 0.9992. This is an interesting result, as it gives an option that some of the SRI funds could move at the same rate with the market.

The SMB factor shows an increase in the number of negative signs by 35.14% and a decrease in positive signs by 6.84% in comparison to the results of the three factor model. The significance of the positive SMB factors is proportionated with 111 factors at 1%, 15 factors at 5%, and 8 factors at 10% significance level. Moreover, eight of the negatively signed SMB factors are statistically significant proportional to four factors at 1%, 1 factor at 5%, and 3 factors at 10% significance level. The result shows that the SRI funds are mainly impacted by small-firm effect. The result is in line with Gregory et al. [3], Grinblatt and Titman [70] and Bauer et al. [7], who confirm that domestic SRI funds tend to be exposed to small firm effect more than their peers. Finally, it is triply confirmed that there is a small-firm effect in the performance of the SRI funds.

The HML factor indicates a decrease in the number of negative signs by 12.07% and an increase in positive signs by 2.25 times. The significance of the negative HML factors is proportionated respectively with 27 factors at 1%, 28 factors at 5%, and 14 factors at 10% significance level. Meanwhile, none of the SRI funds has positively

signed HML factors being statistically significant at any level. Again, the results about SRI funds being mainly growth-oriented are in place and confirmed once more, by using the four factor model.

The UMD (WML or MOM) factors possess 145 positively and 82 negatively signed coefficients. The significance of the positive UMD factors is that they proportional to 2 SRI funds at 1%, 6 funds at 5%, and 7 funds at 10% significance level, and the negative UMD factors are proportional to 7 SRI funds at 1%, 8 funds at 5% and 8 funds at 10% significance level. The study shows that 189 out of the 227 SRI funds have insignificant UMD effects. Hence it can be concluded that the SRI funds do not follow any momentum strategy. Moreover, it is interesting to point out that the value of the R^2 statistics rose to 99.69%, hence suggesting that the four factor model is superior to the Fama and French's three factors and Jensen's single factor model.

The below 'Table 4' is based on the four factor model results merely denoting statistically significant performance at 1%, 5% and 10% levels.

Then in order to provide a clear view of the correlation among the estimated 4-factor alpha, market beta, SMB and HML factors affecting the SRI funds, the below bar 'Chart 3' is provided. The negative correlation among the 4-factor model, market beta, the SMB, the HML factors remains and is the same as of the results from the Fama and French's three factor model. Therefore, as the value of the 4-factor alphas becomes positive and moves in one direction, the values of the market beta, the SMB, and the HML factors move in the opposite direction. Furthermore, there is negative correlation between the 4-factor alpha and the UMD factor, thereby, signifying that as the value of the 4-factor alpha gradually moves upward, it loses the momentum strategy.

Note: The table contains only significantly performing SRI funds. SRI funds' short names, id numbers used in estimation, coefficients and R^2 (coefficient of determination) are provided. The estimation is conducted by using equation (3): $r_{pt} - r_{ft} = \alpha_4 + \beta_{MKT} (r_{mt} - r_{ft}) + \beta_{smb} SMB_t + \beta_{hml} HML_t + \beta_{umd} UMD_t + \varepsilon_t$

The relevant tests regarding the assumptions are made. The tests are

conducted using Breusch-Pagan, Breusch-Godfrey (LM) and Jarque-Bera normality tests. Among 227 funds, 24 suffer from heteroscedasticity, 59 funds from autocorrelation and 98 from abnormality problem. The heteroscedasticity and autocorrelation problems are erased by using "White [89] heteroscedasticity-robust standard errors and Newey and West [90] heteroscedasticity and autocorrelation consistent (HAC) tests. The problem with normality cannot be erased, so it is considered as an integral part of the results. There are 40 significantly performing SRI funds with the relevant 7 Beta, 10 SMB, 31 HML and 23 UMD significant values. The significance is decided upon the p-value of the coefficients.

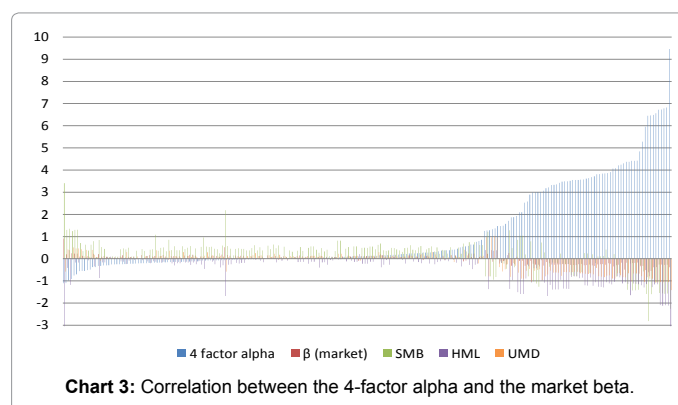
*Significance at 10% level.

**Significance at 5% level.

***Significance at 1% level (Chart 3).

Performance of the SRI fund portfolios matched by Fund Size (Hypothesis 2)

According to the result of "Hypothesis 1", the concept of the small firm effect on the performance of the SRI funds is supported by the results of all the estimation models. For that reason, it was considered



Name	Evviews ID	α_3	$R_{mt} - R_{ft}$	SMB	HML	UMD	R^2
FL SIL.	31.1	-0.2123*** [0.0000]	0.0084* [0.0692]	0.0125*** [0.0336]	-0.0078 [0.4574]	0.0002 [0.9604]	6.93%
AI. TSF. CB. 9 GR INC	4.9	6.4458* [0.0843]	-0.6089 [0.1274]	-2.8096* [0.0835]	-0.7948 [0.3245]	-0.8960 [0.1000]	87.95%
AI. TSF. M. 4INC	7.4	3.2216* [0.0807]	-0.2027 [0.3429]	-0.3625 [0.5965]	-1.1762*** [0.0079]	-0.5330 [0.1695]	78.59%
AI. TSF. M. 5ACC	7.5	6.7295*** [0.0008]	-0.2595 [0.1248]	-1.5566*** [0.0083]	-2.1223*** [0.0003]	-1.0571*** [0.0007]	91.13%
AI. TSF. M. 6ACC	7.6	6.7846*** [0.0006]	-0.2772* [0.0966]	-1.5778*** [0.0067]	-2.1006*** [0.0002]	-1.0334*** [0.0007]	91.98%
AI. TSF. M. 7ACC	7.7	6.8229*** [0.0006]	-0.2696* [0.0966]	-1.5639*** [0.0064]	-2.1126*** [0.0003]	-1.0507*** [0.0006]	91.89%
AI. TSF. M. 8ACC	7.8	6.7192*** [0.0007]	-0.2617 - [0.1144]	1.5474*** [0.0077]	2.0903*** [0.0003]	1.0471*** [0.0007]	91.54%
AI. TSF. UK. G. 4 ACC	8.4	3.8604* [0.0648]	-0.1988 [0.3994]	0.0545 [0.9423]	-1.1150** [0.0159]	-0.7460* [0.0974]	76.76%
AI. T. UK. E. 1 ACC	9.1	6.4859*** [0.0068]	-0.3838* [0.0912]	-1.0495 [0.1015]	-1.1564*** [0.0095]	-1.0777*** [0.0082]	82.04%
AI. T. UK. E. 4 ACC	9.4	4.2409* [0.0616]	-0.1777 [0.4816]	-0.0386 [0.9622]	-1.1134** [0.0219]	0.8306* [0.0897]	72.67%
AI. T. UK. E. 5 ACC	9.5	6.5619*** [0.0060]	-0.3777* [0.0917]	-1.0689* [0.0872]	1.1531** [0.0105]	1.0693*** [0.0083]	81.11%
CIS. SDT. B ACC	15.2	3.5543* [0.0833]	-0.2439 [0.3093]	-0.6054 [0.4349]	-0.8769** [0.0401]	0.6570 [0.1353]	63.84%

Table 4: 4-Factor Carhart Model.

to test the performance of the two SRI fund portfolios contradicting each other in fund size. The tests are conducted by using three different estimation models, namely the Jensen's alpha, the Fama and French's three factor model and Carhart's four factor models. The results of the tests are provided in 'Table 5'.

An inspection of 'Table 5' reveals the results of the three different estimation models. On one hand, the "small portfolios" underperform the market with alpha values ranging from (-0.1192) to (-0.0301). On the other hand, the "large portfolios" tend to outperform the market upon the result of Jensen's alpha and the three factor model and tend to underperform the market based on the result of the four factor model. However, the results are statistically insignificant, hence indicating that unlike the size of the portfolio, the performance is neutral to the market. The conclusion is in line with Gregory et al. [3], who have concluded that neither fund size nor social responsibility were able to define the performance of the SRI funds. However, the suggestion contradicts Starks [50], who concluded that the investors tend to use portfolios with small fund size.

Furthermore, the market beta values are positive ranging between "one" and "zero" and this indicates that the volatility of the portfolios is lower than the market. The HML factors have negative signs, hence indicating that the portfolios constructed on the large and small sized SRI funds tend to be growth-oriented. However, none of the coefficients is statistically significant at any level, indicating that there are not "value" or "growth" orientation effects. The UMD factor, denoting positive signs, implies that the returns of the portfolios continue to rise if the performance is increasing. However, the result is not statistically significant. It can, therefore, be concluded that the portfolios matched by fund size do not follow a momentum strategy.

An interesting finding is that among all the risk factors only the SMB factor shows a statistically significant result. Finally, it can be concluded that, unlike the performance of the portfolios matched by fund size, there is a small-firm effect.

Performance of the SRI fund portfolios matched by Book-to-Market ratio (Hypothesis 3)

According to the results of "Hypothesis 1", the performances of the individual SRI funds tend to be growth-oriented. Further, it was decided to test the performance on the two different portfolios constructed on value-oriented and growth-oriented SRI funds. The tests are conducted by using three different estimation models, namely the Jensen's alpha, the Fama and French's three factor and the Carhart's four factor models. The results of the tests are provided in 'Table 6'.

An inspection of 'Table 6' discloses the outputs of the three estimation models. On one hand, the portfolio with high book-to-market ratio (Value) tends to underperform the market with alpha values ranging from (-0.0595) to (-0.0134). On the other hand, the portfolio with low book-to-market ratio (Growth) tends to outperform the market upon the result of the Jensen's alpha and three factor models and tends to underperform based on the result of the four factor model. However, the results are statistically insignificant, thereby, indicating that unlike the value of book-to-market ratio, the performance of the portfolios is neutral to the market. The conclusion is in line with Cuthbertson et al. [52], who concluded that there is not any evidence regarding the SRI fund portfolios performing significantly based on two types, namely, "growth" or "value". Consequently, the beta values are positive ranging between "one" and "zero" which suggests that the volatility of the portfolios is lower than the market. The HML factors

Models	EvIEWS ID	$\alpha_{j,3,4}$	$R_{mt} - R_{ft}$	SMB	HML	UMD	R ²
Jensen's Alpha model	LARGE	0.0933 [0.6407]	0.0712 [0.1287]	-	-	-	0.89%
	SMALL	-0.0301 [0.8561]	0.0493 [0.2049]	-	-	-	0.42%
Fama and French 3 factor model	LARGE	0.0462 [0.8073]	0.0591 [0.2205]	0.2525*** [0.0000]	-0.1257 [0.1076]	-	11.78%
	SMALL	-0.0720 [0.6502]	0.0318 [0.4304]	0.2015*** [0.0001]	-0.0663 [0.3100]	-	9.85%
Carhart 4 factor model	LARGE	-0.0095 [0.9618]	0.0678 [0.1685]	0.2746*** [0.0000]	-0.1019 [0.2158]	0.0458 [0.3652]	11.68%
	SMALL	-0.1192 [0.4754]	0.0392 [0.3412]	0.2203*** [0.0001]	-0.0462 [0.5030]	0.0388 [0.3598]	9.76%

Table 5: Portfolios matched by fund size.

Name	EvIEWS ID	$\alpha_{j,3,4}$	$R_{mt} - R_{ft}$	SMB	HML	UMD	R ²
Jensen's Alpha model	Value	-0.0259 [0.8841]	0.0365 [0.1604]	-	-	-	0.13%
	Growth	0.0957 [0.6608]	0.0785 [0.1245]	-	-	-	0.92%
Fama and French 3 factor model	Value	-0.0595 [0.8073]	0.0273 [0.2205]	0.1774*** [0.0055]	-0.0851 [0.2337]	-	10.48%
	Growth	0.0420 [0.8389]	0.0611 [0.2459]	0.2751*** [0.0000]	-0.1187 [0.1642]	-	11.51%
Carhart 4 factor model	Value	-0.1117 [0.5404]	0.0355 [0.2339]	0.1981*** [0.0065]	-0.0628 [0.3857]	0.0429 [0.3175]	10.73%
	Growth	-0.0134 [0.9509]	0.0698 [0.1946]	0.2971*** [0.0000]	-0.0950 [0.2912]	0.0455 [0.4098]	11.31%

Table 6: Portfolios matched by Book-to-Market ratio.

have negative signs, hence indicating that the portfolios constructed on SRI funds tend to be growth-oriented, although the result is not statistically significant. Thereby, it denotes that the portfolios matched by book-to-market ratio do not differ by being “value” or “growth” oriented. The UMD factor denoting positive signs implies that the returns of the portfolios continue to rise if the performance is increasing. However, the results are not significant enough. For that reason, the implication relating to the momentum effect is rejected.

Recent evidence is that among the all risk factors only SMB indicates a statistically significant result. In conclusion, it is suggested that unlike the portfolios constructed on the SRI funds with high or low book-to-market ratios, there is a small firm effect.

Performance of the SRI fund portfolios matched by the “Sector Weighting” (Hypothesis 4)

It is crucial to mention that the current hypothesis is not in line with the previous ones. The main purpose is to investigate a performance of the SRI funds based on the sector in which they are invested in. The tests are conducted by using three different estimation models, namely the Jensen’s alpha, Fama and French’s three factor and Carhart’s four factor models. The results of the tests are provided in “Table 7”.

An interesting result is obtained from the estimations suggests that unlike the investing sector of the SRI funds, both portfolios show significant underperformance to the market. The performance value ranges from 2.75% to 2.76% per year. The market betas also show statistically significant results at levels of 1% and 5%. The values range from 0.0064 to 0.0076. The result shows that the volatility of both portfolios is extremely low in comparison to the market. The result for the SMB factor is weaker than the results of the previous hypotheses; however the sign of the coefficient is positive and significant 5% and 10% levels. It means that there is still a “small firm” effect on the performance of the portfolios. The HML factors’ sign is negative in all three different results for both portfolios, hence indicating that both portfolios are growth-oriented. However, the conclusion is upon the three factor model. The UMD factor denotes negative signs in both results, therefore suggesting that the returns both of both portfolios continue to fall if the performance is decreasing. Nevertheless, the result is statistically insignificant. It is suggested, therefore, that there is no evidence regarding the momentum strategy.

The market timing performance of the individual SRI funds (Hypothesis 5)

Generally speaking, it is difficult to make a concrete decision

about the performance of the individual SRI funds relying only on unconditional single and multifactor models. There are conditional models which are constructed to allow the beta coefficient of the market to change over time. However, those conditional models are unable to capture the changes in beta coefficients due to the investors’ private information. After careful consideration, it was decided to use the Treynor and Mazuy [79] “Market Timing” model, in order to differentiate a selective and market timing ability of the SRI funds managers. The full result of the evaluation per individual SRI funds is provided in appendix 4.6. However, the SRI funds with significant selective ability are adopted and provided in Table 7.

From the full set of results it can be seen that 213 out of the 227 SRI funds show positive selective ability and the results are statistically significant with 52 at 1%, 40 at 5% and 22 at 10% level. However, there are 14 SRI funds demonstrating negative selective ability. The negative selective ability is supported by 2 SRI funds being statistically significant at 1% (one fund) and at 10% (one fund) level. Hence, based on the result of the estimation, for the list of 227 SRI funds, it seems clear that the managers of the SRI funds have predominantly positive selective ability. The finding is in line with Chen et al. [91] and Daniel et al. [77] who also found the positive selective ability on the performance of the SRI funds. Moreover, Kreander et al. [4], investigated 60 SRI funds for the selective and timing ability by using Henriksson and Merton’s model [93]. Meanwhile, based on their reports, 31 funds out of 57 were statistically significant at 5% level. They concluded that there is not either selective or market timing ability of the SRI funds.

The market timing ability of the SRI funds is proportional with 212 negative signs of quadratic term and 13 positive signs of the coefficient. The 212 negative market timing ability is supported by SRI funds being statistically significant at 1% (21 funds), 5% (46 funds) and 10% (32 funds). Approximately, 46.70% of the negative market timing ability results is statistically significant. It means that the managers of those SRI funds have wrong marketing timing ability, hence indicating that they arranged a systematic risk of the funds inversely related to the market movement. However, the majority of SRI funds have no market timing ability. The conclusion is similar to the several studies using the Henriksson and Merton model [93]. In other words, Henriksson [94], Ferson and Schadt [95] in their study of the US market, Fletcher [96] studying the UK market and Liljeblom and Löflund [13] found no SRI fund having positive market timing ability. Kreander et al. [4] have also found no fund having significant market timing ability. Moreover, the result is not in line with the findings by Schröder [14], who studied 46 SRI funds in the UK, the US and Germany, hence concluding that five

Name	Sector Weighting	$\alpha_{f,3,4}$	$R_{mt} - R_{ft}$	SMB	HML	UMD	R ²
Jensen's Alpha model	Financial	-0.2296*** [0.0000]	0.0064** [0.0429]	-	-	-	2.08%
		-0.2291*** [0.0000]	0.0068*** [0.0063]	-	-	-	
	Industrial			-	-	-	2.26%
				-	-	-	
Fama and French 3 factor model	Financial	-0.2301*** [0.0000]	0.0074*** [0.0050]	0.0065* [0.0939]	-0.0087* [0.0894]	-	3.68%
		-0.2301*** [0.0000]	0.0076*** [0.0046]	0.0088** [0.0231]	-0.0096* [0.0869]	-	
	Industrial					-	5.21%
						-	
Carhart 4 factor model	Financial	0.2288*** [0.0000]	0.0072** [0.0102]	0.0060 [0.1821]	-0.0092 [0.1160]	-0.0011 [0.7873]	3.07%
		-0.2297*** [0.0000]	0.0075*** [0.0073]	0.0086* [0.0603]	-0.0098 [0.1276]	-0.0004 [0.9282]	4.57%
	Industrial						

Table 7: Portfolios matched by Sector weighting.

SRI funds have positive and seven have negative market timing ability. However, the finding indicates that the majority of SRI funds possess positive selective and negative market timing ability, it counters the decision made by Kreander et al. [4] that 'slight underperformance by funds with the Jensen measure is due to poor market timing rather than stock selection problems'.

The table is based on the four factor model results merely denoting statistically significant performance at 1%, 5% and 10% levels.

Then, in order to provide a clear view of the correlation between the selective ability and the market timing ability of the SRI funds, the below bar 'Chart 4' is provided. It can be that the SRI funds having positive selective ability either have negative or non-market timing ability.

Note: The table contains only significantly performing SRI funds. SRI funds' short names, id numbers used in estimation, coefficients and R^2 (coefficient of determination) are provided. The estimation is conducted by using equation (4): $r_{pt} - r_{ft} = \alpha_{TM} + \beta_{MKT} (r_{mt} - r_{ft}) + (r_{mt} - r_{ft})^2 + \varepsilon_t$

The relevant tests regarding the assumptions are made. The tests are conducted using Breusch-Pagan, Breusch-Godfrey (LM) and Jarque-Bera normality tests. Among 227 funds, 14 suffer from heteroskedasticity, 29 funds from autocorrelation and 105 ones from non-normality problem. The heteroskedasticity and Autocorrelation problems are erased by using "White [89] heteroskedasticity-robust standard errors and Newey and West [90] heteroskedasticity and autocorrelation consistent (HAC) tests. The problem with normality cannot be erased, so it is considered as an integral part of the results. There are 115 significant alphas denoting selective ability of the SRI funds and 56 significant gammas denoting a market timing ability. The significance is decided upon the p-value of the coefficients.

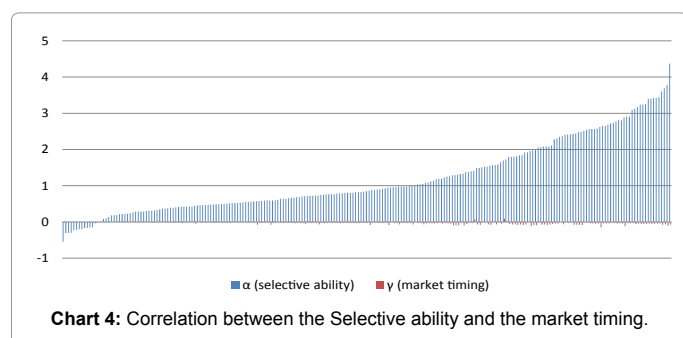
*Significance at 10% level.

**Significance at 5% level.

***Significance at 1% level (Chart 4).

Conclusion

There were five hypotheses to be tested by using different estimation models. The first hypothesis concentrated on identifying the performance of the individual SRI funds trading in the UK market with the currency of GBP. The evaluation was performed by using three different estimation models, namely, the Jensen's alpha [66], the Fama and French [56] three factor model and the Carhart [57] four factor models. The first model discloses that the performance of the SRI funds is neutral and the volatility lower than the market (FTSE All Share index). The neutrality and the lower volatility of the performance are supported by the three factor and four factor models. In this case,



regarding the performance of the SRI funds, the result is consistent with Luther et al. [5], Luther and Matatko [3] and Bauer et al. [7]. The suggestion upon the results directly contradicts implications by Schröder [14], Bauer et al. [6] and Gregory and Whittaker [27]. Furthermore, as the performance of the SRI funds is basically neutral, it is worth to mention the suggestion by Benson and Humphrey [9] that the SRI fund managers are less concerned with the performance. Hence, it can be that "Hypothesis 1" is not rejected as there is not significant performance of the SRI funds.

The second hypothesis is based on two different SRI fund portfolios matched by fund size and was estimated by using three different estimation models. Once more, there is not any difference between the performances of these two portfolios as both of them are neutral in comparison to the market. The result is in line with Belkaoui and Kaprik [12], Girard et al. [48] and Rennenoog et al. [16]. As there is not any difference in performance of the portfolios matched by size, "Hypothesis 2" is also not rejected.

The third hypothesis is assumed to identify the difference in performance of two different portfolios matched by book-to-market ratio. The results demonstrate that there is not any significant difference in performance of those two portfolios. Therefore, "Hypothesis 3" also remains.

The fourth hypothesis involved the determination of the significant difference in portfolios matched by sector weighting. The situation is tremendously changed as both portfolios matched by financial and industrial sector show significant underperformance. Benson et al. [9] have also suggested that sector weighting impacts the performance of SRI funds. Consequently, "Hypothesis 4" is rejected in favour of significant underperformance of the SRI portfolios matched by sector weighting.

The fifth hypothesis focused on the selective and market timing ability of individual SRI funds. The report demonstrates that the majority of the SRI funds have positive selective ability. At the same time, those funds have negative market timing ability. The result implies that fund managers with skill of good SRI funds selective ability are not able to manage the portfolio the way that diversifies the systematic risk. However, as the primary part of the SRI funds market ability is not statistically significant at any level, it may be concluded that "Hypothesis 5" is not rejected.

Conclusion

Conclusion for the hypothesis testing

The study is focused mainly on the performance of SRI funds trading in the UK market with the UK Sterling Pounds. The study endeavours to occupy the niche in the literature. In order to obtain more precise and reasonable results, the data obtained include the 227 UK SRI funds from the 70 fund managers listed as the best screened SRI funds in the UK market. The research is mainly focused on the five different hypotheses developed: The first four hypotheses are tested by applying different estimation models, namely Jensen's single factor, Fama and French's three factors and Carhart's four factor models while the last hypothesis was tested by using only the Treynor and Mazuy's market timing model. The first hypothesis is developed with the aim of investigating the performance of the individual SRI funds. The first finding indicates that there is no difference in the performance between the SRI funds and market. Although, the results point to the outperformance based on all three estimation models, they are not statistically significant. The second finding implies that the

performance of the SRI funds is indifferent not considering whether they are grouped by “large-size” firms or “small-size” firms. The third finding is similar to the previous ones, as it cannot be concluded that the performance of the SRI fund portfolios differs from each other by various values of a book-to-market ratio. However, the fourth finding strikingly differs from the previous ones. The result implies that the SRI fund portfolios grouped by their sector weighting significantly underperform the market. However, the values of unconditional risk-adjusted returns for “Financial” SRI funds and “Industrial” SRI funds are not substantially different from each other. And the final finding is that SRI fund managers have positive selective ability, yet this skill does not assist to have a “right market timing” ability. The finding highlights that despite the positive selective ability, the SRI funds cannot beat the market wrongly or simply, i.e., they lack market timing ability.

Recent evidence

The investigation reveals some recent evidence that draws immediate attention. Consequently, the below mentioned “recent evidence” sheds light to the whole work.

a) Behaving like gold stocks

The beta values of some SRI funds are negative implying that the SRI funds’ movement is inversely related to the market’. This result indicated that some of SRI funds could behave like the gold stocks. In other words, some of the SRI funds tend to do better when the market does badly and vice versa.

b) A “Small-firm” effect

The output of the Jensen’s alpha model postulates that the negative alphas tend to be more skewed towards the ones with small market capitalization. The result of the Fama and French three factor model supports the previously made conclusion that among the 134 out of the 190 positive SMB factors are statistically significant. This conclusion is confirmed by the Carhart’s four factor model with the 134 statistically significant SMB factors, which is line with Grinblatt and Titman [70], Gregory et al. [3] and contradicts Belkaoui and Karpik [12] and Luther et al. [5]. Consequently, it is implied that there is always a “small-firm” effect unlike the over or underperformance of SRI funds.

c) A “Growth-orientation” effect

The Fama and French three factor model reveals that there is a “growth-orientation” effect for the 68 SRI funds. The estimation of Carhart’s four factor model confirms the conclusion with the results of 69 SRI funds having significant “growth-orientation” effect. This finding is in line with Guerard [92] and Bauer et al. [6]. Hence, it can be concluded that the SRI funds are more “growth-oriented” rather than “value-oriented”. In other words, investors investing in the SRI funds believe in potential future growth.

d) No evidence of “momentum strategy”

The Carhart’s four factor model shows that the UMD factor is proportionated with 82 negative UMDs and 145 positive ones. However, only 23 negative UMD and 15 positive UMD factors are statistically significant at 1% (7 negative, 2 positive), 5% (8 negative, 6 positive) and 10% (8 negative, 7 positive) level. As the majority of the UMD factors are not statistically significant, it is concluded that the performance of SRI funds lacks momentum factor or as the value of unconditional risk-adjusted return increases, it loses the momentum strategy.

Another feature of the study is highlighted by the demonstration

of a correlation among unconditional risk-adjusted returns, the market beta, the SMB, the HML and the UMD factors. The study shows that there is a negative correlation among those mentioned factors. Furthermore, as performance of the SRI funds tend to outperform the market, volatility lowers, the “small-firm” effect swaps for “large-firm”, the tendency for “growth-orientation” strengths, and the momentum strategy weakens.

Delimitations and limitations

This study primarily focuses on the UK market and on the SRI funds that are traded with the UK Pound Sterling. Thus, the variables for the exchange rates were initially omitted from the regressions. Moreover, another omitted variable is “ethics” used by Renneboog et al. [16], which also affects the performance of SRI funds. Using those variables would have been decreased the values of alphas of the estimation models.

The dummy variables have not been used for the “UK and Global economic recession period”. Hence, the “crisis effect” is not separated from the estimations, thereby; the result concerning a neutrality of performance could be impacted by the crisis period. Nofsinger and Varma [10] concluded that the SRI funds perform well during the period of the economic recession.

The estimation models employed under the current research are limited to the “unconditional risk-adjusted alphas”. However, Cuthbertson et al. [52] evaluated the performance of SRI funds by using the conditional alpha and beta forms. Mamaysky et al. [97] used time-varying betas and alphas. Recently, Fama and French developed a five-factor model. Those models measure performance of the SRI funds under different conditions and with different risk factors, which can lead to the various estimation results.

Epitomizing the study, it would be fair to conclude the results of the current research are inconclusive as they support some researchers while contradicting others. Hence, it is recommended that to investigate the SRI funds by employing different estimation tools. Obviously, it is not appropriate to consider the SRI funds as the only source of benefit. However, the SRI funds can be beneficial from other sides of perspective. Hence, it can be implied that the SRI funds could mainly be used as an “insurance” tool rather than an “investment” instrument.

Ending on a philosophical note, the words of a seventeenth century writer seem to have lost none of their insight:

“Profits on the exchange are the treasures of goblins. At one time they may be carbuncle stones, then coals, then diamonds, then flintstones, then morning dew, then tears.”

Joseph de la Vega

Confusion of Confusions

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