Socially Responsible Investment and Market Performance: The Case of Energy and Resource Companies

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ABSTRACT

Do financial markets reward the energy and resource companies for adopting socially responsible practices? In this study, we investigate the stock market performance of major international energy and resource firms, classified within the socially responsible investment (SRI) category, from 2005 to 2016. We simulate investments in the portfolios of the SRI energy and resource companies stocks during this 11-year period and we further assess their risk-adjusted performance. The returns of the energy and resource SRI portfolio as a whole were neither consistently superior nor inferior to those of the benchmark indices. However, there exist substantial differences across the individual sub-sectors. The overall results show that markets do not reward or penalize the energy and resource firms for their SRI attitudes. We also find that the crude oil price consistently had a significant influence on the stock returns of the SRI energy and resource companies.

Keywords: Crude Oil Price, Energy and Resource Companies Stocks, Socially Responsible Investment (SRI), SRI Stocks, Stock Market Performance, Stock Market Returns.

JEL classifications: G10, Q40, Q56

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1. Introduction

The global and national energy and environmental policy debates are increasingly shaped by the need to balance the competing objectives of economic efficiency, sustainability and affordability. Many energy and resource firms have noted the social and political changes in their environment and view the pursuit of profit for shareholders combined with social and environmental responsibility as part of their long-term corporate strategies. The recent developments in global climate change agreements (e.g. COP21) and the emergence of the notion of 'stranded carbon' are examples of such contextual changes. The new operating environment represents a major departure from the "business-as-usual" conduct of business as these firms move from a production function of only private goods towards joint production of private and public goods.

From the theoretical point of view, firms undertake sustainable investments to improve their image, secure comparative advantage and maximise profits for their shareholders. This is particularly the case for energy and resource firms since they increasingly find themselves at the centre of the sustainability debate. However, empirical evidence about their performance in financial markets remains scarce. It is, therefore, important to examine whether the market rewards or penalizes this departure from the conventional profit maximisation model.

In order to achieve sustainable energy economy objectives, it is important to decouple energy use and its related emissions and environmental impacts from economic activity. Therefore, not only the governments but also energy and resource firms can have a crucial role through their actions and investments (see, e.g., IEA, 2014 and 2015). In recent years, many major companies have adopted Socially Responsible Investment (SRI) principles as a strategic tool and self-regulation mechanism for improving corporate image and gaining competitive advantage.

SRI has grown drastically over the past three decades. Forum for Social Investment reports that the assets invested in SRI companies in the US have increased by over 1260% to $8.72 trillion between 1995 and 2016 (a compound annual growth of 13.25%) representing nearly 22% of the $40.3 trillion total assets under management (USSIF, 2017). The number and value of SRI funds have also increased significantly and has led to the creation of SRI indices, such as: Calvert Social Index, Domini400 Social Index, FTSE4GOOD Social Index and MSCI ESG Social Indices etc.

However, it is not clear from the literature whether investments according to the SRI principles provide higher, lower or similar returns in comparison with conventional stocks (see, e.g., the review studies by Margolis and Walsh (2003), Orlitzky et al. (2003) and more recently by Revelli and Viviani (2013)). In particular, the literature about the effect of SRI on performance of energy and resource firms is remarkably scarce (see, e.g., Jenkins and Yakovleva (2006), Frynas (2009) and Zhao (2015) for rare exceptions) and the available findings are inconclusive.

Our paper contributes to the literature on SRI investments and firms financial performance in general and in the case of energy and resource firms in particular. To the best of our knowledge, this paper is the first such study to analyse SRI investments in energy and resource companies on a global scale using international data from several markets in different geographical regions covering all six continents. We present novel empirical findings on the performance of international energy and resource SRI stocks. The findings are important for energy market and financial market researchers. In particular, they are of relevance for energy policymakers and for the investors in energy and resource firms.

We analyse the performance of energy and resource SRI companies on the international stock market and we simulate an investment in portfolios of such stocks. We calculate raw returns of the energy and resource SRI stocks portfolios and analyse their performance using Fama-French (1992, 1993) and Carhart (1997) multi-factor models. Furthermore, we control for changes

in the oil price by including the crude oil price returns in our Fama-French and Carhart estimations. We also measure the performance of the portfolio using risk-adjusted techniques, such as the Modified Sharpe Ratio (MSR) and the Certainty Equivalent (CEQ) returns. Moreover, by evaluating the profitability of stocks portfolios in the variants with and without dividends, we can extract the effect of dividends on their total returns. Finally, we investigate the performance in individual sub-sectors and examine the relation between the SRI stocks returns and the changes in the levels of the crude oil price.

The performance of energy and resource SRI stocks portfolios is assessed by comparisons with major global benchmarks, including broad market indices as well as the energy market, the SRI market and the alternative energy market sector indices (S&P Global 1200, MSCI World Energy, FTSE4GOOD Global 100 and S&P Global Clean Energy). The study encapsulates bull and bear market phases and allows the assessment of the impact of those market conditions on the profitability of energy and resource SRI stocks portfolios. We identify bull and bear market periods using the concept of non-overlapping "bull" and "bear" phases based on major peaks and troughs in the stock market indices, presented in Gooding and O'Malley (1977) and in Woodward and Anderson (2009), i.e. based on the price variability of indices and their long-term trends. Our sample is composed of global energy and resource stocks, hence we rely on the examination of bull and bear market phases of the S&P Global Index and the MSCI World Energy Index.

The next section presents the conceptual framework of our study. Section 3 reviews the relevant literature, which relates mainly to market performance of stocks and portfolios within the context of social responsibility. Section 4 presents a theoretical overview of the effect of limiting the size of stocks portfolio due to imposition of the stocks exclusion criteria. Section 5 provides an overview of the data and the methodology. Section 6 presents and discusses the empirical results. Section 7 concludes the paper.

2. Conceptual Framework

The conceptual framework of our analysis relies on two competing theoretical views about the profitability of investments in the SRI stocks.

The literature pointing towards a negative relationship between SRI and stock returns proposes two possible explanations. First, the cost of social responsibility is an extra expense for firms that reduces profitability. However, the SRI supporters argue that, over time, this extra cost is traded off by gains in reputation. Second, focusing on SRI companies as a subset of stocks reduces benefits of diversification (e.g., when stocks of tobacco companies are excluded from portfolios), which may result in lower risk-adjusted returns. On the other hand, the proponents of SRI argue that the excluded companies are engaged in unsustainable products or services that will make them less profitable anyway over time. These arguments are supported by many empirical studies that do not find meaningful differences between the performance of SRI and non-SRI stocks (see, the results in Revelli and Viviani (2013)).

There is also a stream of literature that advocates a positive relationship between SRI and stock returns. The conceptual argumentation in this case is related predominantly to the instrumental stakeholder theory and the slack resources theory. Instrumental stakeholder theory postulates that companies aim to satisfy various stakeholder groups and that the resulting stakeholder–management relationships serve as monitoring and enforcement mechanisms leading to various positive side-effects, such as the increased efficiency of the firm's adaptation to external demands as well as to better overall financial performance (Freeman and Evan 1990; Hill and Jones 1992; Jones 1995; Clarkson 1995).

Slack resources theory argues, in turn, that positive financial performance allows companies to become more socially responsible because it provides them with additional resources necessary to engage in corporate social responsibility, which usually requires availability of substantial excess funds (see Ullmann 1985; McGuire et al. 1988; Waddock and Graves 1997).

Other theoretical and conceptual views postulate that socially responsible companies are likely to benefit from different *"mediating effects"*, such as improvement of reputation, better relations with financial institutions and investors as well as easier access to capital or even lower cost of capital (Spicer 1978; Fombrun and Shanley 1990). Further positive consequences of reputational effects, such as increase in employees' goodwill, may lead to improvement of the firm's financial performance (Davis 1973; McGuire et al. 1988; Waddock and Graves 1997).

There exist different channels through which financial performance of the SRI companies can be improved, for example through higher sales, better profitability or achieving lower cost of capital etc. Moreover, in the theoretical literature there are two other themes related to the conceptual discussions and their respective theoretical arguments that are tested empirically, i.e. the existing studies have also attempted to verify: (1) whether the socially responsible and ethical attitudes increase costs of firms' operations, which leads to negative impact on their financial performance and (2) whether social responsibility can be afforded by firms that already have good financial performance, which leads to feedback effects and further improvement of their financial situation.

In this study, we examine the main theoretical conjectures discussed in the above. We empirically analyse the performance of stocks portfolios composed of the SRI energy and resource companies stocks relative to benchmark portfolios using data from major international financial markets.

3. Relevant Empirical Literature

Theories and concepts of SRI have been evolving over time. In a review about social responsibility research, Lee (2008) found that it has moved from macro level to micro (organisational) level over the last six decades. The literature in the 1950s and 1960s viewed social problems as a matter for politicians and civil society only. In the 1970s and 1980s, however, the literature began to investigate the relationship between social responsibility of firms and their financial performance. The practice of financial investments regarding the SRI attitudes has evolved and triggered more research. In a 2010 survey of 107 money managers on socially responsible investment, at least half of respondents saw social responsibility as a way to manage portfolio risk or to improve long-term performance (Voorhes and Humphreys, 2011).

The early research on the relationship between SRI and financial performance includes the seminal studies by Moskowitz (1972) and Vance (1975). While Moskowitz (1972) found a positive relationship between social responsibility and financial performance, Vance (1975) reported a negative relationship between them. However, both studies did not include the analysis of risk adjusted returns which was later carried out by Alexander and Buchholz (1978), who used social responsibility ranking data from Vance (1975) and applied CAPM models to capture the market risk factor, yet they did not find a statistically significant relationship between social responsibility and stock market performance.

Following the development of multi-factor models and the availability of larger datasets, a number of studies have analysed the SRI relationship and performance separately for SRI indices (e.g., Sauer 1997, Statman 2000, Schroder 2007, Consolandi et al. 2008, Managi et al. 2012) and SRI funds (e.g., Hamilton et al. 1993, Goldreyer and Diltz 1999, Cummings 2000, Bauer et al.

2005, Bello 2005, Scholtens, 2005, Bauer et al. 2006, Bauer et al. 2007, Mill 2006, Gregory and Whittaker 2007, Jones et al. 2008, Renneboog et al. 2008, Cortez et al. 2009, Gil-Bazo et al. 2010, Climent and Soriano 2011, Humphrey and Lee 2011). A brief review of the main findings on funds and indices is presented in Brzeszczyński and McIntosh (2014).

Our paper compares the performance of portfolios which are possible to construct by a private investor (i.e. stocks meeting certain screening criteria related to socially responsible investment). Thus, we next focus on the literature on market return and performance of stocks and portfolios within the context of socially responsible business.

Margolis and Walsh (2003) and Orlitzky et al. (2003) reviewed the studies about the performance of SRI stocks and portfolios. They found that 54 papers showed a positive relationship with financial performance, while 28 others did not evidence any statistically significant relationship. Further 20 papers showed mixed findings, whereas seven papers found a negative relationship. Orlitzky et al. (2003) used a meta-analysis of 52 studies yielding a sample size of 33,878 observations and found a higher correlation between social responsibility and financial performance although the evidence appeared stronger for accounting based financial performance indicators compared to market based indicators.

Derwall et al. (2005) used eco-efficient screening criteria of creating more goods and services using fewer resources and yielding less waste and pollution. Their study covering US data from 1995 to 2003, found that the high eco-efficiency portfolio provided substantially higher average returns than the low eco-efficiency portfolio. Differences in market sensitivity, investment style or industry-specific factors could not explain the performance differential and the results remained significant for transaction costs up to 200 bps. Derwall et al. (2005) suggested that the superior performance of a portfolio, constructed using environmental considerations as a

key factor, could be a case of the market mispricing information on the ecological performance of companies.

Kempf and Osthoff (2007) presented a trading strategy in which they simulated trades relying on buying stocks with higher ratings for social responsibility and selling those with lower ratings. They found an alpha of 8.7% per annum for investors employing the "best-in-class" screening approach. The increased performance continued even after taking into account reasonable transaction costs. Likewise, Statman and Glushkov (2009) found that stock portfolis with high ratings of a broad range of social responsibility characteristics outperformed those with low ratings. Their study showed community, employee and environment as some of the key screening factors that influenced performance.

Ambec and Lanoie (2007) examined several studies in which portfolio analysis was applied to examine whether SRI funds (or indices) exhibit different performance from funds in a more general investment context. A majority of them (11 out of 16 papers) did not find statistically significant differences between the performance of the SRI funds and conventional ones, while in five studies the SRI funds outperformed. Ambec and Lanoie (2008) found companies benefitting from environmental performance. They showed positive links between environmental and economic performance citing examples of better opportunities for cutting costs and increasing revenues by environmentally friendly companies.

Humphrey et al. (2012) investigated whether corporate social performance ratings have a systematic effect on the market based financial performance and risk of the firms. They applied the test for the UK companies over the period 2002-2011. They found no difference in the risk-adjusted performance of portfolios among firms which had high and low corporate social performance ratings.

Galema et al. (2012) concluded that when considering the entire efficient frontier and not imposing any short sales restrictions, socially responsible US investors are generally worse off in mean–variance terms. However, they suffer only in terms of foregone risk reduction opportunities and not in terms of foregone returns. In addition, when short sale constraints are introduced, investors are no longer worse off by engaging in socially responsible investing activities.

Brzeszczyński and McIntosh (2014) analysed the performance of the British SRI stocks in the period 2000-2010. Using the "Global-100" list to select sustainable companies, they found average returns of SRI firms to be higher than those of market indices. The positive performance was also evidenced by risk-adjusted measures (certainty equivalent returns and modified Sharpe ratio) and a simple trading strategy did beat the market indices even after the inclusion of different levels of transaction costs.

In a recent meta-analysis of 85 studies and 190 experiments, Revelli and Viviani (2013) investigated whether inclusion of CSR and ethical criteria in the portfolio construction processes is more profitable than conventional investment policies. They found that, compared with conventional investments, the consideration of CSR in stock market portfolios is neither a weakness nor a strength.

The analysis of the SRI samples used in the existing literature further highlights that previous studies have used data for stocks from different industries, which is likely to have an impact on the results. Kempf and Osthoff (2007) and Statman and Glushkov (2009) applied data for stocks from KLD ratings, which consist of firms from different industries. Kempf and Osthoff (2007) divided the companies into 10 industries for their best-in class approach of positive screening policy. Similarly, in Humphrey et al. (2012) the sample includes firms from 19

industries and Brzeszczyński and McIntosh (2014) also investigated stocks from more than 15 industry sectors.[1]

Recent empirical studies from international markets, including those which analysed the performance of the SRI funds, the SRI stocks or the portfolios composed of SRI stocks (see, e.g., Lean et al. (2015), Auer (2016), Auer and Schuhmacher (2016), Syed (2017) or Wu et al. (2017)), also show mixed results.

Moreover, a recent study by Riedl and Smeets (2017), based on surveys and incentivized experiments, found that both social preferences and social signalling effects can explain the SRI decisions, whereas financial motives play less important role. Socially responsible investors expected to earn lower returns on SRI funds than on conventional funds and also pay higher management fees. Hence, the results from Riedl and Smeets (2017) suggest that investors are willing to sacrifice some financial performance if they invest according to their social preferences. These findings support some of the theoretical considerations, which we discussed above, and they are also consistent with much of the empirical evidence available in the literature from different international markets.

In summary, the review of the empirical SRI studies shows that the findings about the performance of SRI investments are inconclusive. Some of the existing evidence points towards superior performance of SRI investments (e.g. Derwall et al. 2005; Kempf and Osthoff, 2007; Statman and Glushkov, 2009), while many other available results differ (e.g. in Humphrey et al.

[1] Methodologically, it is not clear how the effect of performance of stocks from different industries (which may again have different degrees of social responsibility etc.) is captured by the commonly applied tools, such as through the estimations of multi-factor models. We simplify this problem by using only companies that are focused on the production and supply of energy and related resources (e.g., oil, gas water and minerals) etc. whereas all of them are characterised by substantial social and environmental responsibility and have been screened as socially responsible. This sample selection allows us to observe the performance of large and well established SRI firms making our study novel and different from others in the existing literature.

(2012) a superior risk adjusted performance could not be supported based on a range of market performance models) and those other papers do not support consistent outperformance.

4. The Effect of Limiting the Portfolio Size Due to Exclusion Criteria

The effect of the exclusion of stocks from the pool of all the stocks available in any given market is *a priori* uncertain and, in fact, such decision can lead to either lower returns or higher returns of the constructed portfolio (or it can result in no change at all). Below we provide a theoretical discussion regarding this issue and we also demonstrate what happens if the exclusion criteria are imposed on a group of stocks (in the case, which is the subject of investigation in our study, on the non-SRI energy and resource companies stocks) under different possible scenarios.

Let R_i denote the return for stock *i* in a market composed of a total number of *I* stocks, where *i* = 1, 2, 3, ... *I*. The stocks are classified into two groups: SRI energy and resource companies stocks, denoted by *j* = 1, 2, 3, ... *J*, and all other stocks which do not meet the SRI energy and resource companies stocks selection criteria, denoted by *k* = 1, 2, 3, ... *K*. These two sets are mutually exclusive and fully complementary, i.e.: the relation *J* + *K* = *I* must always hold.

The return achieved from the market portfolio R_p composed of all stocks *I* available in any given market is:

$$R_p = \sum_{i=1}^{I} w_i \cdot R_i = \sum_{i=1}^{J} w_j \cdot R_j + \sum_{i=1}^{K} w_k \cdot R_k \qquad (1)$$

where: R_i are the returns of stock *i*, R_j are the returns of the SRI energy and resource companies stocks *j* and R_k are the returns of the non-SRI energy and resource companies stocks *k*. The respective weights are: w_i (for *i* = 1, 2, 3, ... *I*), w_j (for *j* = 1, 2, 3, ... *J*) and w_k (for *k* = 1, 2, 3, ... *K*) and they must always sum up to 1 within each group, i.e.: $\sum_{i-1}^{I} w_i = 1$, $\sum_{j-1}^{J} w_j = 1$ and $\sum_{k-1}^{K} w_k = 1$.

The effect of the exclusion of any one of the two groups of the distinguished stocks, in this case the removal of the stocks which do not meet the SRI energy and resource companies stocks selection criteria (k = 1, 2, 3, ... K), on the portfolio return R_p is as follows.

(a) If $\sum_{i=1}^{J} w_j \cdot R_j - \sum_{i=1}^{I} w_i \cdot R_i > 0$, then the exclusion of the non-SRI energy and resource companies stocks is beneficial for the portfolio performance, because R_p increases after the removal of stocks k = 1, 2, 3, ... K.

(b) However, if $\sum_{i=1}^{J} w_j \cdot R_j - \sum_{i=1}^{I} w_i \cdot R_i < 0$, then the exclusion of the non-SRI energy and resource companies stocks is detrimental to the portfolio performance, because R_p decreases after the removal of stocks k = 1, 2, 3, ... K.

(c) In cases when $\sum_{i=1}^{J} w_j \cdot R_j - \sum_{i=1}^{I} w_i \cdot R_i = 0$, the exclusion of the non-SRI energy and resource companies stocks does not have any effect of the return R_p of the portfolio.

Note that the above relationship holds under all possible combinations of returns, including the cases when $\sum_{i=1}^{J} w_j \cdot R_j > \sum_{i=1}^{K} w_k \cdot R_k$, $\sum_{i=1}^{J} w_j \cdot R_j < \sum_{i=1}^{K} w_k \cdot R_k$ or $\sum_{i=1}^{J} w_j \cdot R_j = \sum_{i=1}^{K} w_k \cdot R_k$ and regardless whether $R_p > 0$, $R_p < 0$ and $R_p = 0$. Moreover, this relation is also true regardless of the size of the groups, i.e. for any possible values of I, J and K.

For example, if $R_p = 5\%$, $\sum_{i=1}^{J} w_j \cdot R_j = 2\%$ and $\sum_{i=1}^{K} w_k \cdot R_k = 3\%$ or $R_p = 4\%$, $\sum_{i=1}^{J} w_j \cdot R_j = -2\%$ and $\sum_{i=1}^{K} w_k \cdot R_k = 6\%$ or if $R_p = -7\%$, $\sum_{i=1}^{J} w_j \cdot R_j = -9\%$ and $\sum_{i=1}^{K} w_k \cdot R_k = 2\%$, the exclusion of the non-SRI energy and resource companies stocks (all stocks k = 1, 2, 3, ... K) is detrimental to the portfolio performance, because R_p decreases in all these cases. Conversely, if $R_p = 5\%$, $\sum_{i=1}^{J} w_j \cdot R_j = 8\%$ and $\sum_{i=1}^{K} w_k \cdot R_k = -3\%$ or if $R_p = -8\%$, $\sum_{i=1}^{J} w_j \cdot R_j = -3\%$ and $\sum_{i=1}^{K} w_k \cdot R_k = -5\%$ or if $R_p = -3\%$, $\sum_{i=1}^{J} w_j \cdot R_j = 1\%$ and

$\sum_{i=1}^{K} w_k \cdot R_k = -4\%$, the exclusion of the non-SRI energy and resource companies stocks (all stocks *k* = 1, 2, 3, ... *K*) is beneficial for the portfolio performance, because then R_p increases in all these cases.

However, an important practical issue to consider here that also determines the relation between $\sum_{i=1}^{J} w_j \cdot R_j$ and $\sum_{i=1}^{J} w_j \cdot R_j$ is the method of weighting stocks, i.e. how the weights w_i (for *i* = 1, 2, 3, ... *I*), w_j (for *j* = 1, 2, 3, ... *J*) and w_k (for *k* = 1, 2, 3, ... *K*) are assigned. For example, the assumption of equal weights will inevitably lead to different values of $\sum_{i=1}^{J} w_j \cdot R_j$ and $\sum_{i=1}^{J} w_j \cdot R_j$ and consequently to different R_p, than the assumption of unequal weights.

The portfolios constructed in practice by stock market investors may have either equal weights or weights different from an equal structure, i.e. they are can be allocated through the optimization procedures (e.g. based on the mean-variance relationship) or they can be determined by the size of the stocks (usually measured by their market capitalization) or some other criteria (e.g., the value of such indicators as P/E, P/BV or D/Y ratios etc.).

Hence, we can conclude that the effect of the exclusion of any one of the two groups of stocks from the broad market portfolio, in the case discussed in this paper the removal of the stocks which do not meet the SRI energy and resource companies stocks, depends predominantly on the sign of the relation defined as: $\sum_{i=1}^{J} w_j \cdot R_j - \sum_{i=1}^{I} w_i \cdot R_i$, but also on the method of weighting stocks and the assumptions regarding the weights, which ultimately determine the return R_p as well as the values of $\sum_{i=1}^{J} w_j \cdot R_j$ and $\sum_{i=1}^{K} w_k \cdot R_k$.

5. Data and Methodology

5.1. Data

The sample selection process required us to analyse first the scope of business activity of all 344 companies from the Global-100 list that appeared in the annual screening during the first 11 years since the listing started in 2005. As the focus of this study is on energy and resource SRI stocks, from the Global-100 list we identified companies that: (a) produce energy, minerals and water, (b) produce energy related materials for consumption in energy or transport industry and (c) supply energy, minerals and water.[2] This selection led to the identification of the following industry groups: (1) Alternative Energy, (2) Electric Utilities, (3) Electricity, (4) Energy Equipment and Services, (5) Gas, Water and Multiutilities, (6) Industrial Engineering, (7) Mining, (8) Oil Equipment, Services and Distribution and (9) Oil and Gas Producers.

We used the energy and resource SRI stocks data from the list compiled by Corporate Knights based in Toronto, Canada, which publishes annually the "Global 100 Most Sustainable Corporations in the World". The basis of listing is mainly quantitative as it provides scores against 12 different KPIs[3] for all global publicly traded companies exceeding market capitalisation of at least US$ 2 billion. For example, the screening requires all the companies to pass nine different Piotroski F-Score (Piotroski, 2000) tests, which confirm the sound financial position of the firms. Similarly, in the sustainability disclosure principle, companies that fail to disclose at least 75% of

[2] The purpose of our study was to analyse the performance of stocks which simultaneously meet the SRI and energy / resource industry membership criteria. Therefore, we deliberately selected stocks which are at the intersection of energy/resource and SRI criteria. We do not test the performance of separate portfolios of energy / resource stocks and SRI stocks, however we investigate it indirectly by comparing the results of our portfolios with pure SRI index and pure energy sector indices.

[3] These key performance indicators (KPIs) are: Energy Productivity, Carbon Productivity, Water Productivity, Waste Productivity, Innovation Capacity, Percentage Tax Paid, CEO to Average Worker Pay, Pension Fund Status, Safety Performance, Employee Turnover, Leadership Diversity and Clean Capital Pay Link. More details are available at: www.corporateknights.com.

the priority indicators for their respective GICS Industry Group are eliminated. As such, the results follow a rules-based construction methodology and ensure sustainable financial index of firms. The listing criteria also include screening against product category (e.g. tobacco is not included), sustainability-related fines, penalties or settlements.

We filtered all SRI companies based on the above categories and this procedure identified 56 SRI energy and resource companies for the 11 year period between February 2005 and January 2016.

Table 1 presents the constituents of the SRI energy and resource companies stocks portfolio (henceforth, referred to as: 'SRI E&RC stocks portfolio') used in this study. It also provides information about the country of origin, area of operation, number of employees and year of establishment.

[Table 1 around here]

As shown in Table 1, the list of the constituent companies in our SRI E&RC stocks portfolio consists of long established large firms. For example, BP Plc, Lonmin Plc, PG & E Corp, Teck Resources, Tokyo Gas, Umicore and Wartsila OYJ are more than a century old. There are few companies that were founded more recently but have a long history. For example, the newest company in the list, Cenovus Energy Inc. formed in 2008, is a split from Encana which descends from the 19th century Canadian Pacific Railway. Similarly, BHP Billiton was incorporated in 2001 but it was a merger of Billington and BHP that were established in 1860 and 1885, respectively. Likewise, Aluminia Limited, established in 2002 is a demerger from WMC Resources which had a history dating back to 1950s.

Many of these companies have grown large over time and they have a presence in many countries (e.g., British Petroleum has operations in 80 markets). These firms contribute to the national economies and provide employment in communities. The companies produce gas, oil,

minerals and electricity with a range of local and global environmental impacts. Therefore, these firms are widely believed to bear important social, economic and environmental responsibilities. The companies in our sample have more than 25,000 employees on average. Those firms with relatively fewer employees, such as Cairn Energy from the United Kingdom which officially had 156 employees as of year-end 2016, as mentioned in the annual report for the year also had several hundred contractors in 2016.

In terms of geographical distribution, the 56 stocks in our database come from 19 countries of which the highest number of firms is from the UK (11 companies) followed by Canada (9 companies). There are 7 companies form the US and 4 from Finland and Spain. Further, Australia and Brazil have 3 companies each. France, Japan and Norway are represented by 2 companies each and the remaining 9 countries have 1 company each. Given that most countries in the world have at least one energy company, the Global-100 ranking concentration in less than 10% of all countries worldwide is an indication that in many countries SRI related criteria do not seem to be considered to a sufficient extent by energy companies there.

Figure A1 in the Appendix shows the countries and number of SRI energy and resource companies in the SRI E&RC stocks portfolio.

Table 2 presents the constituent companies in the Global-100 list broken into numbers for each year.

[Table 2 around here]

The source of all the stock price and dividend data for the constituents of the analysed SRI E&RC stocks portfolio is Bloomberg.

We used the ticker symbol of the respective stock exchange, so the price at first was obtained in the currency of the country of the exchange and then we used the Bloomberg currency converting function to change both the stock price and dividends data into US dollars in order to

maintain uniformity and consistency for the calculation purposes. Where stock price and dividends were not quoted in full currency value (e.g., Sterling Pound quoted in Pence), we converted them into the respective unit of currency (e.g., to pound sterling) before applying the USD conversion.

Similarly to the approach used by Brzeszczyński and McIntosh (2014), the returns of the SRI portfolios were compared with the returns of various stock market indices. However, we extend this type of analysis by utilizing a larger number of comparable benchmarks. We employ four benchmark indices as opposed to only two (FTSE100 as the broad market and FTSE4GOOD as the SRI index) in Brzeszczyński and McIntosh (2014). Our selection of benchmarks captures stocks globally and covers the broad market as well as energy market, SRI and alternative energy market sectors, which creates a broader perspective for the comparison purposes.

(1) ***Broad Market***

For the broad market index, we employ the S&P Global 1200, which is a composite index comprising seven regional and country indices: S&P 500, S&P Europe 350, S&P/TOPIX 150 (Japan), S&P TSX 60 (Canada), S&P/ASX 50 (Australia), S&P Asia 50 and S&P Latin America 40. The S&P Global 1200 is calculated in US dollars. The index captures 70% of the global market capitalisation covering 30 countries inclusive of the country of origin of the stocks in our SRI E&RC stocks portfolio only except for the stocks from India and South Africa. The main selection criterion for S&P Global 1200 is company size measured by its stock market capitalisation. Hence, it contains predominantly large blue-chip firms. Additional selection criterion is stocks liquidity, which is revised at a monthly frequency based on such indicators as stock's annual value traded, its float turnover and the number of days traded. The S&P Global 1200 index takes into account

also sectoral classifications and ensures balance between 10 main broad economy sectors with respect to Global Industry Classification Standard (GICS).

(2) ***Energy Market Sector***

We include the MSCI World/Energy Index as a benchmark for the energy sector. The index is designed to capture the large and mid-cap segments across 23 Developed Markets (DM) countries, 16 of which are common to the country of origin of our SRI energy and resource companies stocks. Moreover, the index maintains sectoral classifications among seven energy categories that are again common in our SRI E&RC stocks portfolio. The selection criteria are based on index construction approach with a strong emphasis on index liquidity, investability and replicability, which allows for cross regional comparisons across all market capitalisation size, sector and style segments and combinations. Similar to S&P 1200 Global index, securities in MSCI World Energy Index are classified in the energy sector following the Global Industry Classification Standard (GICS).

(3) ***SRI Market Sector***

In the SRI category, we use the FTSE4GOOD Global 100 Index as comparable benchmark. The index includes companies with high environmental, social and governance (ESG) ratings. The FTSE4GOOD index is designed to measure the performance of companies that meet globally recognised corporate responsibility standards. The selection criteria are revised on regular basis to meet market expectations and reflect the new developments in the CSR practice. They rely on extensive market consultation process and are approved by an independent committee of experts. The FTSE4GOOD inclusion criteria are split into five areas: (i) environmental, (ii) human and labour rights, (iii) supply chain labour standards, (iv) countering

bribery and (v) climate change. Each of them is further divided into three categories: (i) policy, (ii) management and (iii) reporting. Subsequently, there are indicators assigned to each of the policy, management and reporting subdivision. The number of the indicators that a company must meet depends on whether that company is classed as high, medium or low impact in a particular area. Moreover, FTSE4GOOD index excludes the companies with business interests in the following industries: tobacco producers, companies manufacturing either whole, strategic parts or platforms for nuclear weapon systems and companies manufacturing whole weapons systems.

(4) ***Alternative Energy Market Sector***

In the case of alternative energy market sector, we employ the FTSE ET50 index which is composed of global companies that are involved in clean energy related businesses. The index is designed for the creation of index tracking funds, derivatives and as a performance benchmark. The selection criteria of the index consist of a diversified mix of clean energy production and clean energy technology and equipment provider companies. Therefore, during the selection process the stocks are screened and weighted to ensure that the index is investable and also sufficiently liquid for trading purposes. The index consists of companies from the list of 17 countries, 9 of which are common to the country of domicile of our SRI energy and resource companies stocks. Furthermore, the index maintains sectoral classifications among 8 industries including oil and gas, materials and utilities that are again common to the industry types of the companies in our SRI E&RC stocks portfolio.

We evaluate the performance of our portfolios against the four indices mentioned above both at price and total return definition levels.

First, we compare the results of the investment in the SRI E&RC stocks portfolio with the 'price index' (PI) versions of the four indices mentioned above. However, the SRI E&RC stocks

portfolio includes dividend payments, which is the income to investors holding these stocks. Therefore, we also analyse the returns of SRI E&RC stocks portfolio against the 'total return index' (TRI) versions of the four indices (i.e. the versions of the indices which include dividend payments), such that the comparison is on equal ground. On the other hand, the 'total return' versions of the indices are not commonly used by investors as conventional benchmarks. Hence, we also perform direct comparison between the 'price index' versions of the indices and the SRI portfolios without dividends, in order to level the playing field.

5.2. Methodology

The Global-100 list was used to construct portfolios of global socially responsible energy companies over the period from 02.2005 to 01.2016 (11 annual sub-periods) and their returns were compared to the returns of the respective indices. Since the Global-100 list is announced at the end of January each year, right before the meeting of the World Economic Forum (WEF) in Davos, we assumed the first portfolio was constructed on the 1st of February 2005. The portfolios were then rebalanced each year on the last working day of January.

The selection procedure of stocks entering the portfolios was as follows. The companies identified on the Global-100 list, entered the portfolio in the first year and the portfolio was held until the next Global-100 list was announced a year later. Stocks that no longer appeared on the Global-100 were removed from the portfolio and the energy companies new to the Global-100 list were included. Effectively, this means that we simulate the trades relying on buying stocks that appeared on the list and selling those that were removed from it. This procedure was repeated every year until the last year in our sample period.

As the Global-100 was an unranked list for a number of years (ranking was only provided since the year 2010) rather than an index, it had to be assumed that each stock has an equal

weighting in the SRI portfolios. This means that a stock which remains in the portfolio from one year to the next when the total number of stocks in the portfolio changes requires an adjustment (either additional purchases or sells) in order to maintain the same equal weighting.

When a company was taken-over and disappeared from the stock market in the period of the duration of our portfolios, we assumed that the proceeds were kept in a non-interest bearing account until the portfolio was rebalanced. The reason for the assumption is that private investors are less likely to insist on reinvesting the proceeds and may keep them in their current account until the portfolios are rebalanced. When mergers or takeovers involved payment in stocks rather than cash, it was assumed that the new stocks were held in the portion of the offer until the rebalancing event.

The stock price data and dividend payments data were collected and included in the analysis of the SRI E&RC stocks portfolio performance. Data on price and dividend was imported from Bloomberg.

As mentioned above, similarly to Kempf and Osthoff (2007) and Brzeszczyński and McIntosh (2014), the returns of the SRI portfolios are compared to the returns of market indices. The annual simple holding period returns for the SRI portfolios in two versions (with dividends and without dividends) as well as for the following indices: S&P Global 1200 (price index), S&P Global 1200 (total return index), MSCI World/Energy (price index), MSCI World/Energy (total return index), FTSE4GOOD Global 100 (price index), FTSE4GOOD Global 100 (total return index), FTSE ET50 (price index) and FTSE ET50 (total return index) were calculated for all 10 individual years and average annual geometric returns were computed for five-year sub-periods and for the overall ten-year period. In addition, we analyse returns in both bull and bear market periods.

The results in these sub-periods allow to conduct a deeper analysis of the performance of SRI portfolios and to conduct further robustness checks. The annual return was determined as a simple holding period return with any dividends added. For the one-, five- and eleven-year periods, the average annual geometric returns using the annual data were calculated. For other sub-periods, returns were calculated using monthly data and then annualised to make them comparable with other periods. Whether the differences between returns of the SRI E&RC stocks portfolio and the benchmark indices were statistically significant was assessed by a *t*-statistic.

We also analyse the performance of the SRI E&RC stocks portfolio by using the most important risk-adjusted measures, such as the modified Sharpe ratio of Israelsen (2005) and the Certainty Equivalent returns (see, e.g., DeMiguel et al. (2009)), which were calculated for both versions of the SRI E&RC stocks portfolio (with and without dividends) and both versions of all four indices (total return indices with dividends and price indices without dividends).

The Sharpe ratio (Sharpe, 1966 and 1994) measures excess return per unit of total risk. However, the classical definition of the Sharpe ratio suffers from inaccuracy errors and incorrect assessment of risk when returns are negative in some sub-periods, so we calculated the modified Sharpe ratio (*MSR*) of Israelsen (2005):

$$MSR = ER/SD^{(ER/absER)} \qquad (2)$$

where *ER* is the excess return defined as mean monthly difference between the portfolio (or index) return and the risk-free return computed for *n* equal to 12, 60 or 120 months, respectively, and *SD* is the sample standard deviation of the monthly differences of returns.

MSR is a commonly used measure to address the problem of negative returns and alleviates the problems with the traditional Sharpe ratio.

Certainty Equivalent (*CEQ*) returns are defined as:

$$CEQ = \hat{\mu}_k - (\gamma/2)\hat{\sigma}_k^2 \qquad (3)$$

where $\hat{\mu}_k$ and $\hat{\sigma}_k^2$ are the mean and variance of excess returns of a given portfolio or an index k and γ is the risk aversion parameter. The formulation of *CEQ* in (3) assumes a multi-period investor with quadratic utility. The 'normal' level of risk aversion is at the level γ =1, while higher (lower) values of γ indicate higher (lower) levels of risk aversion.

Finally, we estimate parameters of the Fama-French three-factor model (Fama and French, 1992; 1993):

$$R_{pt} - R_{ft} = \alpha_p + \beta_{1p}RMRF_t + \beta_{2p}SMB_t + \beta_{3p}HML_t + \varepsilon_{pt} \quad (4a)$$

and the Carhart (1997) four-factor model:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{1p}RMRF_t + \beta_{2p}SMB_t + \beta_{3p}HML_t + \beta_{4p}MOMENTUM_t + \varepsilon_{pt} \quad (4b)$$

where R_{pt} is the return on the SRI portfolio in period t; R_{ft} is the risk-free return in period t; R_{mt} is the return of the world stock market index in period t and $RMRF_t = R_{mt} - R_{ft}$; SMB_t is the difference in return between small-cap and large cap portfolios in period t; HML_t is the difference in return between high book-to-market stocks (i.e. value stocks) and low book-to-market stocks (i.e. growth stocks) in period t; $MOMENTUM_t$ is the difference in return between portfolio of stocks classified as those that have strong momentum and stocks classified as those that have weak momentum (momentum is broadly interpreted as the variable which captures the stock price movements tendencies when the stock prices continue rising if they are going up and continue declining if they are going down) and ε_{pt} is the error term.

The data for the explanatory variables used in models (4a) and (4b), i.e. for R_{ft}, R_{mt}, $RMRF_t$, SMB_t, HML_t and $MOMENTUM_t$, were obtained directly from the Fama and French database.[4] Defined as Fama/French Global Factors and Portfolios, the factors data is constructed from the

[4] Available at the Tuck School of Business at the Dartmouth College website.

portfolios of stocks of 23 different countries. We adopted the factor data from Fama/French Global Factors because 16 out of 19 stocks in our portfolio are from the countries in the list of Fama/French Global Factors.

Market is defined as the return on a region's value-weighted market portfolio minus the US one month T-bill rate. SMB is the equal-weighted average of the returns on the three small stock portfolios for the region minus the average of the returns on the three big stock portfolios:

$$SMB = 1/3\ (Small\ Value + Small\ Neutral + Small\ Growth) - 1/3\ (Big\ Value + Big\ Neutral + Big\ Growth) \quad (5)$$

HML is the equal-weighted average of the returns for the two high book to market (B/M) portfolios for a given region minus the average of the returns for the two low B/M portfolios:

$$HML = 1/2\ (Small\ Value + Big\ Value) - 1/2\ (Small\ Growth + Big\ Growth) \quad (6)$$

MOMENTUM is the equal-weighted average of the returns for the two winner portfolios for a given region minus the average of the returns for the two loser portfolios:

$$MOMENTUM = 1/2\ (Small\ High + Big\ High - 1/2\ (Small\ Low + Big\ Low). \quad (7)$$

We also perform estimations of the Carhart (1997) model with crude oil returns as additional control variable based on the following model:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{1p}RMRF_t + \beta_{2p}SMB_t + \beta_{3p}HML_t + \beta_{4p}MOMENTUM_t + \beta_{5p}OIL_t + \varepsilon_{pt} \quad (8)$$

where: OIL_t is the return of the Brent oil price.

Finally, we explore the impact of the crude oil price on the portfolio returns and we estimate the parameters of the following model:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p OIL_t + \varepsilon_{pt} \quad (9)$$

as well as the model where the dependent variable is defined as the *excess* return of the SRI portfolio relative to the international stock market benchmark:

$$ER_{pt} = \alpha_p + \beta_p OIL_t + \varepsilon_{pt} \quad (10)$$

where ER_{pt} is the excess return defined as the difference:

$$ER_{pt} = R_{pt} - R_{mt} \quad (11)$$

and where R_{mt} is the return of the world stock market index in period *t*.

In the next section, we present the results of the analysis of the raw returns of our SRI E&RC stocks portfolio and assess its performance relative to the selected benchmark indices as well as using the risk-adjusted measures described above.

6. Empirical Results and Discussion

6.1. Results for the SRI E&RC Stocks Portfolio

6.1.1. Raw Returns

The results of the preliminary analysis based on raw returns for the entire portfolio of the SRI energy and resource companies stocks show that it did not outperform the broad market index as well as other energy sector, SRI and alternative energy market indices in the 11-year sample period from February 2005 to January 2016.

Table 3 presents average annual geometric returns for our whole sample period of 2005–2016 based on the simulation of investment in the energy and resource companies from the Global-100 list compared to all four benchmark indices and reports also the values of the respective *t*-statistics.

Panel A in Table 3 reports the returns of the SRI E&RC stocks portfolio with dividends and the returns of the benchmark indices in their price index version. Such comparison to stock

market indices is often used by financial market investors as well as business media, however it is not entirely accurate because price indices by definition do not include dividends, while any investment in stocks (e.g., in a portfolio of SRI energy and resource companies stocks such as the one investigated in our study) in practice will benefit from the dividends paid out by companies. Nevertheless, we start with such comparison because stock market performance relative to price version of stock indices is often discussed in business media etc., so regardless of their validity for this purpose, they are important benchmarks to which our results should first be referred.

As the Panel A in Table 3 shows, there is a slight outperformance of the SRI stocks portfolio relative to all four benchmarks. The average annual return is 1.89% and it is higher than the respective average annual returns equal to 1.20%, -0.24%, -0.63% and -0.42%, although the differences are not statistically significant. However, the outperformance in the individual years in terms of the numbers of the annual periods characterized by the superior results is broadly equal in all 5 cases: the SRI E&RC stocks portfolio has outperformed the index benchmarks 2 times, while the indices S&P GLOBAL 1200 TR Index, MSCI WORLD ENERGY TR Index, FTSE4GOOD GLOBAL 100 TR Index and FTSE ET50 TR Index have outperformed others 2, 3, 2 and 2 times, respectively.

Panel B in Table 3 presents the returns of the SRI E&RC stocks portfolio with dividends and the returns of the benchmark indices in their total return versions. This comparison in Panel B is the most relevant one from the practical point of view, because it allows (unlike the results in Panel A) for direct assessment of the same type of returns (in this case: the returns including the dividends) and it reflects the actual investments outcomes (unlike the results in panel C which do not take into account the dividends).

Panel B in Table 3 shows that there is no clear pattern of outperformance by either the SRI stocks portfolio or any of the benchmark indices. In the full period from 2005 to 2016 the SRI

stocks portfolio achieved the average annual return equal to 1.89%, while the return of the S&P GLOBAL 1200 TR Index was 3.64%, the return of the MSCI WORLD ENERGY TR Index was 2.44%, the return of the FTSE4GOOD GLOBAL 100 TR Index was 1.13% and the return of the FTSE ET50 TR Index was 0.43%. The average value of the returns of these four benchmarks is 1.91%, which is almost exactly the same as the return of 1.89% for the SRI stocks portfolio. Moreover, as in case of the results in Panel A, the outperformance in the individual years in terms of the numbers of the annual periods characterized by the superior results is also very similar in all 5 cases: the SRI E&RC stocks portfolio has beaten the index benchmarks 2 times, while the indices S&P GLOBAL 1200 TR Index, MSCI WORLD ENERGY TR Index, FTSE4GOOD GLOBAL 100 TR Index and FTSE ET50 TR Index have beaten others 2, 3, 2 and 2 times, respectively.

Finally, Panel C in Table 3 presents the returns of the SRI E&RC stocks portfolio without dividends and the returns of the benchmark indices in their price index version. The purpose of this comparison is to examine and compare the relative performance of stocks which, at the same time, illustrates the impact of dividends on the SRI stocks portfolio and on the indices.

In the full period from 2005 to 2016 the SRI stocks portfolio without dividends achieved negative average annual return equal to -1.36%, while the corresponding value for the best performing benchmark S&P GLOBAL 1200 Price Index was positive and equal to 1.20%. The average value of the returns of the four benchmarks is -0.02%, which shows that dividends played a relatively more important role in the performance of the investigated portfolio than in case of the benchmark stock market indices.

[Table 3 around here]

Apart from the calculation of the average annual returns and the returns in the single annual periods, we also investigated the performance in other sub-samples, i.e. in the rolling 5-year long

periods and in the bull and bear market phases.[5] Overall, the performance during the multiple-year periods and during the bull and bear market conditions was mixed and the differences in returns were not statistically significant, although the S&P GLOBAL 1200 Price Index has beaten others most often in the 5-year long rolling samples and also in the bear market phases, while FTSE ET50 TR Index was the best performer in the bear market phases.

Despite the fact that there is no clear evidence of the overall outperformance that could be detected in our results presented in all three panels in Table 3, the variation of returns over time across the individual years shows an interesting pattern that we found in our study. Such effect can be explained by two major events on the global market: the global financial crisis and the changes in the level of the crude oil price.

First, the performance of the analysed SRI E&RC stocks portfolio was the worst in the annual period 2008/2009, which directly follows the global financial crisis of 2007/2008. The total return of the portfolio was -42.39%, while the return excluding dividends was -44.36%. Nevertheless, it needs to be emphasized that this result was still comparable with the changes of the benchmark indices over the same period, which also suffered severe losses. Hence, this negative performance is clearly related to a broader stock markets trend after the global financial crisis.

Second, the worsening performance of portfolios starting from the annual period 2011/2012 onwards coincides in time with a decline of the crude oil price, which started to slide down from its peak in 2011 (which was the second peak in our whole sample period after its

[5] Bull and bear market periods were have been identified using the idea of non-overlapping 'bull' and 'bear' phases based on major peaks and troughs found in the stock market indices, presented in Gooding and O'Malley (1977) and Woodward and Anderson (2009), i.e. based on the variability of the indices (S&P Global and MSCI World Energy in case of this study). Bull market periods cover 99 months from 02.2005 to 10.2007, from 03.2009 to 04.2011 and from 10.2011 to 01.2015 and bear market periods cover 21 months from 11.2007 to 02.2009 and from 05.2011 to 09.2011. We report the results for bull and bear market sub-periods as additional illustration of the broader picture regarding our overall findings, which indicates what happens in the bull and bear market sub-samples.

previous peak in 2008). The decrease of the crude oil price was first gradual and then substantially accelerated after 2013. More importantly, the performance of portfolios has been worsening also in *relative* terms after 2011. We interpret this effect as the impact of declining crude oil price on the profitability of many companies, which business directly (or indirectly) depends on crude oil price levels and which stocks were part of our portfolios.[6]

6.1.2. The Effect of Dividends

Our calculations allow us also to extract the impact of dividends on the SRI E&RC stocks portfolio performance, which can be directly conducted by comparing the results for the variants of portfolios with and without dividends that are contained in the respective panels in Table 3.

The average annual return of the SRI E&RC stocks portfolio in the variant where the dividends were included in the calculations is 1.89%, while in the variant where the dividends were excluded it is -1.36%. This result has a very straightforward interpretation and also practical implications for stock market investors, which are as follows.

First, the difference in the annual average return that is substantially over 3% (i.e. 1.89% minus -1.36% equal to 3.25%) is large indicating that dividend payments matter to investors who allocated their funds in the stocks from our SRI E&RC stocks portfolio. Second, as mentioned in the previous section, the dividends play a relatively more important role in the performance of the investigated portfolio than in case of the benchmark stock market indices.[7]

[6] This finding is clearly supported subsequently by the estimation results of the parameters of the Carhart model with crude oil price returns as a control variable (discussed later in this paper). The respective estimates of the parameter for crude oil returns are statistically significant and positive, which means that the SRI E&RC stocks portfolio returns are related indeed to oil price returns in the same direction. Therefore, the negative oil price returns starting from the year 2011 are associated with negative returns of the SRI energy and resource portfolios.

[7] The comparison of data for average dividend yield indicators for different industries also supports this effect. For example, in our sample period the average dividend yield for the energy industry stocks from the MSCI World Energy Sector Index and S&P Global 1200 Energy Sector Index was 2.84% and 2.94%, respectively, while it was as a rule lower for other industries, e.g. 2.38% for the financial industry stocks from the S&P 500 Financials Sector Index, 1.33% for the information technology stocks from the S&P Global 1200 Information Technology Sector Index or 2.16% from the MSCI World Health Care Index etc.

Third, in terms of the qualitative conclusions it makes also a huge difference whether dividends are added or excluded from the calculations, because the annual average return is either positive or negative in these two cases, hence leading to either the overall investment profit or the overall investment loss.

Therefore, dividends appear to matter a lot in the performance of the analysed SRI E&RC stocks portfolio and its individual stocks.

Our results also mean that the SRI energy and resource companies tend to pay relatively large dividends, which is another important finding of this study.

6.1.3. Risk-Adjusted Performance

In the next step we turn towards the analysis of the risk-adjusted returns, such as the modified Sharpe ratio (*MSR*) and Certainty Equivalent (*CEQ*) returns, as well as the evaluation of the portfolio performance based on the Fama-French and Carhart models.

The values of the modified Sharpe ratio (*MSR*) are presented in Table 4. They show similar pattern of worsening performance of the SRI E&RC stocks portfolio over time, which is also consistent with the evolution path of the crude oil price.

[Table 4 around here]

The values of Certainty Equivalent (*CEQ*) returns are presented in Table 5 for three variants representing normal risk aversion of investors (γ =1), lower risk aversion (γ =0.5, i.e. half of normal risk aversion level) and higher risk aversion (γ =2, i.e. double the normal risk aversion level). Similarly to Tables 3 and 4, they illustrate the same pattern of results for the profitability of the SRI E&RC stocks portfolio with superior performance in the first two 5-year sub periods (2005-2010 and 2006-2011) and then a substantial deterioration with subsequent underperformance in the next periods.

[Table 5 around here]

In the next step we move to the analysis of the Fama-French three-factor model and Carhart four-factor model, which are the most widely used multi-factor models for explaining the performance of investment funds or stock portfolios. Due to space considerations, we focus here on the presentation and discussion of the more extended specification of the and Carhart four-factor model, which encompasses the Fama-French three-factor model, however all the results are available upon request.

[Tables 6a and 6b around here]

In all regressions we first tested for the presence of possible seasonality. Next we performed tests for autocorrelation and heteroscedasticity. For autocorrelation we used Ljung-Box Q test and for heteroscedasticity we applied the ARCH test of Engle (1982). When heteroscedasticity was present in a model, it was addressed by estimating an appropriate GARCH class model. Autocorrelation was removed by adding autoregressive (AR) and/or moving average (MA) terms.

Table 6a presents the estimation results of the parameters of Carhart four-factor model represented by equation (4b). In the whole sample only the market factor $RMRF_t$ is statistically significant (estimate of 1.07 significant at the 1% level). In the sub-samples, the $RMRF_t$ variable is significant in all the 5-year long sub-periods and in most of the single-year sub-periods. The SMB_t, HML_t and WML_t factors are mostly insignificant in the sub-samples.

The estimation results of the alpha (constant) parameter presented in Table 6a show that it is negative but statistically not significant in the full period from 2005 to 2016. In the shorter 5-year sub-periods, its estimates are positive and statistically significant[8] in the first two sub-

[8] The positive and significant estimates of the alpha may imply market inefficiency, however we found this effect only at the beginning of the whole analysed period, so the conclusions about market efficiency have to be carefully formulated. Moreover, a comprehensive investigation of market efficiency would require access to very detailed microstructural data for individual trades and this was beyond the scope of our study. Therefore, we can only conclude

samples (2005-2010 and 2006-2011), however they are becoming negative and statistically significant in the last three sub-samples (2009-2014, 2010-2015 and 2011-2016). This pattern is entirely consistent with the findings presented earlier in Tables 3, 4 and 5 for the raw returns and for other risk-adjusted measures.[9]

Table 6b presents the results from the estimation of the Carhart model with the fifth variable, i.e. the crude oil returns, which serve as the control variable. Its estimate for the entire period is positive and equals 0.1016 (statistically significant at the 1% level). With other estimation results for other variables broadly unchanged in comparison with Table 6a, this finding means that the crude oil price was an important factor in explaining stock returns of the companies from the SRI E&RC stocks portfolio, which is not very surprising given that many of them are directly involved in crude oil business or their financial situation heavily relies (directly or indirectly) on the crude oil price.

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that our results might suggest some market inefficiency, although a clear lack of consistency in overperformance, points towards the validity of the adaptive market efficiency hypothesis (AMH) proposed by Lo (2004 and 2005) (some more recent evidence on AMH is provided e.g. by Urquhart and McGroarty (2014 and 2016) or Manahov and Hudson (2014), among others) rather than efficient market hypothesis (EMH). Adaptive market hypothesis incorporates the principles of evolution, such as: adaptation or natural selection, to explain financial markets mechanisms. It is consistent with the evolutionary model of individuals adapting to a changing environment using heuristics. In the context of our study, according to the AMH, stock prices reflect the information that combines environmental conditions and their movements are the result of interaction of different distinct groups of investors. Under the AMH, the degree of market efficiency is a function of such factors as the number and type of competitors in the market or their adaptability to the evolving market conditions. There are also important theoretical implications of AMH in light of our research and the results reported in this paper provide empirical support for them: (1) relation between risk and reward is unlikely to be stable over time, (2) investment strategies perform better in certain environments and worse in others, (3) profit and utility maximization are secondary objectives for investors, whereas their primary objective is survival and (4) survival is achieved through innovation (given that the risk-reward relationship is time-varying in nature, adaptation to changing market conditions is a natural way to behave and to achieve a desired level of expected returns in financial markets).

[9] Although the Fama-French and Carhart models are time-series models and are based on time series data (in case of this paper on data at the monthly frequency of observations), such databases can be treated also as panel data, if the portfolio returns are disaggregated into individual stocks returns. Therefore, as a robustness check, we created such database in panel data format and estimated the Fama-French and Carhart models using panel data estimations. The results were qualitatively very similar to the traditional time-series approach where portfolio returns were not disaggregated into individual stocks returns (i.e. the estimates of the parameters of the Fama-French and Carhart variables were very similar in terms of value and statistical significance). We do not report those results due to space limitation, but they are available upon request. We would like to thank two anonymous referees for suggesting this interesting idea.

However, an interesting effect is the pattern of results for the crude oil returns estimates across all the 5-year sub-periods, which shows a clear decline in the value of the estimated parameter over time (and loss of significance) from 0.0884 (significant at the 5% level) to 0.0014 (not significant), although they are positive in all these sub-samples. This finding means that the crude oil price movements have been an important factor in explaining the SRI E&RC stocks portfolio returns, but their influence weakened over time.

We further explore the role of the crude oil price movements using additional models in sections 6.3 and 6.4.

In the next section 6.2, we also investigate in more details the performance of the SRI E&RC stocks within different sub-groups.

6.2. Results for the Sub-groups within the SRI E&RC Stocks Portfolio

In the next step, we inspect more closely what actually happens inside the entire SRI E&RC stocks portfolio by investigating the performance of stocks from the individual sectors. Subsequently, we focus on the analysis of two broader groups of stocks: oil related companies and non-oil related companies.

The results across the distinguished 9 sectoral groups differed quite substantially. The best performing sectors were Alternative Energy and Gas, Water and Multiutilities, which stocks achieved the highest returns equal to 9.44% and 7.17%, respectively, while the worst performing sector was Mining characterised by negative return equal to -16.55%. All returns for the whole 11-year period (February to January) from 2005 to 2016 for the individual sub-sectors within the SRI E&RC stocks portfolio (in the variant with dividends) are presented in the Appendix in Table A1.

These sectoral differences in performance, as well as the findings from the previous section about the statistical significance of the crude oil returns variable, prompted us further to examine the performance of the SRI E&RC stocks divided into two broader groups: oil related companies and non-oil related companies.

The selection of stocks to these two groups was based on companies that are: (1) energy and resource stocks and largely oil related and (2) energy and resource stocks but are not oil related. In the case of the former group, companies from the mining industry, oil and gas industry and oil equipment, services and distribution industries were chosen. The companies in the latter group were formed from industries such as alternative energy, electricity and gas, water and multi-utilities.

The results depicting performance of the oil related companies and non-oil related companies are reported in Tables 7a – 7d and they reveal very interesting additional patterns.

Tables 7a and 7b present the returns for the whole 11-year period (February to January) from 2005 to 2016 for the oil related companies stocks portfolio (with dividends), for the non-oil related companies stocks portfolio (with dividends) and for the total return versions of the benchmark indexes.

A direct comparison of the average annual return for the whole sample period from 2005 to 2016 reveals a striking result: an investment in the oil related stocks portfolio would have led to the average annual *loss* equal to -4.27%, while the non-oil related stocks portfolio would have delivered average annual *profit* equal to 4.61%. The result of the oil related stocks portfolio was consistently *worse* than *all* the benchmark indices returns, whereas the result of the non-oil related stocks portfolio was consistently *better* than *all* the benchmark indices returns (which were: 3.64%, 2.44%, 1.13% and 0.43%).

Moreover, the oil related stocks recorded only 5 positive returns out of all 11 annual sub-periods and 2 positive returns out of 7 in the 5-year long sub-periods. On the other hand, the non-oil related stocks recorded 8 positive returns out of 11 annual sub-periods and 5 positive returns out of 7 in the 5-year long sub-periods.

[Tables 7a, 7b, 7c and 7d around here]

Similar picture emerges from Tables 7c and 7d presenting the values of the modified Sharpe ratios for the oil related companies stocks portfolio (with dividends), for the non-oil related companies stocks portfolio (with dividends) and for the total return versions of the benchmark indexes. The average annual modified Sharpe ratios for the group of oil related stocks for the entire period from 2005 to 2016 is negative and equal to -0.01, while for the group of non-oil related stocks it is positive and equal to 0.18.

The results for the variant of the SRI E&RC stocks portfolio without dividends for the oil related companies stocks portfolio, for the non-oil related companies stocks portfolio and for the price index versions of the benchmark indexes are presented in the Appendix in Tables B1 – B4 and they show similar patterns as those discussed above in this section.[10]

6.3. Impact of Crude Oil Price on Performance of SRI E&RC Stocks Portfolio

The results presented in previous sections clearly point towards the existence of a relationship between the SRI E&RC stocks portfolio financial performance and the dynamics of oil price returns. Therefore, in this section we specifically focus on this issue and we investigate it deeper by trying to answer the question how the crude oil price movements affect the returns of

[10] Furthermore, these results provide additional interesting evidence regarding the impact of dividends on portfolio performance. The average annual return of the oil related stocks portfolio is -7.00%, while its version with dividends achieved -4.27%, which means a difference of -2.37%. However, in the case of the non-oil related stocks portfolio, the average annual return is 0.57% while its version with dividends achieved 4.67%, which means a much larger difference of -4.04%. This comparison shows that dividends mattered considerably more in case of the non-oil related companies than for oil related companies.

our SRI E&RC stocks portfolio and we also provide evidence regarding how this relation evolved over time.

Table 8a presents the estimation results of parameters from model (9) for the SRI E&RC stocks portfolio returns with the crude oil return as the explanatory variable. It shows that in the full period the estimate for the crude oil returns is positive and it equals 0.3004 (significant at the 1% level). Moreover, the estimates of this parameter are also always significant in all sub-samples and they are consistently significant in all 5-year sub-periods and in all single-year periods.

A closer inspection of the evolution of the estimates for crude oil returns across all 5-year sub-periods proves that they increased from the level of 0.2053 in 2005-2010 to 0.4862 in 2009-2014 and then declined to 0.2634 in the last period 2011-2016. This pattern confirms the results reported and discussed earlier indicating the importance of the crude oil overall and it illustrates its declining role over time towards the end of our sample period.

[Tables 8a and 8b around here]

Table 8b presents the estimation results of parameters from model (10) for the SRI E&RC stocks portfolio *excess* returns (defined as the difference between the SRI E&RC stocks portfolio returns and the returns of the world market index) with the crude oil return again as the explanatory variable. It shows that, similarly to Table 8a, the crude oil returns are also statistically significant and positive in the entire sample period as well as in most sub-periods. Furthermore, Table 8b reveals the same effect as previously detected and discussed, i.e. that the crude oil price importance weakened at the end of the analysed sample period. The estimates of crude oil return variable were quite stable in the first six 5-year long sub-periods from 2005-2010 to 2010-2015 at the level between 0.09 and 0.13 (estimates significant in all these cases), but subsequently they dropped to 0.05 (estimate not significant) in the last sub-period 2011-2016.

This finding for the SRI E&RC stocks portfolio excess returns means that the crude oil price directly affects not only just the returns of the SRI energy and resource companies stocks, but it has also an impact on their returns measured relative to the general market conditions (as captured by the world stock market index). This is an important conclusion from this study. The relationships discussed in this section are shown in Figure 2.

[Figure 2 around here]

6.4. Relevance of the Crude Oil Price for Performance of Oil Related Stocks and Non-oil Related Stocks from the SRI E&RC Portfolio

Finally, in this last section we investigate the performance of stocks divided into two groups, i.e. oil related companies and non-oil related companies, and the relation between their returns (referred to henceforth as: ${}^{oil}R_{pt}$ and ${}^{non\text{-}oil}R_{pt}$, respectively) and the crude oil returns as the explanatory factor.

Table 9a reports the estimated parameters of models for the oil related stocks. The estimate for the whole period of the crude oil return variable is positive and equal to 0.4318 (significant at 1% level). In the 5-year periods the crude oil return increases from 0.4211 to 0.5604 and then drops at the end of the sample period to 0.3070.

This pattern of estimates is similar also in case of the models for the non-oil related stocks presented in Table 9b, but their values are roughly twice as low. The estimate for the whole period of the crude oil return variable is positive, however it is equal to only 0.1897 (significant at 1% level). In the 5-year periods it displays the same pattern, but it increases from 0.2257 to 0.3266 and then drops at the end of the sample period to just 0.1425.

[Tables 9a and 9b around here]

These findings show that the movements in the crude oil price had more influence on the performance of oil related stocks rather than non-oil related stocks, which is not surprising. However, the results in Tables 9a and 9b allow us to measure the magnitude of this difference: it appears that crude oil price returns are related *twice* as strongly to the performance of the SRI E&RC oil related stocks than to the performance of the SRI E&RC non-oil related stocks.[11]

7. Conclusions

The main objective of this study was to examine whether the performance of the stocks of SRI energy and resource companies is superior relative to major benchmarks and whether portfolios composed of such companies can outperform the market.

We first calculated the raw returns and assessed the performance of the portfolios relative to the broad, energy sector, SRI and alternative energy market indices. We report that in the entire 11-year period (February 2005 - January 2016) the annual average performance of the SRI E&RC stocks portfolio was neither consistently superior nor consistently inferior compared to the corresponding returns of all the benchmark indices. Overall, we found that the market does not penalize or reward the energy and resource companies for adopting the SRI practices[12], however their performance relies heavily on the changes in crude oil price.

[11] It is noteworthy that the literature has not yet extensively focused on the effects of oil price changes on firm-level stock returns, which would allow for a more in-depth analysis of this effect (given that firms within the same sector naturally exhibit heterogeneous responses to oil price changes). The lack of empirical evidence in this area is related to the fact that there are very few studies that rely on the firm-level portfolio construction (see a review by Degiannakis et al. 2018). Only a very limited number of papers report results based on firm-level data. They show that individual firms' stock returns respond to changes in oil prices (see, e.g., Boyer and Filion (2007), Scholtens and Wang (2008), Narayan and Sharma (2011), Tsai (2015)), yet the evidence about the nature, magnitude and variation of these reactions is very scarce. Hence, our paper also contributes to this particular new line of literature by addressing the gap in research about the effects of oil price changes on the company-level stock returns, also identified in the recent review paper by Degiannakis et al. (2018).

[12] Given that firms chase multiple objectives and the maximisation of their share price (or maximisation of shareholder value) is just one of them, the situation within which the companies analysed in this study are not being penalised for adopting the SRI principles may already be sufficient for them if they gain, indeed, social acceptance etc.

When the entire sample is divided into oil related stocks and non-oil related stocks, we found that an investment in the oil related stocks portfolio would have led to the average annual *loss* of -4.27%, while the non-oil related stocks portfolio would have delivered average annual *profit* of 4.61%. The performance of the oil related stocks portfolio was consistently *worse* than *all* the benchmark indices returns, whereas the result of the non-oil related stocks portfolio was consistently *better* than *all* the benchmark indices.

Another important finding from out study is that the dividends mattered quite a lot for the analysed SRI energy and resource stocks portfolio and its individual stocks because their inclusion in the calculation of the total returns substantially increased their performance.

The analysis of models of the SRI E&RC stocks portfolio returns with crude oil return as the explanatory variable shows that in the full period the estimate for crude oil returns is positive and significant at 1% level. However, across all 5-year sub-periods the estimate of crude oil return variable first increased in 2005-2010 and 2009-2014 periods and then declined in the last period 2011-2016. This pattern confirms our other results indicating the importance of the oil price, but also illustrates its declining role over time towards the end of our sample period.

In the models with the *excess* returns, we also found similar effects, which implies that crude oil price directly affects not only the returns of the SRI energy and resource companies stocks, but it has also an impact on their returns measured *relative to the general market conditions* (as captured by the world stock market index). This is another important conclusion from this study.

Our findings also evidence that the movements in the crude oil price had more influence on the performance of oil related stocks rather than non-oil related stocks. Furthermore, we measured the magnitude of this difference: it appears that crude oil price returns are related *twice*

as strongly to the performance of the SRI E&RC oil related stocks than to the performance of the SRI E&RC non-oil related stocks.

Finally, our analysis shows that the group of SRI energy and resource companies from the Global-100 list in the 11-year period 2005-2016 has been limited to 19 countries of origin from 16 developed nations. This indicates that in many emerging economies, where production and consumption of energy and natural resources are substantial and steadily growing, the SRI related criteria are yet to be fulfilled by the firms from these countries.

The findings of this study have broad important policy implications for financial market regulators and environmental protection agencies in addition to the investors who allocate their funds in energy and resource company stocks (including alternative energy firms). They also should raise awareness among stock market investors to mobilise capital in more sustainable ways and, possibly, to channel it towards more sustainable methods of energy production.

References

Alexander, G.J. and Buchholz, R.A. (1978). "Corporate Social Responsibility and Stock Market Performance." The Academy of Management Journal 21(3): 479-486.

Ambec, S. and Lanoie, P. (2007). "When and Why Does it Pay to be Green?." Discussion Paper No. IEA-07-04, Montreal: HEC. Accessed 23 July 2015. http://www.hec.ca/iea/cahiers/2007/iea0704_planoie.pdf.

Ambec, S. and Lanoie, P. (2008). "Does It Pay to Be Green? A Systematic Overview." Academy of Management Perspectives 22(4): 45-62.

Auer, B.R. (2016). "Do Socially Responsible Investment Policies Add or Destroy European Stock Portfolio Value?." Journal of Business Ethics 13(2): 381-397.

Auer, B.R. and Schuhmacher, F. (2016). "Do Socially (Ir)responsible Investments Pay? New Evidence from International ESG Data." Quarterly Review of Economics and Finance 59: 51-62.

Bauer, R., Derwall, J. and Otten, R. (2007. "The Ethical Mutual Fund Performance Debate: New Evidence from Canada." Journal of Business Ethics 70(2): 111-124.

Bauer, R., Koedijk, K. and Otten, R. (2005). "International Evidence on Ethical Mutual Fund Performance and Investment Style." Journal of Banking and Finance 29(7): 1751-1767.

Bauer, R., Otten, R., and Rad, A. (2006). "Ethical Investing in Australia: Is There a Financial Penalty?." Pacific-Basin Finance Journal 14(1): 33-48.

Bello, Z. (2005). "Socially Responsible Investing and Portfolio Diversification." Journal of Financial Research 28(1): 41-57.

Boyer, M.M. and Filion D. (2007). "Common and Fundamental Factors in Stock Returns of Canadian Oil and Gas Companies." Energy Economics 29: 428–53.

Brzeszczyński, J. and McIntosh, G. (2014). "Performance of Portfolios composed of British SRI Stocks." Journal of Business Ethics 120(3): 335-362.

Carhart, M.M. (1997). "On Persistence in Mutual Fund Performance" Journal of Finance 52(1): 57-83.

Clarkson, M. (1995). "A Stakeholder Framework for Analyzing and Evaluating Corporate Social Performance." Academy of Management Review 20(1): 92-117.

Climent, F. and Soriano, P. (2011). "Green and Good?." The Investment Performance of US Environmental Mutual Funds" Journal of Business Ethics 103(2): 275-287.

Consolandi, C., Jaiswal-Dale, A., Poggiani, E. and Vercelli, A. (2008). "Global Standards and Ethical Stock Indexes: The Case of the Dow Jones Sustainability Stoxx Index." Journal of Business Ethics 87(1): 185-197.

Cortez, M.C., Silva, F. and Areal, N. (2009). "The Performance of European Socially Responsible Funds." Journal of Business Ethics 87(4): 573-588.

Cummings, L.S. (2000). "The Financial Performance of Ethical Investment Trusts: An Australian Perspective." Journal of Business Ethics 25(1): 79-92.

Davis, K. (1973). "The Case for and Against Business Assumption of Social Responsibilities." Academy of Management Journal 16(2): 312-322.

Degiannakis, S, Filis G. and Kizys, R. (2018). "The Effects of Oil Price Shocks on Stock Market Volatility: Evidence from European Data". The Energy Journal 35(1): 35-56.

DeMiguel, V., Garlappi L., and Uppal R. (2009). "Optimal Versus Naive Diversification: How Inefficient is the 1/N Portfolio Strategy?." Review of Financial Studies 22(5): 1915-1953.

Derwall, J., Guenster, N., Bauer, R., and Koedijk, K. (2005). "The Eco-efficiency Premium Puzzle." Financial Analysts Journal 61(2): 51-63.

Engle, R.F. (1982). "Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation" Econometrica 50(4): 987-1007.

Fama, E.F. and French, K.R. (1992). "The Cross-section of Expected Returns." Journal of Finance 47(2): 427-465.

Fama, E.F. and French, K.R. (1993). "Common Risk Factors in the Returns on Stocks and Bonds." Journal of Financial Economics 33(1): 3-56.

Fombrun, C, and Shanley, M. (1990). "What's in a Name? Reputation Building and Corporate Governance Strategy." Academy of Management Journal 33(2): 233-258.

Freeman, E, and Evan, E. (1990), "Corporate Governance: A Stakeholder Interpretation" Journal of Behavioral Economics 19(4): 337-359.

Frynas, J.G. (2009). "Corporate Social Responsibility in the Oil and Gas Sector." Journal of World Energy Law and Business 3(2): 178-195.

Galema, R., Scholtens, B. and Plantinga, A. (2012). "The Cost of Socially Responsible Portfolios: Testing for Mean-Variance Spanning." working paper, University of Groningen.
Available at: http://ssrn.com/abstract=1086560

Gil-Bazo, J., Ruiz-Verdu, P. and Santos, A. (2010). "The Performance of Socially Responsible Mutual Funds: The Role of Fees and Management Companies." Journal of Business Ethics 94(2): 243-263.

Goldreyer, E. and Diltz, J. (1999). "The Performance of Socially Responsible Mutual Funds: Incorporating Sociopolitical Information in Portfolio Selection." Managerial Finance 25(1): 23-36.

Gooding, A.E., and O'Malley, T.P. (1977). '"Market phase and the stationarity of beta." Journal of Financial and Quantitative Analysis 12(5): 833–857.

Gregory, A., and Whittaker, J. (2007). "Performance and Performance Persistence of 'Ethical' Unit Trusts in the UK." Journal of Business Finance and Accounting 34(7/8): 1327-1344.

Hamilton, S., Jo, H. and Statman, M. (1993). "Doing Well While Doing Good? The Investment Performance of Socially Responsible Funds." Financial Analysts Journal 49(6): 62-66.

Hill C., and Jones, T. (1992). "Stakeholder-Agency Theory". Journal of Management Studies 29(2): 131-154.

Humphrey, J.E. and Lee, D.D. (2011). "Australian Socially Responsible Funds: Performance, Risk and Screening Intensity." Journal of Business Ethics 102(4): 519-535.

Humphrey, J.E., Lee, D.D., and Shen, Y. (2012). "Does it Cost to be Sustainable?." Journal of Corporate Finance 18(3): 626-639.

IEA (2014). "Energy, Climate Change and Environment. 2014 Insights", International Energy Agency, Paris.

IEA (2015). "Energy and Climate Change. World Energy Outlook Special Report", International Energy Agency, Paris.

Israelsen, C.L. (2005). "A Refinement to the Sharpe Ratio and Information Ratio." Journal of Asset Management 5(6): 423-427.

Jenkins, H. and Yakovleva, N. (2006). "Corporate Social Responsibility in the Mining Industry: Exploring Trends in Social and Environmental Disclosure". in Special Issue on 'Improving Environmental, Economic and Ethical Performance in the Mining Industry. Part 1. Environmental Management and Sustainable Development', Journal of Cleaner Production 14(3–4): 271–284.

Jones, T. (1995). "Instrumental Stakeholder Theory: A synthesis of Ethics and Economics." Academy of Management Review 20(2): 404-437.

Jones, S., van der Laan, S., Frost, S., and Loftus, J. (2008). "The Investment Performance of Socially Responsible Investment Funds in Australia." Journal of Business Ethics 80(2): 181-203.

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

Lean, H.H., Ang, W.R., Smyth, R. (2015). "Performance and Performance Persistence of Socially Responsible Investment Funds in Europe and North America." North American Journal of Economics and Finance 34(1): 254-266.

Lee M. (2008). “A Review of the Theories of Corporate Social Responsibility: Its Evolutionary Path and the Road Ahead”, International Journal of Management Reviews 10(1): 53-73.

Lo, A.W. (2004). “The Adaptive Markets Hypothesis.” Journal of Portfolio Management 30: 15-29.

Lo, A.W. (2005). “Reconciling Efficient Markets with Behavioural Finance: The Adaptive Markets Hypothesis. Journal of Investment Consulting 7: 21-44.

Managi, S., Okimoto, T., and Matsuda, A. (2012). “Do Socially Responsible Investment Indexes Outperform Conventional Indexes?.” Applied Financial Economics 22(18): 1511-1527.

Manahov, V., Hudson, R. (2014). “A Note on the Relationship between Market Efficiency and Adaptability – New Evidence from Artificial Stock Markets. Expert Systems with Applications 41: 7436-7454.

Margolis, J.D. and Walsh, J.P. (2003). “Misery Loves Companies: Rethinking Social Initiatives by Business.” Administrative Science Quarterly 48(2): 268-305.

McGuire, J, Sundgren, A, and Schneeweis, T. (1988). “Corporate Social Responsibility and Firm Financial Performance.” Academy of Management Journal 31(4): 854-872.

Mill, G.A. (2006). “The Financial Performance of a Socially Responsible Investment Over Time and a Possible Link with Corporate Social Responsibility.” Journal of Business Ethics 63(2): 131-148.

Moskowitz, M. (1972). “Choosing Socially Responsible Stocks.” Business and Society 1(1): 71-75.

Narayan, P.K. and Sharma S.S. (2011). “New Evidence on Oil Price and Firm Returns.” Journal of Banking and Finance 35(12): 3253–3262.

Orlitzky, M., Schmidt, F.L. and Rynes, S.L. (2003). “Corporate Social and Financial Performance: A Meta-Analysis.” Organization Studies 24(3): 403-441.

Piotroski, J.D. (2000). “Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers.” Journal of Accounting Research 38: 1-41.

Revelli, C., and Viviani, J.-L. (2013). “The Link Between SRI and Financial Performance: Effects and Moderators.” Management International 17(2): 105-122.

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

Riedl, A., Smeets, P. (2017). “Why Do Investors Hold Socially Responsible Mutual Funds?.” Journal of Finance 72(6): 2505-2550.

Sauer, D. (1997). “The Impact of Social-Responsibility Screens on Investment Performance: Evidence from the Domini 400 Social Index and Domini Equity Fund.” Review of Financial Economics 6(2): 23-35.

Scholtens, B. (2005). “Style and Performance of Dutch Socially Responsible Investment Funds.” Journal of Investing 14(1): 63-72.

Scholtens, B. and Wang L. (2008). “Oil Risk in Oil Stocks.” The Energy Journal 29: 89–111.

Schroder, M. (2007). “Is there a Difference? The Performance Characteristics of SRI Equity Indexes.” Journal of Business Finance and Accounting 34(1): 331-348.

Sharpe, W. (1966). “Mutual Fund Performance.” Journal of Business 39(1): 119-138.

Sharpe, W. (1994). “The Sharpe Ratio”, Journal of Portfolio Management 21(1): 49-58.

Spicer, B. (1978). “Investors, Corporate Social Performance and Information Disclosure: An Empirical Study.” Accounting Review 53(1): 94-111.

Statman, M. (2000). “Socially Responsible Mutual Funds.” Financial Analysts Journal 56(3): 30-39.

Statman, M. and Glushkov, D. (2009). “The Wages of Social Responsibility.” Financial Analysts Journal 65(4): 33-46.

Syed, A.M. (2017). “Socially Responsible: Are They Profitable?.” Research in International Business and Finance 42: 1504-1515.

Tsai, C.L. (2015). “How Do US Stock Returns Respond Differently to Oil Price Shocks Pre-crisis, Within the Financial Crisis, and Post-crisis?.” Energy Economics 50: 47–62.

Ullmann, A. (1985). “Data in Search of a Theory: A Critical Examination of the Relationship among Social Performance, Social Disclosure and Economic Performance of U.S. Firms.” Academy of Management Review 10(1-2): 540-557.

Urquhart, A. and McGroarty, F. (2014). “Calendar Effects, Market Conditions and the Adaptive Market Hypothesis: Evidence from Long-Run U.S. Data.” International Review of Financial Analysis 35: 154-166.

Urquhart, A. and McGroarty, F. (2016). “Are Stock Markets Really Efficient? Evidence of the Adaptive Market Hypothesis.” International Review of Financial Analysis 47: 39-49.

USSIF (2014). “*Report on US Sustainable, Responsible and Impact Investing Trends 2014*”. Washington: The Forum for Sustainable and Responsible Investment. Available at: http://www.ussif.org/trends

Vance, S.C. (1975). “Are Socially Responsible Corporations Good Investment Risks?.” Management Review 64(8): 19-24.

Voorhes, M., and Humphreys, J. (2011). "Recent Trends in Sustainable and Responsible Investing in the United States" Journal of Investing 20(3): 90-94.

Waddock, S, and Graves S. (1997). "The Corporate Social Performance-Financial Performance Link." Strategic Management Journal 18(4): 303-319.

Woodward, G., and Anderson, H. (2009). "Does Beta React to Market Conditions? Estimates of 'Bull' and 'Bear' Betas Using a Nonlinear Market Model with an Endogenous Threshold Parameter." Quantitative Finance 9(8): 913–924.

Wu, J., Lodorfos, G., Dean, and A., Gioulmpaxiotis, G. (2015). "The Market Performance of Socially Responsible Investment during Periods of the Economic Cycle – Illustrated Using the Case of FTSE." Managerial and Decision Economics 38(2): 238-251.

Zhao, W. (2015). "Corporate Social Responsibility in the Energy Industry: A Content Analysis of Leading Energy Companies Websites." Electronic Theses, Treatises and Dissertations**.** Paper 9505.
Available at: http://diginole.lib.fsu.edu/etd/9505

Table 1: List of SRI energy and resource companies.

#	Company Name	Country	Area of Operation	No. of Employees	Year Established
1	Alumina Limited	Australia	Mining	5100	2000
2	Anglo American Platinum Ltd.	South Africa	Mining	28692	1946
3	Baker Hughes	United States	Energy Equipment & Services	64000	1986
4	Barrick Gold Corp	Canada	Mining	11000	1984
5	BG Group Plc	United Kingdom	Oil & Gas Producers	4717	1998
6	BHP Billiton Plc	United Kingdom	Mining	26146	1996
7	BP Plc	United Kingdom	Oil & Gas Producers	74000	1909
8	Cairn Energy Plc	United Kingdom	Oil & Gas Producers	156	2002
9	Cenovus Energy Inc	Canada	Oil Equipment, Services & Distribution	2882	2008
10	Centrica Plc	United Kingdom	Gas, Water & Multiutilities	34901	1995
11	Companhia Energética Minas GER-PRF	Brazil	Electricity	5864	1952
12	Duke Energy Corp.	USA	Electricity	29060	2005
13	Electricite de France	France	Electric Utilities	151073	1955
14	Enagas SA	Spain	Gas, Water & Multiutilities	1426	1972
15	Enbridge Inc	Canada	Gas, Water & Multiutilities	8654	1987
16	Encana Corp	Canada	Oil & Gas Producers	2107	2001
17	Expro International Group	United Kingdom	Oil & Gas Producers	4500	1992
18	Fortum OYJ	Finland	Electricity	8785	1998
19	FPL Group Inc	USA	Electricity	14000	1984
20	Galp Energia SGPS SA	Portugal	Oil & Gas Producers	6389	1999
21	Gamesa Corporacion Tecnologica SA	Spain	Alternative Energy	25000	1976
22	Hess Corporation	United States	Energy	2075	1920
23	Iberdrola SA	Spain	Electricity	33772	1992
24	Lonmin Plc	United Kingdom	Mining	24713	1909
25	Mitsui OSK Lines Ltd.	Japan	Gas, Water & Multiutilities	10794	1942
26	Neste Oil Corporation	Finland	Oil & Gas Producers	5339	2004
27	Nexen Inc	Canada	Oil & Gas Producers	3228	1971
28	Norsk Hydro Asa	Norway	Mining	34625	1988
29	OMV AG	Austria	Oil & Gas Producers	20721	1943
30	Origin Energy Limited	Australia	Oil & Gas Producers	5788	1946
31	Outotec OYJ	Finland	Mining	4146	1990
32	Pennon Group Plc	United Kingdom	Gas, Water & Multiutilities	4799	1989
33	Petrobras Petroleo Brasileiro	Brazil	Oil & Gas Producers	62703	1966
34	PG & E Corp.	USA	Electricity	23000	1905
35	Pinnacle West Capital Corp.	USA	Electricity	6292	1985
36	Reliance Industries Ltd	India	Oil & Gas Producers	24167	1973
37	Repsol SA	Spain	Oil & Gas Producers	24226	1927
38	Rio Tinto PLC	United Kingdom	Mining	46807	1962
39	Royal Dutch Shell PLC	Netherlands	Oil & Gas Producers	86000	2002
40	Saipem SPA	Italy	Oil Equipment, Services & Distribution	33936	1957
41	Schlumberger Limited	USA	Oil Equipment, Services & Distribution	100000	1956
42	Schneider Electric	France	Electricity	153124	1995
43	Scottish & Southern Energy Plc	United Kingdom	Electricity	21157	1989
44	Sembcorp Industries Ltd.	Singapore	Gas, Water & Multiutilities	18072	1998
45	Severn Trent Plc	United Kingdom	Gas, Water & Multiutilities	7602	1989
46	Statoil ASA	Norway	Oil & Gas Producers	20245	1988
47	Suncor Energy Inc	Canada	Oil & Gas Producers	12381	1989
48	Teck Resources Ltd.	Canada	Mining	9600	1951
49	Tokyo Gas Co Ltd.	Japan	Gas, Water & Multiutilities	16823	1885
50	Transalta Corp.	Canada	Electricity	2228	1992
51	TransCanada Corp.	Canada	Gas, Water & Multiutilities	7500	2003
52	Umicore SA	Belgium	Mining	9769	1904
53	Vale SA	Brazil	Mining	65539	1969
54	Vestas Windsystems A/S	Denmark	Industrial Engineering	23303	1986
55	Wartsila Oyj	Finland	Industrial Engineering	18065	1914
56	Woodside Petroleum Ltd	Australia	Oil & Gas Producers	3597	1971

Source: Data collated by authors from companies' websites, annual reports and from Bloomberg.

Table 2: List of companies in the SRI E&RC stocks portfolio - period 02.2005-01.2016.

#	Company Name	2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
1	Alumina Ltd	x										
2	Anglo American Platinum Ltd						x	x	x			
3	Baker Hughes											x
4	Barrick Gold Corp									x		
5	BG Group PLC					x	x	x	x	x	x	x
6	BHP Billiton PLC					x						
7	BP PLC	x	x									
8	Cairn Energy PLC	x				x						
9	Cenovus Energy Inc									x	x	
10	Centrica PLC	x	x	x	x	x	x	x	x	x	x	x
11	Companhia Energética de Minas Gerais S.A.									x		
12	Duke Energy Corp.						x				x	
13	Electricite de France											x
14	Enagas SA									x		x
15	Enbridge Inc	x	x	x			x	x	x	x	x	x
16	Encana Corp					x	x	x	x		x	x
17	Expro International Group	x										
18	Fortum Corp.				x							
19	FPL Group Inc	x	x	x	x	x						
20	Galp Energia SGPS SA									x	x	x
21	Gamesa Corporacion Tecnologica SA	x	x	x								
22	Hess Corporation										x	x
23	Iberdola SA		x	x	x	x	x	x	x			
24	Lonmin PLC					x	x					
25	Mitsui OSK Lines Ltd							x				
26	Neste Oil Corporation			x	x	x	x	x	x	x	x	x
27	NEXEN INC				x		x	x	x	x		
28	Norsk Hydro Asa							x	x			
29	OMV AG				x		x		x			
30	Origin Energy Limited						x	x	x			
31	Outotec OYJ									x	x	x
32	Pennon Group Plc								x			
33	Petrobras Petroleo Brasileiro						x	x	x			
34	PG & E Corp.					x	x	x				
35	Pinnacle West Capital Corp.	x	x	x	x	x	x					
36	Reliance Industries Ltd							x	x			
37	Repsol SA							x	x	x		
38	Rio Tinto PLC				x							
39	Royal Dutch Shell PLC	x		x	x		x			x	x	
40	Saipem S.p.A.				x	x						
41	Schlumberger Limited	x	x	x								
42	Schneider Electric SA								x	x	x	x
43	Scottish & Southern Energy PLC	x	x	x								
44	Sembcorp Industries Limited						x					
45	Severn Trent PLC	x	x	x								
46	Statoil ASA					x	x	x	x	x	x	x
47	Suncor Energy Inc						x	x	x	x	x	x
48	Teck Resources Ltd									x	x	x
49	Tokyo Gas Co Ltd							x				
50	Transalta Corp.	x	x									
51	TransCanada Corp.			x	x	x	x					
52	Umicore SA						x	x	x	x	x	
53	Vale SA									x		
54	Vestas Windsystems A/S	x	x	x	x	x	x	x	x			
55	Wartsila Oyj					x						
56	Woodside Petroleum Ltd									x		
	Total	15	12	13	13	16	22	20	20	20	16	15

Note: 'x' denotes the respective company appeared on the Global 100 list in the indicated year(s) and, therefore, it is included in the sample for the analysis..

Table 3: Average annual geometric returns for the whole 11-year period (February to January) from 2005 to 2016 for the SRI E&RC stocks portfolio and for the benchmark indexes: 1) Global broad market (S&P Global 1200), 2) Global energy market (MSCI World Energy) 3) Global SRI market (FTSE4GOOD Global 100) and 4) Global alternative energy market (FTSE ET50).

A: SRI E&RC stocks portfolio (with dividends) and price index versions of benchmark indices.

Single-year Periods	SRI Energy Portfolio	S&P GLOBAL 1200 Price Index	Difference	t-Statistic	MSCI WORLD ENERGY Price Index	Difference	t-Statistic	FTSE4GOOD GLOBAL 100 Price Index	Difference	t-Statistic	FTSE ET50 Price Index	Difference	t-Statistic
2005-2006	**35.14%**	**15.11%**	20.02%	0.945	**41.06%**	-5.92%	-0.156	**8.99%**	26.14%	1.329	**33.27%**	1.87%	0.052
2006-2007	**38.98%**	-4.81%	43.79%	1.721*	-8.52%	47.51%	1.767*	-3.11%	42.10%	1.789*	-14.33%	53.32%	1.451
2007-2008	**22.63%**	-1.38%	24.01%	1.005	**15.53%**	7.10%	0.227	-6.02%	28.64%	1.212	**31.93%**	-9.30%	-0.219
2008-2009	-42.39%	-43.03%	0.64%	0.026	-33.89%	-8.51%	-0.291	-44.51%	2.12%	0.089	-47.21%	4.82%	0.152
2009-2010	**47.42%**	**34.51%**	12.91%	0.298	**20.63%**	26.79%	0.655	**33.19%**	14.23%	0.33	**25.34%**	22.08%	0.435
2010-2011	**18.13%**	**16.88%**	1.25%	0.037	**23.11%**	-4.98%	-0.128	**10.25%**	7.88%	0.222	**3.63%**	14.50%	0.38
2011-2012	-16.30%	-5.07%	-11.23%	-0.438	-5.52%	-10.78%	-0.353	-6.78%	-9.53%	-0.373	-25.03%	8.72%	0.318
2012-2013	**3.83%**	**13.25%**	-9.42%	-0.368	**3.21%**	0.62%	0.022	**14.20%**	-10.37%	-0.397	**2.73%**	1.10%	0.045
2013-2014	-11.38%	**12.50%**	-23.88%	-1.231	**1.99%**	-13.37%	-0.704	**11.91%**	-23.28%	-1.192	**35.32%**	-46.70%	-2.149**
2014-2015	-9.73%	**5.00%**	-14.73%	-0.867	-13.06%	3.33%	0.156	**3.21%**	-12.94%	-0.766	-2.58%	-7.15%	-0.341
2015-2016	-23.53%	-7.20%	-16.32%	-0.636	-23.04%	-0.48%	-0.018	-6.21%	-17.32%	-0.662	-8.96%	-14.57%	-0.547
Multiple-year Periods													
2005-2010	**14.36%**	-3.70%	18.06%	1.29	**3.52%**	10.84%	0.675	-6.01%	20.37%	1.494	-0.07%	14.43%	0.762
2006-2011	**11.32%**	-3.41%	14.73%	1.008	**0.74%**	10.58%	0.665	-5.79%	17.12%	1.184	-4.97%	16.30%	0.873
2007-2012	**0.59%**	-3.46%	4.05%	0.282	**1.40%**	-0.81%	-0.051	-6.52%	7.11%	0.499	-7.47%	8.06%	0.457
2008-2013	-2.71%	-0.75%	-1.95%	-0.136	-0.86%	-1.84%	-0.119	-2.80%	0.10%	0.007	-11.99%	9.28%	0.571
2009-2014	**6.05%**	**13.72%**	-7.67%	-0.585	**8.11%**	-2.07%	-0.149	**11.84%**	-5.79%	-0.437	**6.25%**	-0.20%	-0.014
2010-2015	-3.86%	**8.22%**	-12.08%	-1.117	**1.26%**	-5.12%	-0.422	**6.27%**	-10.14%	-0.922	**1.02%**	-4.88%	-0.404
2011-2016	-11.87%	**3.34%**	-15.21%	-1.493	-7.82%	-4.05%	-0.359	**2.89%**	-14.76%	-1.438	-1.56%	-10.31%	-0.925
Full Period	**1.89%**	**1.20%**	0.68%	0.082	-0.24%	2.13%	0.226	-0.63%	2.52%	0.303	-0.42%	2.31%	0.224
Bull market	**21.70%**	**17.67%**	4.03%	0.432	**1.35%**	20.35%	2.008**	**15.32%**	6.38%	0.685	**22.55%**	-0.85%	-0.073
Bear market	-40.63%	-37.48%	-3.15%	-0.244	-38.22%	-2.41%	-0.165	-38.18%	-2.45%	-0.192	-44.83%	4.20%	0.259

B: SRI E&RC stocks portfolio (with dividends) and total return index versions of benchmark indices.

Single-year Periods	SRI Energy Portfolio	S&P GLOBAL 1200 TR Index	Difference	t-Statistic	MSCI WORLD ENERGY TR Index	Difference	t-Statistic	FTSE4GOOD GLOBAL 100 TR Index	Difference	t-Statistic	FTSE ET50 TR Index	Difference	t-Statistic
2005-2006	**35.14%**	**17.79%**	17.35%	0.813	**44.53%**	-9.40%	-0.244	**8.99%**	26.14%	1.329	**33.27%**	1.87%	0.052
2006-2007	**38.98%**	-5.47%	44.45%	1.604	-9.00%	47.99%	1.682	-3.11%	42.10%	1.789*	-14.33%	53.32%	1.451
2007-2008	**22.63%**	**0.96%**	21.67%	0.894	**18.77%**	3.86%	0.123	-6.02%	28.64%	1.212	**31.97%**	-9.34%	-0.22
2008-2009	-42.39%	-41.22%	-1.17%	-0.047	-32.11%	-10.28%	-0.346	-44.51%	2.12%	0.089	-46.72%	4.33%	0.136
2009-2010	**47.42%**	**38.59%**	8.83%	0.2	**24.71%**	22.71%	0.544	**33.31%**	14.11%	0.328	**26.79%**	20.63%	0.403
2010-2011	**18.13%**	**20.02%**	-1.89%	-0.055	**26.59%**	-8.46%	-0.217	**13.79%**	4.34%	0.122	**4.75%**	13.38%	0.35
2011-2012	-16.30%	-2.36%	-13.94%	-0.538	-3.03%	-13.27%	-0.432	-3.67%	-12.63%	-0.49	-23.32%	7.01%	0.254
2012-2013	**3.83%**	**16.62%**	-12.79%	-0.495	**6.39%**	-2.56%	-0.092	**18.26%**	-14.43%	-0.546	**3.87%**	-0.04%	-0.002
2013-2014	-11.38%	**15.51%**	-26.89%	-1.37	**5.17%**	-16.55%	-0.861	**15.53%**	-26.90%	-1.359	**36.79%**	-48.17%	-2.203**
2014-2015	-9.73%	**7.69%**	-17.42%	-1.01	-10.27%	0.53%	0.025	**6.43%**	-16.16%	-0.936	-1.77%	-7.96%	-0.379
2015-2016	-23.53%	-4.82%	-18.71%	-0.721	-20.02%	-3.51%	-0.127	-3.32%	-20.21%	-0.762	-8.14%	-15.39%	-0.574
Multiple-year Periods													
2005-2010	**14.36%**	-1.74%	16.10%	1.127	**5.75%**	8.61%	0.526	-5.99%	20.35%	1.492	**0.35%**	14.01%	0.738
2006-2011	**11.32%**	-1.38%	12.70%	0.852	**2.98%**	8.34%	0.516	-5.18%	16.50%	1.139	-4.37%	15.69%	0.838
2007-2012	**0.59%**	-0.73%	1.32%	0.091	**4.30%**	-3.71%	-0.23	-5.29%	5.88%	0.411	-6.46%	7.05%	0.398
2008-2013	-2.71%	**2.17%**	-4.88%	-0.334	**2.03%**	-4.74%	-0.302	-0.84%	-1.87%	-0.129	-10.83%	8.13%	0.497
2009-2014	**6.05%**	**16.95%**	-10.90%	-0.822	**11.37%**	-5.32%	-0.379	**14.83%**	-8.78%	-0.658	**7.67%**	-1.62%	-0.11
2010-2015	-3.86%	**11.20%**	-15.06%	-1.379	**4.27%**	-8.13%	-0.665	**9.77%**	-13.63%	-1.228	**2.31%**	-6.18%	-0.509
2011-2016	-11.87%	**6.16%**	-18.03%	-1.751*	-4.88%	-6.99%	-0.613	**6.25%**	-18.12%	-1.742*	-0.34%	-11.53%	-1.031
Full Period	**1.89%**	**3.64%**	-1.75%	-0.206	**2.44%**	-0.55%	-0.058	**1.13%**	0.76%	0.091	**0.43%**	1.46%	0.141
Bull market	**21.70%**	**20.42%**	1.27%	0.134	**20.39%**	1.31%	0.119	**17.47%**	4.22%	0.451	**23.42%**	-1.72%	-0.147
Bear market	-40.63%	-35.70%	-4.94%	-0.378	-36.13%	-4.50%	-0.304	-37.34%	-3.30%	-0.256	-44.09%	3.46%	0.212

C: SRI E&RC stocks portfolio (without dividends) and price index versions of benchmark indices.

Single-year Periods	SRI Energy Portfolio	S&P GLOBAL 1200 Price Index	Difference	t-Statistic	MSCI WORLD ENERGY Price Index	Difference	t-Statistic	FTSE4GOOD GLOBAL 100 Price Index	Difference	t-Statistic	FTSE ET50 Price Index	Difference	t-Statistic
2005-2006	**31.06%**	**15.11%**	15.94%	0.767	**41.06%**	-10.00%	-0.268	**8.99%**	22.07%	1.144	**33.27%**	-2.21%	-0.062
2006-2007	**33.33%**	-4.81%	38.13%	1.535	-8.52%	41.85%	1.593	-3.11%	36.44%	1.587	-14.33%	47.66%	1.326
2007-2008	**19.41%**	-1.38%	20.79%	0.883	**15.53%**	3.88%	0.126	-6.02%	25.43%	1.091	**31.93%**	-12.51%	-0.299
2008-2009	-44.36%	-43.03%	-1.32%	-0.055	-33.89%	-10.47%	-0.365	-44.51%	0.15%	0.006	-47.21%	2.85%	0.091
2009-2010	**42.49%**	**34.51%**	7.98%	0.189	**20.63%**	21.86%	0.549	**33.19%**	9.30%	0.222	**25.34%**	17.15%	0.346
2010-2011	**14.65%**	**16.88%**	-2.23%	-0.066	**23.11%**	-8.46%	-0.22	**10.25%**	4.40%	0.125	**3.63%**	11.02%	0.292
2011-2012	-18.47%	-5.07%	-13.40%	-0.526	-5.52%	-12.95%	-0.428	-6.78%	-11.69%	-0.461	-25.03%	6.56%	0.242
2012-2013	**0.75%**	**13.25%**	-12.50%	-0.488	**3.21%**	-2.46%	-0.089	**14.20%**	-13.45%	-0.514	**2.73%**	-1.97%	-0.08
2013-2014	-15.49%	**12.50%**	-27.99%	-1.447	**1.99%**	-17.48%	-0.923	**11.91%**	-27.39%	-1.407	**35.32%**	-50.81%	-2.345**
2014-2015	-12.26%	**5.00%**	-17.25%	-1.042	-13.06%	0.80%	0.038	**3.21%**	-15.46%	-0.939	-2.58%	-9.68%	-0.472
2015-2016	-25.57%	-7.20%	-18.36%	-0.728	-23.04%	-2.52%	-0.095	-6.21%	-19.36%	-0.753	-8.96%	-16.61%	-0.634
Multiple-year Periods													
2005-2010	**10.59%**	-3.70%	14.29%	1.042	**3.52%**	7.07%	0.449	-6.01%	16.60%	1.243	-0.07%	10.66%	0.573
2006-2011	**7.67%**	-3.41%	11.08%	0.772	**0.74%**	6.93%	0.444	-5.79%	13.47%	0.949	-4.97%	12.65%	0.69
2007-2012	-2.41%	-3.46%	1.05%	0.074	**1.40%**	-3.81%	-0.243	-6.52%	4.10%	0.293	-7.47%	5.06%	0.291
2008-2013	-5.67%	-0.75%	-4.92%	-0.347	-0.86%	-4.81%	-0.315	-2.80%	-2.87%	-0.203	-11.99%	6.31%	0.394
2009-2014	**2.55%**	**13.72%**	-11.17%	-0.862	**8.11%**	-5.56%	-0.405	**11.84%**	-9.28%	-0.709	**6.25%**	-3.69%	-0.255
2010-2015	-6.93%	**8.22%**	-15.15%	-1.412	**1.26%**	-8.19%	-0.681	**6.27%**	-13.20%	-1.212	**1.02%**	-7.95%	-0.664
2011-2016	-14.63%	**3.34%**	-17.97%	-1.784*	-7.82%	-6.81%	-0.611	**2.89%**	-17.52%	-1.726*	-1.56%	-13.07%	-1.187
Full Period	-1.36%	**1.20%**	-2.57%	-0.312	-0.24%	-1.12%	-0.122	-0.63%	-0.73%	-0.089	-0.42%	-0.94%	-0.093
Bull market	**17.73%**	**17.67%**	0.07%	0.007	**1.35%**	16.38%	1.642	**15.32%**	2.41%	0.263	**22.55%**	-4.81%	-0.419
Bear market	-42.36%	-37.48%	-4.88%	-0.384	-38.22%	-4.14%	-0.288	-38.18%	-4.18%	-0.333	-44.83%	2.47%	0.155

Notes for Table 3 (A-C): 1) * - means statistical significance at the 10% level. 2) The *t*-statistic was calculated based on the paired difference test. 3) Bold numbers indicate positive figures. 4) Cells highlighted in grey identify the portfolio or index with the highest average annual geometric return for the analysed period: 2005 – 2016. 4) Cells highlighted in grey identify the portfolio or index with the highest MSR ratio for that period 5) Single-year period covers 12 months between 1st February to 31st Jan. 6) Multiple-year period covers five consecutive single-year period.

Notes on bull and bear periods: In all the tables (Tables 3 A-C, Table 4, Table 5, Tables 7 A-D, Appendix tables A1 and B1-B4) bull and bear market periods have been identified using the idea of non-overlapping 'bull' and 'bear' phases based on major peaks and troughs found in the stock market indices, presented in Gooding and O'Malley (1977) and more recently in Woodward and Anderson (2009), i.e. based on the variability of indices (S&P Global and MSCI World Energy) in case of this study. Bull market periods cover 103 months over 02.05 to 10.07, 03.09 to 04.11 and 10.2011 to 01.15 and bear market periods cover 29 months during: 11.07 to 02.09, 05.2011 to 09.2011 and 06.2015 to 01.2016.

Table 4: Modified Sharpe ratios (*MSR*) and Standard Deviations (*SD*) from 2005 to 2016 for the SRI E&RC stocks portfolio (with dividends) and for the total return index versions of benchmark indices.

Single-year Periods	SRI Energy Portfolio		S&P Global 1200 TR Index		MSCI World Energy Sector TR Index		FTSE4GOOD Global 100 Total Return Index		FTSE ET50 INDEX TR USD	
	MSR	**SD**	MSR	**SD**	MSR	**SD**	MSR	**SD**	MSR	**SD**
2005-2006	**0.5430**	**0.0436**	**0.4847**	**0.0235**	**0.4439**	**0.0692**	**0.2613**	**0.0182**	**0.3530**	**0.0667**
2006-2007	**0.8095**	**0.0299**	-0.0004	**0.0633**	-0.0006	**0.0670**	-0.0003	**0.0507**	-0.0011	**0.0921**
2007-2008	**0.2890**	**0.0510**	-0.0001	**0.0366**	**0.2184**	**0.0565**	-0.0003	**0.0373**	**0.2789**	**0.0833**
2008-2009	-0.0040	**0.0954**	-0.0029	**0.0701**	-0.0026	**0.0908**	-0.0031	**0.0662**	-0.0055	**0.1263**
2009-2010	**0.5267**	**0.0660**	**0.4608**	**0.0637**	**0.3226**	**0.0629**	**0.4132**	**0.0629**	**0.2628**	**0.0890**
2010-2011	**0.2513**	**0.0624**	**0.2919**	**0.0573**	**0.3159**	**0.0696**	**0.1958**	**0.0646**	**0.0846**	**0.0783**
2011-2012	-0.0008	**0.0624**	0.0000	**0.0531**	-0.00001	**0.0748**	-0.0001	**0.0534**	-0.0014	**0.0751**
2012-2013	**0.0812**	**0.0576**	**0.3668**	**0.0367**	**0.1240**	**0.0515**	**0.3795**	**0.0388**	**0.1010**	**0.0374**
2013-2014	-0.0004	**0.0475**	**0.4233**	**0.0295**	**0.1464**	**0.0320**	**0.4119**	**0.0304**	**0.8374**	**0.0321**
2014-2015	-0.0003	**0.0453**	**0.2915**	**0.0220**	-0.0004	**0.0522**	**0.2388**	**0.0228**	0.0000	**0.0454**
2015-2016	-0.0015	**0.0751**	-0.0001	**0.0430**	-0.0011	**0.0656**	-0.0001	**0.0455**	-0.0003	**0.0511**
Multiple-year Periods										
2005-2010	**0.1956**	**0.0572**	-0.0001	**0.0515**	**0.0715**	**0.0692**	-0.0003	**0.0471**	**0.0310**	**0.0915**
2006-2011	**0.1573**	**0.0609**	-0.0001	**0.0582**	**0.0463**	**0.0693**	-0.0002	**0.0564**	-0.0001	**0.0938**
2007-2012	**0.0320**	**0.0674**	**0.0041**	**0.0562**	**0.0722**	**0.0709**	-0.0002	**0.0569**	-0.0002	**0.0904**
2008-2013	**0.0021**	**0.0687**	**0.0599**	**0.0562**	**0.0562**	**0.0699**	**0.0162**	**0.0572**	-0.0005	**0.0812**
2009-2014	**0.1122**	**0.0592**	**0.2967**	**0.0481**	**0.1832**	**0.0582**	**0.2561**	**0.0500**	**0.1330**	**0.0624**
2010-2015	-0.0001	**0.0550**	**0.2435**	**0.0397**	**0.0902**	**0.0560**	**0.2072**	**0.0420**	**0.0654**	**0.0536**
2011-2016	-0.0005	**0.0576**	**0.1539**	**0.0369**	-0.0001	**0.0552**	**0.1518**	**0.0382**	**0.0210**	**0.0482**
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Full Period	**0.0428**	**0.0578**	**0.0702**	**0.0454**	**0.0484**	**0.0629**	**0.0245**	**0.0446**	**0.0333**	**0.0706**
Bull market	**0.2916**	**0.0527**	**0.3471**	**0.0417**	**0.2533**	**0.0570**	**0.3010**	**0.0411**	**0.2656**	**0.0623**
Bear market	-0.0031	**0.0707**	-0.0020	**0.0549**	-0.0027	**0.0731**	-0.0021	**0.0541**	-0.0046	**0.0956**

Notes: 1) The modified Sharpe ratio was calculated based on the formula from Israelsen (2005): $MSR = ER/SD^{(ER/absER)}$, where ER is excess return defined as mean monthly difference between the portfolio (or index) return and risk-free return computed for n equal to 12, 60 or 132 months, respectively, and SD is the sample standard deviation of the monthly differences of returns 2). Bold numbers indicate positive MSR and SD figures. 4) Cells highlighted identify the portfolio or index with the highest MSR ratio for that period 5) Single-year period covers 12 months between 1st February to 31st Jan 6) Multiple-year period covers five consecutive single-year periods.

Table 5: Certainty Equivalent (*CEQ*) returns (for risk aversion parameters: $\gamma = 0.5$, $\gamma = 1$ and $\gamma = 2$) from 2005 to 2016 for the SRI E&RC stocks portfolio (with dividends) and for the total return index versions of benchmark indices.

Single-year Periods	$\gamma = 0.5$					$\gamma = 1$					$\gamma = 2$				
	SRI Energy Portfolio	S&P Global 1200 TR Index	MSCI World Energy Sector TR Index	FTSE4GOOD Global 100 Total Return Index	FTSE ET50 INDEX TR USD	SRI Energy Portfolio	S&P Global 1200 TR Index	MSCI World Energy Sector TR Index	FTSE4GOOD Global 100 Total Return Index	FTSE ET50 INDEX TR USD	SRI Energy Portfolio	S&P Global 1200 TR Index	MSCI World Energy Sector TR Index	FTSE4GOOD Global 100 Total Return Index	FTSE ET50 INDEX TR USD
2005-2006	**2.32%**	**1.12%**	**2.95%**	**0.47%**	**2.24%**	**2.27%**	**1.11%**	**2.83%**	**0.46%**	**2.13%**	**2.18%**	**1.08%**	**2.59%**	**0.44%**	**1.91%**
2006-2007	**2.40%**	-0.76%	-1.07%	-0.60%	-1.45%	**2.38%**	-0.86%	-1.19%	-0.66%	-1.66%	**2.33%**	-1.06%	-1.41%	-0.79%	-2.09%
2007-2008	**1.41%**	-0.25%	**1.15%**	-0.85%	**2.15%**	**1.34%**	-0.29%	**1.07%**	-0.88%	**1.98%**	**1.21%**	-0.35%	**0.91%**	-0.95%	**1.63%**
2008-2009	-4.37%	-4.32%	-3.10%	-4.80%	-4.76%	-4.60%	-4.45%	-3.31%	-4.91%	-5.16%	-5.05%	-4.69%	-3.72%	-5.13%	-5.95%
2009-2010	**3.37%**	**2.83%**	**1.93%**	**2.50%**	**2.14%**	**3.26%**	**2.73%**	**1.83%**	**2.40%**	**1.94%**	**3.04%**	**2.53%**	**1.63%**	**2.20%**	**1.55%**
2010-2011	**1.47%**	**1.59%**	**2.08%**	**1.16%**	**0.51%**	**1.37%**	**1.51%**	**1.96%**	**1.06%**	**0.36%**	**1.18%**	**1.34%**	**1.71%**	**0.85%**	**0.05%**
2011-2012	-1.39%	-0.14%	-0.15%	-0.25%	-2.06%	-1.49%	-0.21%	-0.29%	-0.33%	-2.20%	-1.68%	-0.35%	-0.57%	-0.47%	-2.48%
2012-2013	**0.38%**	**1.31%**	**0.57%**	**1.43%**	**0.34%**	**0.30%**	**1.28%**	**0.51%**	**1.40%**	**0.31%**	**0.14%**	**1.21%**	**0.37%**	**1.32%**	**0.24%**
2013-2014	-0.95%	**1.23%**	**0.44%**	**1.23%**	**2.67%**	-1.01%	**1.21%**	**0.42%**	**1.21%**	**2.64%**	-1.12%	**1.16%**	**0.37%**	**1.16%**	**2.59%**
2014-2015	-0.81%	**0.63%**	-0.84%	**0.53%**	-0.11%	-0.86%	**0.62%**	-0.91%	**0.52%**	-0.16%	-0.96%	**0.59%**	-1.04%	**0.49%**	-0.26%
2015-2016	-2.10%	-0.37%	-1.76%	-0.24%	-0.65%	-2.24%	-0.42%	-1.87%	-0.29%	-0.72%	-2.52%	-0.51%	-2.08%	-0.40%	-0.85%
Multiple-year Periods															
2005-2010	**1.04%**	-0.27%	**0.38%**	-0.65%	**0.07%**	**0.96%**	-0.33%	**0.26%**	-0.70%	-0.13%	**0.79%**	-0.47%	**0.02%**	-0.81%	-0.55%
2006-2011	**0.87%**	-0.18%	**0.20%**	-0.51%	-0.27%	**0.77%**	-0.26%	**0.08%**	-0.59%	-0.49%	**0.59%**	-0.43%	-0.16%	-0.75%	-0.93%
2007-2012	**0.10%**	-0.06%	**0.39%**	-0.44%	-0.40%	-0.01%	-0.13%	**0.26%**	-0.53%	-0.60%	-0.24%	-0.29%	**0.01%**	-0.69%	-1.01%
2008-2013	-0.10%	**0.26%**	**0.27%**	**0.01%**	-0.75%	-0.22%	**0.18%**	**0.15%**	-0.07%	-0.91%	-0.46%	**0.02%**	-0.10%	-0.23%	-1.24%
2009-2014	**0.58%**	**1.37%**	**0.98%**	**1.22%**	**0.73%**	**0.49%**	**1.31%**	**0.90%**	**1.16%**	**0.64%**	**0.31%**	**1.20%**	**0.73%**	**1.03%**	**0.44%**
2010-2015	-0.26%	**0.93%**	**0.43%**	**0.83%**	**0.28%**	-0.33%	**0.89%**	**0.35%**	**0.78%**	**0.21%**	-0.49%	**0.81%**	**0.19%**	**0.69%**	**0.06%**
2011-2016	-0.97%	**0.53%**	-0.34%	**0.54%**	**0.04%**	-1.05%	**0.50%**	-0.42%	**0.51%**	-0.01%	-1.22%	**0.43%**	-0.57%	**0.43%**	-0.13%
Full Period	**0.16%**	**0.27%**	**0.21%**	**0.06%**	**0.11%**	**0.08%**	**0.22%**	**0.11%**	**0.01%**	-0.01%	-0.09%	**0.11%**	-0.09%	-0.09%	-0.26%
Bull market	**1.47%**	**1.40%**	**1.36%**	**1.19%**	**1.56%**	**1.40%**	**1.36%**	**1.28%**	**1.15%**	**1.46%**	**1.26%**	**1.27%**	**1.12%**	**1.07%**	**1.27%**
Bear market	-4.45%	-3.76%	-3.88%	-3.97%	-5.04%	-4.58%	-3.84%	-4.01%	-4.04%	-5.26%	-4.83%	-3.99%	-4.28%	-4.19%	-5.72%

Notes: 1) Certainty Equivalent (*CEQ*) returns are defined as: $\hat{\mu}_k - (\gamma/2)\hat{\sigma}_k^2$, where $\hat{\mu}_k$ and $\hat{\sigma}_k^2$ are the mean and variance of excess returns of a portfolio or an index k and γ is the risk aversion parameter. This formulation of *CEQ* assumes a multi-period investor with quadratic utility. The 'normal' level of risk aversion is 1, while higher (lower) values indicate higher (lower) levels of risk aversion. 3) Bold numbers indicate positive *CEQ* figures. 4) Cells highlighted in grey identify the portfolio or index with the highest *CEQ* value for that period for a given risk aversion level of γ.

Table 6a: Estimation results of parameters of Carhart four-factor model in the entire sample from 02.2005 to 01.2016 and

in the individual single- and multiple-year sub-periods.

Single-year Periods	*constant*	$RMRF_t$	SMB_t	HML_t	$MOMENTUM_t$	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2006	-0.009347 (0.006417)	0.550695 (1.410412)	-0.650142 (0.931411)	0.394405 (2.126673)	1.670996 (1.347944)	12	OLS	0.778524	F-stat: 7.444454 (p = 0.021824) Q(10) = 8.8275 (p = 0.453) LM(10) = 3.704812 (p = 0.5926)
2006-2007	-0.002582 (0.014042)	1.742491 ** (0.708851)	-0.951012 (0.942051)	1.102375 (1.204043)	-0.566911 (0.987840)	12	OLS	0.297737	F-stat: 2.165912 (p = 0.175168) Q(10) = 8.2438 (p = 0.605) LM(10) = 5.948700 (p = 0.3112)
2007-2008	0.009892 (0.009796)	0.868113 ** (0.288962)	0.001714 (0.455212)	-0.060503 (0.878868)	0.755206 (0.575321)	12	OLS	0.789938	F-stat: 11.34136 (p = 0.003521) Q(10) = 6.2395 (p = 0.795) LM(10) = 2.916939 (p = 0.7128)
2008-2009	0.000580 (0.005794)	1.307021 *** (0.085727)	0.723956 * (0.342126)	-1.064136 ** (0.309518)	0.553652 *** (0.142481)	12	OLS	0.969413	F-stat: 88.15867 (p =0.000005) Q(10) = 11.187 (p = 0.343) LM(10) = 6.771964 (p = 0.2382)
2009-2010	0.009918 (0.009482)	0.848279 * (0.316788)	-0.811787 (0.959010)	-0.795951 (0.669209)	-0.192267 (0.204664)	12	OLS	0.963013	F-stat: 41.91421 (p =0.001393) Q(10) = 9.7363 (p = 0.204) LM(10) = 6.68 (p = 0.2454)
2010-2011	0.000122 (0.005074)	1.005458 *** (0.093368)	0.344739 (0.307800)	0.265604 (0.270343)	-0.353404 (0.239773)	12	OLS	0.944954	F-stat: 48.20842 (p = 0.000035) Q(10) = 14.134 (p = 0.167) LM(10) = 6.189696 (p = 0.2882)
2011-2012	-0.010789 (0.007595)	1.092945 *** (0.129408)	0.601138 (0.578222)	-0.111336 (0.522221)	0.012280 (0.253907)	12	OLS	0.872995	F-stat: 19.90264 (p = 0.000633) Q(10) = 5.3048 (p = 0.870) LM(10) = 6.717249 (p = 0.2425)
2012-2013	0.004358 (0.013557)	0.883266 ** (0.312221)	-0.134973 (0.713600)	-0.435489 (0.651786)	-1.027467 (0.560709)	12	OLS	0.880493	F-stat: 21.26125 (p = 0.000514) Q(10) = 10.829 (p =0.371) LM(10) = 6.332885 (p =0.2752)
2013-2014	-0.008476 (0.016812)	1.594954 *** (0.420398)	1.324147 (1.061515)	0.629713 (1.307470)	-1.618794 (0.915396)	12	OLS	0.535669	F-stat: 4.172496 (p = 0.048604) Q(10) = 13.923 (p = 0.177) LM(10) = 6.389529 (p = 0.2701)
2014-2015	-0.001723 (0.009969)	1.034747 ** (0.399161)	0.236730 (0.627248)	1.941675 ** (0.706911)	0.284111 (0.595130)	12	OLS	0.580374	F-stat: 4.803450 (p = 0.035083) Q(10) = 10.277 (p = 0.416) LM(10) = 6.627231 (p = 0.2499)
2015-2016	0.003523 (0.011171)	0.689477 (0.425379)	-0.138891 (0.718056)	0.093438 (1.841817)	-1.922010 (1.152672)	12	OLS	0.777787	F-stat: 10.62553 (p = 0.004259) Q(10) = 7.1506 (p = 0.711) LM(10) = 6.350523 (p = 0.2736)

Table 6a: (continued)

Multiple-year Periods	*constant*	$RMRF_t$	SMB_t	HML_t	$MOMENTUM_t$	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2010	0.010401 *** (0.003795)	1.214343 *** (0.083647)	0.036162 (0.248672)	-0.446349 * (0.259069)	0.180873 * (0.097308)	60	OLS	0.802289	F-stat: 60.85399 (p = 0.000000) Q(10) = 8.6457 (p = 0.566) LM(10) = 9.869408 (p = 0.4520)
2006-2011	0.007512 ** (0.003588)	1.164729 *** (0.072095)	-0.082006 (0.228446)	-0.485311 ** (0.224971)	0.089690 (0.090575)	60	OLS	0.833125	F-stat: 74.63938 (p = 0.000000) Q(10) = 6.1379 (p = 0.804) LM(10) = 9.032429 (p = 0.5290)
2007-2012	0.001068 (0.003482)	1.147564 *** (0.063786)	0.241609 (0.223099)	-0.470023 ** (0.205951)	0.096196 (0.085566)	60	OLS	0.860811	F-stat: 92.22129 (p = 0.000000) Q(10) = 11.571 (p = 0.315) LM(10) = 4.620812 (p = 0.9150)
2008-2013	-0.00462 (0.003372)	1.142855 *** (0.064585)	0.484365 ** (0.237716)	-0.423158 ** (0.193399)	0.031696 (0.084548)	60	OLS	0.872647	F-stat: 102.0695 (p = 0.000000) Q(10) = 12.211 (p = 0.271) LM(10) = 6.563907 (p = 0.7659)
2009-2014	-0.009037 ** (0.003599)	1.059358 *** (0.080347)	0.112236 (0.256362)	-0.108680 (0.214140)	-0.157143 * (0.088279)	60	OLS	0.812934	F-stat: 65.09910 (p = 0.000000) Q(10) = 7.2791 (p = 0.699) LM(10) = 3.831414 (p = 0.9546)
2010-2015	-0.007874 ** (0.003569)	1.062000 *** (0.080336)	0.393217 (0.244848)	0.421655 * (0.218770)	-0.412105 *** (0.151376)	60	OLS	0.792849	F-stat: 57.45419 (p = 0.000000) Q(10) = 3.9708 (p = 0.949) LM(10) = 4.015032 (p = 0.9467)
2011-2016	-0.007810 * (0.004171)	1.066926 *** (0.104845)	0.155930 (0.288839)	0.710751 ** (0.287680)	-0.610538 *** (0.187052)	60	OLS	0.733997	F-stat: 41.70042 (p = 0.000000) Q(10) = 7.7571 (p = 0.653) LM(10) = 4.928144 (p = 0.8959)
Full Period	*constant*	$RMRF_t$	SMB_t	HML_t	$MOMENTUM_t$	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2016	-0.002984 (0.003142)	1.074698 *** (0.068523)	0.166042 (0.202130)	0.285871 (0.209958)	0.011500 (0.098124)	132	OLS	0.707988	F-stat: 44.64136 (p = 0.000000) Q(10) = 11.953 (p = 0.102) LM(10) = 13.56863 (p = 0.1936)

Notes: 1) Standard errors are included in brackets. 2) Statistical significance is indicated as: *** significant at 0.01 level, ** significant at 0.05 level and * significant at 0.1 level. 3) Sample size is reported as the number of months in the respective samples. 4) All regressions are based on time series models. Guide to estimation methods: OLS = Ordinary Least Squares, ARCH = AutoRegressive Conditional Heteroscedasticity and GARCH = Generalised AutoRegressive Conditional Heteroscedasticity, 5) The reported diagnostic tests include the value of the F-test statistic, the value of the Ljung-Box Q statistic with 10 lags as the test for autocorrelation and the value of the LM statistic with 10 lags as the test for any remaining ARCH effects (their respective p-values are reported in brackets).

Table 6b: Estimation results of parameters of Carhart four-factor model with crude oil returns as a control variable in the entire sample from 02.2005 to 01.2016 and in the individual single- and multiple-year sub-periods.

Single-year Periods	*constant*	$RMRF_t$	SMB_t	HML_t	$MOMENTUM_t$	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2006	-0.017451 (0.009706)	0.404640 (0.446652)	0.019338 (0.824202)	-0.064521 (1.183161)	2.037924 ** (0.747684)	0.053658 (0.129337)	12	OLS	0.770469	F-stat: 8.384755 (p = 0.011111) Q(10) = 11.095 (p = 0.350) LM(10) = 6.744210 (p = 0.2404)
2006-2007	0.003543 (0.016635)	1.589788 * (0.759705)	-0.983317 (0.973767)	0.510154 (1.472260)	-0.527421 (1.021456)	0.088888 (0.118334)	12	OLS	0.251118	F-stat: 1.737712 (p = 0.259638) Q(10) = 7.8527 (p = 0.643) LM(10) = 6.957834 (p = 0.2238)
2007-2008	0.009193 (0.012719)	0.872135 ** (0.314507)	-0.012023 (0.510581)	-0.043434 (0.964121)	0.747969 (0.625219)	0.014503 (0.146796)	12	OLS	0.755326	F-stat: 7.791539 (p = 0.013321) Q(10) = 6.5548 (p = 0.767) LM(10) = 2.938129 (p = 0.7095)
2008-2009	-0.000053 (0.019057)	1.211262 *** (0.123738)	0.766731 (0.748020)	-0.635919 (0.850403)	0.500658 * (0.191157)	0.091677 (0.088733)	12	OLS	0.992637	F-stat: 186.3574 (p = 0.000588) Q(10) = 6.1673 (p = 0.520) LM(10) = 5.024429 (p = 0.4129)
2009-2010	0.013147 ** (0.001441)	0.928837 *** (0.070092)	-1.121491 * (0.362492)	-0.519336 * (0.143988)	-0.223540 ** (0.039615)	-0.120607 * (0.040928)	12	OLS	0.993473	F-stat: 187.0433 (p = 0.005329) Q(10) = 10.225 (p = 0.115) LM(10) = 3.886766 (p = 0.5658)
2010-2011	-0.001578 (0.004853)	0.953629 *** (0.093707)	0.143279 (0.317492)	0.065146 (0.286260)	-0.368632 (0.222857)	0.174833 (0.120052)	12	OLS	0.952552	F-stat: 45.16630 (p = 0.000110) Q(10) = 13.530 (p = 0.196) LM(10) = 3.760582 (p = 0.5844)
2011-2012	-0.012047 (0.008457)	1.072199 *** (0.143668)	0.434794 (0.702508)	-0.120401 (0.553680)	-0.027629 (0.281400)	0.075954 (0.156924)	12	OLS	0.857395	F-stat: 14.22725 (p = 0.002822) Q(10) = 5.2287 (p = 0.875) LM(10) = 3.758571 (p = 0.5847)
2012-2013	0.004213 (0.014975)	0.881912 ** (0.338459)	-0.141079 (0.781987)	-0.423805 (0.748300)	-1.022451 (0.615265)	0.004771 (0.103705)	12	OLS	0.860625	F-stat: 14.58471 (p = 0.002641) Q(10) = 12.235 (p = 0.270) LM(10) = 6.406378 (p = 0.2687)
2013-2014	-0.015485 (0.016506)	1.404753 ** (0.416083)	1.081255 (1.008650)	0.858988 (1.234848)	-0.913972 (0.992267)	0.431143 (0.305924)	12	OLS	0.593006	F-stat: 4.205488 (p = 0.054689) Q(10) = 11.287 (p = 0.336) LM(10) = 6.019329 (p =0.3043)
2014-2015	-0.006154 (0.016419)	1.151327 * (0.538602)	0.131875 (0.732786)	2.050642 ** (0.815729)	0.206609 (0.672657)	-0.064943 (0.183094)	12	OLS	0.520491	F-stat: 3.388024 (p = 0.084748) Q(10) = 9.4264 (p = 0.492) LM(10) = 5.570961 (p = 0.3502)
2015-2016	0.000874 (0.012354)	1.015440 (0.669881)	-0.035145 (0.766454)	0.593523 (2.071077)	-1.605863 (1.297974)	-0.104129 (0.160211)	12	OLS	0.757804	F-stat: 7.883553 (p = 0.012942) Q(10) = 7.1443 (p = 0.712) LM(10) = 6.945570 (p = 0.2247)

Table 6b: (continued)

Multiple-year Periods	*constant*	$RMRF_t$	SMB_t	HML_t	$MOMENTUM_t$	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2010	0.009192 ** (0.003700)	1.156087 *** (0.084706)	-0.048078 (0.242754)	-0.407881 (0.250484)	0.170160 * (0.093986)	0.088394 ** (0.039111)	60	OLS	0.816030	F-stat: 53.34075 (p = 0.000000) Q(10) = 9.0902 (p = 0.524) LM(10) = 11.07565 (p = 0.3517)
2006-2011	0.006688 * (0.003483)	1.114830 *** (0.075129)	-0.135864 (0.224937)	-0.443621 ** (0.220847)	0.086226 (0.088497)	0.075710 * (0.039695)	60	OLS	0.840762	F-stat: 63.30285 (p = 0.000000) Q(10) = 4.1760 (p = 0.939) LM(10) = 8.148981 (p = 0.6143)
2007-2012	0.000050 (0.003498)	1.106334 *** (0.067543)	0.170186 (0.223824)	-0.432043 ** (0.204046)	0.092533 (0.084268)	0.068612 (0.041394)	60	OLS	0.865097	F-stat: 76.67041 (p = 0.000000) Q(10) = 7.8266 (p = 0.646) LM(10) = 4.272000 (p = 0.9342)
2008-2013	-0.004735 (0.003380)	1.118445 *** (0.070170)	0.428771 * (0.246038)	-0.394963 ** (0.196263)	0.030177 (0.084713)	0.037397 (0.041616)	60	OLS	0.872199	F-stat: 81.53134 (p = 0.000000) Q(10) = 11.071 (p = 0.352) LM(10) = 5.091092 (p = 0.8850)
2009-2014	-0.009619 ** (0.003646)	1.039109 *** (0.082872)	0.041370 (0.266024)	-0.088077 (0.215140)	-0.147081 (0.088856)	0.059783 (0.059905)	60	OLS	0.812920	F-stat: 52.27461 (p = 0.000000) Q(10) = 7.8494 (p = 0.644) LM(10) = 4.457912 (p = 0.9243)
2010-2015	-0.007397 ** (0.003552)	1.031191 *** (0.082498)	0.331200 (0.246499)	0.368237 (0.220000)	-0.396972 ** (0.150368)	0.074439 (0.052366)	60	OLS	0.796624	F-stat: 47.22055 (p = 0.000000) Q(10) = 4.5642 (p = 0.918) LM(10) = 3.867329 (p = 0.9531)
2011-2016	-0.007789 * (0.004290)	1.065858 *** (0.113549)	0.155238 (0.292718)	0.710251 (0.290970)	-0.610075 *** (0.189617)	0.001385 (0.053399)	60	OLS	0.729074	F-stat: 32.75432 (p = 0.000000) Q(10) = 7.7755 (p = 0.651) LM(10) = 4.918282 (p = 0.8966)
Full Period	*constant*	$RMRF_t$	SMB_t	HML_t	$MOMENTUM_t$	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2016	-0.002319 (0.002910)	1.021210 *** (0.069520)	0.101909 (0.197855)	0.238139 (0.195236)	-0.017123 (0.090714)	0.101632 *** (0.034728)	132	OLS	0.720671	F-stat: 68.59637 (p = 0.000000) Q(10) = 15.715 (p = 0.108) LM(10) = 12.16531 (p = 0.2741)

Notes: 1) Standard errors are included in brackets. 2) Statistical significance is indicated as: *** significant at 0.01 level, ** significant at 0.05 level and * significant at 0.1 level. 3) Sample size is reported as the number of months in the respective samples. 4) All regressions are based on time series models. Guide to estimation methods: OLS = Ordinary Least Squares, ARCH = AutoRegressive Conditional Heteroscedasticity and GARCH = Generalised AutoRegressive Conditional Heteroscedasticity, 5) The reported diagnostic tests include the value of the F-test statistic, the value of the Ljung-Box Q statistic with 10 lags as the test for autocorrelation and the value of the LM statistic with 10 lags as the test for any remaining ARCH effects (their respective p-values are reported in brackets).

Table 7a: **Average annual geometric returns for the 11-year period (February to January) 2005 to 2016 for oil related companies stocks portfolio (with dividends) and for total return versions of the benchmark indexes: 1) Global broad market (S&P Global 1200), 2) Global energy market (MSCI World Energy) 3) Global SRI market (FTSE4GOOD Global 100) and 4) Global alternative energy market (FTSE ET50).**

Single-year Periods	Portfolio with dividends	S&P Global 1200 TR Index			MSCI World Energy TR Index			FTSE4GOOD Global 100 TR Index			FTSE ET50 TR Index		
	Return	Return	Difference	t-stat	Return	Difference	t-stat	Return	Difference	t-stat	Return	Difference	t-stat
2005-2006	41.95%	17.79%	24.16%	1.3546	**44.53%**	-2.58%	-0.2245	8.99%	32.96%	1.7251	33.27%	8.68%	0.5074
2006-2007	-9.97%	-5.47%	-4.50%	-0.2436	-9.00%	-0.96%	-0.0767	**-3.11%**	-6.86%	-0.4528	-14.33%	4.37%	0.1599
2007-2008	8.04%	0.96%	7.08%	0.5096	18.77%	-10.73%	-1.1709	-6.02%	14.05%	0.9743	**31.97%**	-23.93%	-1.5093
2008-2009	-52.94%	-41.22%	-11.72%	-0.4519	**-32.11%**	-20.83%	-1.8222*	-44.51%	-8.43%	-0.2874	-46.72%	-6.22%	-0.2243
2009-2010	**64.86%**	38.59%	26.27%	1.4539	24.71%	40.15%	2.6066**	33.31%	31.55%	1.7723	26.79%	38.08%	1.5913
2010-2011	17.96%	20.02%	-2.06%	-0.224	**26.59%**	-8.63%	-0.8802	13.79%	4.16%	0.4738	4.75%	13.21%	1.4771
2011-2012	-16.90%	**-2.36%**	-14.54%	-1.0738	-3.03%	-13.87%	-1.2271	-3.67%	-13.22%	-0.8914	-23.32%	6.42%	0.6206
2012-2013	3.32%	16.62%	-13.30%	-1.1773	6.39%	-3.07%	-0.4665	**18.26%**	-14.94%	-1.4024	3.87%	-0.55%	-0.0417
2013-2014	-15.84%	15.51%	-31.35%	-1.8018*	5.17%	-21.01%	-1.3383	15.53%	-31.36%	-1.8073*	**36.79%**	-52.63%	-3.5172***
2014-2015	-15.40%	**7.69%**	-23.09%	-1.4941	-10.27%	-5.13%	-0.5845	6.43%	-21.83%	-1.3884	-1.77%	-13.63%	-0.7686
2015-2016	-19.90%	-4.82%	-15.09%	-0.6104	-20.02%	0.12%	0.0082	**-3.32%**	-16.59%	-0.6755	-8.14%	-11.76%	-0.437
Multiple-year Periods													
2005-2010	1.39%	-1.74%	3.13%	0.1643	**5.75%**	-4.36%	-0.3328	-5.99%	7.38%	0.3731	0.35%	1.03%	0.0456
2006-2011	-2.30%	-1.38%	-0.92%	-0.0521	**2.98%**	-5.28%	-0.411	-5.18%	2.88%	0.1586	-4.37%	2.07%	0.0947
2007-2012	-3.85%	-0.73%	-3.12%	-0.1839	**4.30%**	-8.15%	-0.643	-5.29%	1.44%	0.0791	-6.46%	2.61%	0.1379
2008-2013	-4.71%	**2.17%**	-6.88%	-0.4154	2.03%	-6.74%	-0.5443	-0.84%	-3.87%	-0.2191	-10.83%	6.13%	0.336
2009-2014	7.04%	**16.95%**	-9.91%	-0.6785	11.37%	-4.32%	-0.3355	14.83%	-7.79%	-0.5259	7.67%	-0.63%	-0.0383
2010-2015	-6.33%	**11.20%**	-17.53%	-1.2931	4.27%	-10.60%	-0.9927	9.77%	-16.10%	-1.1672	2.31%	-8.64%	-0.5994
2011-2016	-13.31%	6.16%	-19.47%	-1.1689	-4.88%	-8.43%	-0.7196	**6.25%**	-19.56%	-1.167	-0.34%	-12.97%	-0.7253
Full Period	-4.27%	**3.64%**	-7.91%	-0.4521	2.44%	-6.71%	-0.5521	1.13%	-5.40%	-0.2995	0.43%	-4.70%	-0.2386
Bull market	14.65%	19.19%	-4.54%	-0.277	18.11%	-3.47%	-0.2869	16.32%	-1.67%	-0.1019	**20.60%**	-5.95%	-0.3112
Bear market	-49.55%	**-36.92%**	-12.63%	-0.6151	-38.22%	-11.33%	-0.9663	-38.48%	-11.06%	-0.4913	-47.58%	-1.97%	-0.0897

Notes: 1) * - means statistical significance at the 10% level. 2) The *t*-statistic was calculated based on the paired difference test. 3) Bold numbers indicate positive figures. 4) Cells highlighted in grey identify the portfolio or index with the highest average annual geometric return for the analysed period: 2005 – 2016.

Table 7b: Average annual geometric returns for the 11-year period (February to January) 2005 to 2016 for non-oil related companies stocks portfolio (with dividends) and for total return versions of the benchmark indexes: 1) Global broad market (S&P Global 1200), 2) Global energy market (MSCI World Energy), 3) Global SRI market (FTSE4GOOD Global 100) and 4) Global alternative energy market (FTSE ET50).

Single-year Periods	Portfolio with dividends	S&P Global 1200 TR Index			MSCI World Energy TR Index			FTSE4GOOD Global 100 TR Index			FTSE ET50 TR Index		
	Return	Return	Difference	t-stat	Return	Difference	t-stat	Return	Difference	t-stat	Return	Difference	t-stat
2005-2006	25.17%	17.79%	7.38%	0.574	**44.53%**	-19.36%	-0.9902	8.99%	16.18%	1.2265	33.27%	-8.09%	-0.4731
2006-2007	**47.82%**	-5.47%	53.28%	2.2979**	-9.00%	56.82%	2.5138**	-3.11%	50.93%	2.665**	-14.33%	62.15%	1.971*
2007-2008	25.84%	0.96%	24.88%	2.1303*	18.77%	7.07%	0.481	-6.02%	31.85%	2.666**	**31.97%**	-6.13%	-0.3122
2008-2009	-33.06%	-41.22%	8.16%	0.5678	**-32.11%**	-0.94%	-0.0363	-44.51%	11.45%	0.6506	-46.72%	13.67%	0.7463
2009-2010	23.15%	**38.59%**	-15.45%	-1.273	24.71%	-1.57%	-0.0961	33.31%	-10.16%	-0.6972	26.79%	-3.64%	-0.2854
2010-2011	18.32%	20.02%	-1.70%	-0.1869	**26.59%**	-8.27%	-0.5672	13.79%	4.52%	0.4471	4.75%	13.57%	0.8892
2011-2012	-15.23%	**-2.36%**	-12.87%	-0.931	-3.03%	-12.20%	-0.5915	-3.67%	-11.56%	-0.8473	-23.32%	8.09%	0.3824
2012-2013	5.06%	16.62%	-11.56%	-1.1983	6.39%	-1.34%	-0.1158	**18.26%**	-13.20%	-1.3336	3.87%	1.18%	0.1389
2013-2014	2.45%	15.51%	-13.07%	-1.408	5.17%	-2.73%	-0.221	15.53%	-13.08%	-1.3957	**36.79%**	-34.35%	-3.0494**
2014-2015	**8.49%**	7.69%	0.80%	0.0971	-10.27%	18.76%	1.4462	6.43%	2.06%	0.2209	-1.77%	10.26%	0.8061
2015-2016	-26.96%	-4.82%	-22.15%	-2.2253**	-20.02%	-6.94%	-0.5775	**-3.32%**	-23.65%	-2.2825**	-8.14%	-18.82%	-1.201
Multiple-year Periods													
2005-2010	**13.93%**	-1.74%	15.67%	0.99	5.75%	8.18%	0.3986	-5.99%	19.92%	1.2651	0.35%	13.58%	0.6422
2006-2011	**12.65%**	-1.38%	14.03%	0.9078	2.98%	9.67%	0.4934	-5.18%	17.83%	1.1546	-4.37%	17.02%	0.821
2007-2012	0.80%	-0.73%	1.53%	0.1207	**4.30%**	-3.50%	-0.1902	-5.29%	6.09%	0.4294	-6.46%	7.26%	0.4203
2008-2013	-2.78%	**2.17%**	-4.95%	-0.4128	2.03%	-4.81%	-0.2678	-0.84%	-1.94%	-0.1438	-10.83%	8.06%	0.5229
2009-2014	5.86%	**16.95%**	-11.09%	-1.0408	11.37%	-5.51%	-0.3675	14.83%	-8.97%	-0.7837	7.67%	-1.81%	-0.1249
2010-2015	3.21%	**11.20%**	-7.99%	-0.7975	4.27%	-1.06%	-0.0724	9.77%	-6.56%	-0.6281	2.31%	0.90%	0.0616
2011-2016	-6.28%	6.16%	-12.44%	-1.2052	-4.88%	-1.40%	-0.0988	**6.25%**	-12.53%	-1.1785	-0.34%	-5.94%	-0.4026
Full period	**4.61%**	3.64%	0.97%	0.0719	2.44%	2.17%	0.1251	1.13%	3.48%	0.252	0.43%	4.18%	0.2322
Bull market	19.83%	19.19%	0.64%	0.0469	18.11%	1.72%	0.1022	16.32%	3.51%	0.2544	**20.60%**	-0.77%	-0.0431
Bear market	**-35.43%**	-36.92%	1.49%	0.1233	-38.22%	2.79%	0.1473	-38.48%	3.06%	0.2187	-47.58%	12.15%	0.6546

Notes: 1) * - means statistical significance at the 10% level. 2) The *t*-statistic was calculated based on the paired difference test. 3) Bold numbers indicate positive figures. 4) Cells highlighted in grey identify the portfolio or index with the highest average annual geometric return for the analysed period: 2005 – 2016.

Table 7c: Modified Sharpe ratios (*MSR*) and Standard Deviations (*SD*) from 2005 to 2016 for oil related companies stocks portfolio (with dividends) and for the total return versions of the benchmark indexes.

Single-year Periods	Portfolio with dividends			S&P Global 1200 TR Index			MSCI World Energy TR Index			FTSE4GOOD Global 100 TR Index			FTSE ET50 TR Index		
	MSR	TR	SD	MSR	GTR	SD	MSR	GTR	SD	MSR	GTR	SD	MSR	GTR	SD
2005-2006	1.74	**0.21**	22.29%	**1.78**	0.15	8.20%	1.73	0.18	23.97%	0.92	0.08	6.35%	1.30	0.13	23.19%
2006-2007	-0.02	-0.36	15.95%	-0.02	-0.10	21.99%	-0.03	-0.15	23.24%	**-0.01**	**-0.10**	17.61%	-0.06	-0.14	31.96%
2007-2008	0.16	0.02	22.64%	0.00	-0.03	12.82%	0.73	0.11	19.66%	-0.01	-0.10	13.07%	**0.95**	**0.14**	28.97%
2008-2009	-0.21	-0.46	38.35%	**-0.10**	-0.43	24.35%	-0.11	-0.36	31.49%	-0.11	-0.50	23.03%	-0.21	**-0.28**	43.78%
2009-2010	**2.41**	**0.72**	26.85%	1.74	0.39	22.07%	1.13	0.29	21.77%	1.52	0.34	21.80%	0.87	0.21	30.85%
2010-2011	0.67	0.14	26.67%	1.00	0.20	19.86%	**1.10**	**0.23**	24.12%	0.61	0.12	22.37%	0.17	0.04	27.11%
2011-2012	-0.05	-0.11	29.84%	**0.00**	-0.02	18.39%	-0.01	**-0.02**	25.92%	-0.01	-0.04	18.49%	-0.06	-0.20	26.00%
2012-2013	0.15	0.02	22.05%	1.30	0.17	12.72%	0.36	0.05	17.84%	**1.35**	**0.17**	13.43%	0.29	0.04	12.95%
2013-2014	-0.03	-0.17	19.94%	1.52	0.16	10.22%	0.47	0.05	11.08%	1.47	0.15	10.53%	**3.31**	**0.42**	11.13%
2014-2015	-0.03	-0.13	17.98%	**1.01**	**0.08**	7.62%	-0.02	-0.07	18.08%	0.81	0.06	7.90%	0.00	-0.01	15.72%
2015-2016	-0.06	-0.14	31.74%	-0.01	-0.05	14.88%	-0.05	-0.17	22.72%	**-0.01**	**-0.03**	15.75%	-0.01	-0.08	17.68%
Multiple-year Periods															
2005-2010	0.00	-0.01	28.14%	-0.01	-0.05	20.04%	**0.12**	**0.03**	24.69%	-0.02	-0.10	18.78%	-0.01	-0.02	32.74%
2006-2011	-0.01	-0.04	28.58%	-0.01	-0.04	21.56%	**0.03**	**0.01**	24.48%	-0.02	-0.08	21.02%	-0.02	-0.05	33.11%
2007-2012	-0.02	-0.04	30.62%	0.00	-0.02	20.91%	**0.12**	**0.03**	24.93%	-0.01	-0.06	21.16%	-0.02	-0.06	32.24%
2008-2013	-0.02	-0.04	30.52%	**0.09**	**0.02**	20.97%	0.07	0.02	24.62%	0.00	-0.01	21.33%	-0.03	-0.09	29.89%
2009-2014	0.27	0.06	25.57%	**0.99**	**0.17**	16.98%	0.56	0.10	20.35%	0.84	0.14	17.60%	0.33	0.06	22.98%
2010-2015	-0.01	-0.05	23.26%	**0.79**	**0.11**	14.21%	0.21	0.03	19.71%	0.64	0.09	15.09%	0.12	0.02	19.75%
2011-2016	-0.03	-0.10	24.19%	**0.47**	**0.06**	13.06%	-0.01	-0.04	19.32%	0.46	0.06	13.49%	0.00	0.00	17.68%
Full Period	-0.01	-0.05	26.25%	**0.14**	**0.02**	17.13%	0.05	0.01	22.32%	0.00	0.00	16.93%	0.00	-0.01	26.19%
Bull market	0.57	0.12	23.26%	**1.24**	**0.18**	14.37%	0.85	0.15	19.76%	1.06	0.16	14.15%	0.89	0.15	21.60%
Bear market	-0.15	-0.47	28.93%	**-0.07**	-0.38	19.01%	-0.10	-0.40	25.38%	-0.07	-0.41	18.75%	-0.16	**-0.31**	33.15%

Notes: 1) The modified Sharpe ratio was calculated based on the formula from Israelsen (2005): $MSR = ER/SD^{(ER/absER)}$, where ER is the excess return defined as mean monthly difference between the portfolio (or index) return and the risk-free return computed for n equal to 12, 60 or 132 months, respectfully, and SD is the sample standard deviation of the monthly differences of returns. 2). Bold numbers indicate positive MSR and SD figures. 3) Cells highlighted in grey identify the portfolio or index with the highest MSR ratio for that period 4) Single-year period covers 12 months from 1st February to 31st January. 5) Multiple-year period covers five consecutive single-year period.

Table 7d: Modified Sharpe ratios (*MSR*) and Standard Deviations (*SD*) from 2005 to 2016 for the non-oil related companies stocks portfolio (with dividends) and for the total return versions of the benchmark indexes.

Single-year Periods	Portfolio with dividends			S&P Global 1200 TR Index			MSCI World Energy TR Index			FTSE4GOOD Global 100 TR Index			FTSE ET50 TR Index		
	MSR	TR	SD	MSR	TR	SD	MSR	TR	SD	MSR	TR	SD	MSR	TR	SD
2005-2006	1.58	**0.31**	13.94%	**1.78**	0.15	8.20%	1.73	0.18	23.97%	0.92	0.08	6.35%	1.30	0.13	23.19%
2006-2007	**4.10**	**7.44**	10.48%	-0.02	-0.10	21.99%	-0.03	-0.15	23.24%	-0.01	-0.10	17.61%	-0.06	-0.14	31.96%
2007-2008	**1.15**	**0.19**	18.57%	0.00	-0.03	12.82%	0.73	0.11	19.66%	-0.01	-0.10	13.07%	0.95	0.14	28.97%
2008-2009	**-0.10**	-0.32	29.93%	-0.10	-0.43	24.35%	-0.11	-0.36	31.49%	-0.11	-0.50	23.03%	-0.21	**-0.28**	43.78%
2009-2010	0.98	0.25	23.60%	**1.74**	**0.39**	22.07%	1.13	0.29	21.77%	1.52	0.34	21.80%	0.87	0.21	30.85%
2010-2011	1.10	**0.24**	16.59%	1.00	0.20	19.86%	**1.10**	0.23	24.12%	0.61	0.12	22.37%	0.17	0.04	27.11%
2011-2012	-0.02	-0.40	10.53%	**0.00**	-0.02	18.39%	-0.01	**-0.02**	25.92%	-0.01	-0.04	18.49%	-0.06	-0.20	26.00%
2012-2013	0.29	0.04	17.29%	1.30	0.17	12.72%	0.36	0.05	17.84%	**1.35**	**0.17**	13.43%	0.29	0.04	12.95%
2013-2014	0.15	0.02	16.14%	1.52	0.16	10.22%	0.47	0.05	11.08%	1.47	0.15	10.53%	**3.31**	**0.42**	11.13%
2014-2015	0.87	**0.12**	9.74%	**1.01**	0.08	7.62%	-0.02	-0.07	18.08%	0.81	0.06	7.90%	0.00	-0.01	15.72%
2015-2016	-0.04	-0.31	16.30%	-0.01	-0.05	14.88%	-0.05	-0.17	22.72%	**-0.01**	**-0.03**	15.75%	-0.01	-0.08	17.68%
Multiple-year Periods															
2005-2010	**0.53**	**0.15**	21.19%	-0.01	-0.05	20.04%	0.12	0.03	24.69%	-0.02	-0.10	18.78%	-0.01	-0.02	32.74%
2006-2011	**0.49**	**0.14**	21.52%	-0.01	-0.04	21.56%	0.03	0.01	24.48%	-0.02	-0.08	21.02%	-0.02	-0.05	33.11%
2007-2012	0.00	0.00	21.37%	0.00	-0.02	20.91%	**0.12**	**0.03**	24.93%	-0.01	-0.06	21.16%	-0.02	-0.06	32.24%
2008-2013	-0.01	-0.04	20.96%	**0.09**	**0.02**	20.97%	0.07	0.02	24.62%	0.00	-0.01	21.33%	-0.03	-0.09	29.89%
2009-2014	0.34	0.07	17.20%	**0.99**	**0.17**	16.98%	0.56	0.10	20.35%	0.84	0.14	17.60%	0.33	0.06	22.98%
2010-2015	0.22	0.04	14.30%	**0.79**	**0.11**	14.21%	0.21	0.03	19.71%	0.64	0.09	15.09%	0.12	0.02	19.75%
2011-2016	-0.01	-0.08	14.53%	**0.47**	**0.06**	13.06%	-0.01	-0.04	19.32%	0.46	0.06	13.49%	0.00	0.00	17.68%
Full Period	**0.18**	**0.04**	18.16%	0.14	0.02	17.13%	0.05	0.01	22.32%	0.00	0.00	16.93%	0.00	-0.01	26.19%
Bull market	1.22	**0.31**	15.17%	**1.24**	0.18	14.37%	0.85	0.15	19.76%	1.06	0.16	14.15%	0.89	0.15	21.60%
Bear market	-0.08	-0.39	21.54%	**-0.07**	-0.38	19.01%	-0.10	-0.40	25.38%	-0.07	-0.41	18.75%	-0.16	**-0.31**	33.15%

Notes: 1) The modified Sharpe ratio was calculated based on the formula from Israelsen (2005): $MSR = ER/SD^{(ER/absER)}$, where ER is the excess return defined as mean monthly difference between the portfolio (or index) return and the risk-free return computed for n equal to 12, 60 or 132 months, respectfully, and SD is the sample standard deviation of the monthly differences of returns. 2). Bold numbers indicate positive MSR and SD figures. 3) Cells highlighted in grey identify the portfolio or index with the highest MSR ratio for that period 4) Single-year period covers 12 months between 1st February to 31st January. 5) Multiple-year period covers five consecutive single-year period.

Table 8a: **Estimation results of parameters of model (9) for the SRI E&RC stocks portfolio returns with the crude oil return as explanatory factor:**

$$R_{pt} - R_{ft} = \alpha_p + \beta_p OIL_t + \varepsilon_{pt}$$

Single-year Periods	*constant*	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2006	0.014792 (0.012323)	0.275450 * (0.147768)	12	OLS	0.183658	F-stat: 3.474737 (p = 0.091900) Q(10) = 15.674 (p = 0.109) LM(10) = 4.742451 (p = 0.4481)
2006-2007	0.030525 *** (0.006719)	0.209945 * (0.103393)	12	OLS	0.413729	F-stat: 4.881324 (p =0.036666) Q(10) = 4.4967 (p = 0.876) LM(10) = 2.479765 (p = 0.7795)
2007-2008	0.013122 (0.010052)	0.285323 ** (0.119573)	12	OLS	0.476090	F-stat: 3.498990 (p = 0.071321) Q(10) = 8.5703 (p = 0.285) LM(10) = 6.935054 (p = 0.2255)
2008-2009	-0.025822 (0.018389)	0.391066 ** (0.154600)	12	OLS	0.206081	F-stat: 2.427659 (p = 0.143489) Q(10) = 9.7004 (p = 0.375) LM(10) = 2.666323 (p = 0.7513)
2009-2010	0.021078 * (0.010217)	0.345397 * (0.165041)	12	OLS	0.318165	F-stat: 2.710979 (p = 0.115331) Q(10) = 8.7847 (p = 0.361) LM(10) = 3.629994 (p = 0.6038)
2010-2011	-0.003461 (0.010397)	0.848904 *** (0.250144)	12	OLS	0.479974	F-stat: 6.076403 (p = 0.021376) Q(10) = 4.9581 (p = 0.838) LM(10) = 5.719859 (p = 0.3344)
2011-2012	-0.025631 (0.015267)	0.724738 ** (0.270711)	12	OLS	0.017213	F-stat: 1.064220 (p = 0.416703) Q(10) = 2.9749 (p = 0.936) LM(10) = 2.500045 (p = 0.7765)
2012-2013	0.010775 *** (0.003071)	0.676636 ** (0.283943)	12	OLS	0.133485	F-stat: 1.564844 (p = 0.271950) Q(10) = 3.7352 (p = 0.880) LM(10) = 6.956422 (p = 0.2239)
2013-2014	-0.000674 (0.002175)	0.701054 ** (0.303732)	12	OLS	0.374555	F-stat: 4.293742 (p = 0.049054) Q(10) = 10.720 (p = 0.295) LM(10) = 6.761650 (p = 0.2390)
2014-2015	0.013984 (0.009245)	0.399387 * (0.171202)	12	OLS	0.612297	F-stat: 4.474444 (p = 0.047943) Q(10) = 4.8530 (p = 0.563) LM(10) = 6.851842 (p = 0.2319)
2015-2016	-0.013580 (0.018036)	0.459038 ** (0.137457)	12	OLS	0.265905	F-stat: 1.996107 (p = 0.199628) Q(10) = 3.8471 (p = 0.797) LM(10) = 4.547385 (p = 0.4736)

Table 8a: **(continued)**

Multiple-year Periods	*constant*	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2010	0.014267 *** (0.005130)	0.205322 *** (0.057156)	60	ARCH(2)	0.150916	F-stat: 13.37821 (p = 0.000550) Q(10) = 8.6195 (p = 0.569) LM(10) = 10.14627 (p = 0.4278)
2006-2011	0.009277 (0.007486)	0.252614 *** (0.080350)	60	ARCH(2)	0.186255	F-stat: 9.175059 (p = 0.000351) Q(10) = 3.9416 (p = 0.915) LM(10) = 12.14791 (p = 0.2753)
2007-2012	-0.004078 (0.005823)	0.455796 *** (0.079759)	60	ARCH(2)	0.211944	F-stat: 8.995424 (p = 0.000402) Q(10) = 5.4402 (p = 0.794) LM(10) = 4.469686 (p = 0.9237)
2008-2013	0.000778 (0.004355)	0.414940 *** (0.082988)	60	ARCH(2)	0.199859	F-stat: 8.702472 (p = 0.000503) Q(10) = 7.4768 (p = 0.588) LM(10) = 6.254548 (p = 0.7934)
2009-2014	-0.001867 (0.005733)	0.486186 *** (0.155997)	60	OLS	0.155968	F-stat: 6.451299 (p = 0.002981) Q(10) = 6.9485 (p = 0.642) LM(10) = 5.419850 (p = 0.8614)
2010-2015	0.003344 (0.004418)	0.377119 *** (0.089054)	60	ARCH(2)	0.136755	F-stat: 10.93965 (p = 0.001620) Q(10) = 6.5093 (p = 0.771) LM(10) = 7.117618 (p = 0.7143)
2011-2016	-0.002405 (0.003922)	0.263450 *** (0.055405)	60	ARCH(1)	0.171671	F-stat: 7.236229 (p = 0.001583) Q(10) = 9.2498 (p = 0.415) LM(10) = 11.28378 (p = 0.3358)
Full Period	*constant*	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2016	0.004807 (0.004061)	0.300422 *** (0.058384)	132	GARCH(1,1)	0.178141	F-stat: 29.78139 (p = 0.000000) Q(10) = 5.4871 (p = 0.856) LM(10) = 10.30342 (p = 0.4143)

Notes: 1) Standard errors are included in brackets. 2) Statistical significance is indicated as: *** significant at 0.01 level, ** significant at 0.05 level and * significant at 0.1 level. 3) Sample size is reported as the number of months in the respective samples. 4) All regressions are based on time series models. Guide to estimation methods: OLS = Ordinary Least Squares, ARCH = AutoRegressive Conditional Heteroscedasticity and GARCH = Generalised AutoRegressive Conditional Heteroscedasticity, 5) The reported diagnostic tests include the value of the F-test statistic, the value of the Ljung-Box Q statistic with 10 lags as the test for autocorrelation and the value of the LM statistic with 10 lags as the test for any remaining ARCH effects (their respective p-values are reported in brackets).

Table 8b: Estimation results of parameters of model (10) for the SRI E&RC stocks portfolio excess returns with the crude oil return as explanatory factor:

$$R_{pt} - R_{mt} = \alpha_p + \beta_p OIL_t + \varepsilon_{pt}$$

Single-year Periods	*constant*	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2006	0.000860 (0.003121)	0.395525 *** (0.069022)	12	OLS	0.831036	F-stat: 23.13295 (p = 0.000823) Q(10) = 5.6589 (p = 0.685) LM(10) = 5.484904 (p = 0.2411)
2006-2007	0.027492 (0.026216)	0.198604 * (0.084017)	12	OLS	0.227268	F-stat: 1.808803 (p = 0.231710) Q(10) = 9.6863 (p = 0.207) LM(10) = 4.103242 (p = 0.3922)
2007-2008	0.005114 (0.004890)	0.298901 *** (0.086667)	12	OLS	0.364012	F-stat: 4.147965 (p = 0.052886) Q(10) = 4.3633 (p = 0.886) LM(10) = 3.534220 (p = 0.4727)
2008-2009	0.007592 (0.011965)	0.151044 * (0.078215)	12	OLS	0.198794	F-stat: 3.729302 (p = 0.082279) Q(10) = 3.6144 (p = 0.963) LM(10) = 3.976196 (p = 0.4092)
2009-2010	0.012559 (0.009223)	-0.140036 (0.098807)	12	OLS	0.083995	F-stat: 2.008668 (p = 0.186798) Q(10) = 13.598 (p = 0.192) LM(10) = 6.153890 (p = 0.1879)
2010-2011	-0.004912 (0.004040)	0.144342 * (0.073285)	12	OLS	0.207454	F-stat: 3.879317 (p = 0.077196) Q(10) = 11.632 (p = 0.310) LM(10) = 3.890082 (p = 0.4211)
2011-2012	-0.014166 *** (0.003496)	0.233832 ** (0.084796)	12	OLS	0.202687	F-stat: 2.398171 (p = 0.146269) Q(10) = 5.3520 (p = 0.803) LM(10) = 3.508047 (p = 0.4767)
2012-2013	-0.009329 (0.007451)	0.085122 (0.110365)	12	OLS	-0.038237	F-stat: 0.594879 (p = 0.458376) Q(10) = 9.1927 (p =0.514) LM(10) = 6.395501 (p = 0.1715)
2013-2014	-0.020450 *** (0.001450)	0.983411 *** (0.201198)	12	OLS	0.897157	F-stat: 24.98978 (p = 0.000306) Q(10) = 5.2414 (p = 0.631) LM(10) = 1.811915 (p = 0.7703)
2014-2015	-0.009575 (0.018607)	0.031584 (0.164213)	12	OLS	0.185158	F-stat: 2.249772 (p = 0.161308) Q(10) = 9.1780 (p = 0.421) LM(10) = 6.649885 (p = 0.1556)
2015-2016	-0.015477 (0.009604)	0.052452 (0.118629)	12	OLS	0.176588	F-stat: 2.179524 (p = 0.169084) Q(10) = 9.1792 (p = 0.421) LM(10) = 5.907877 (p = 0.2061)

Table 8b: (continued)

Multiple-year Periods	*constant*	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2010	0.008307 ** (0.003812)	0.108698 *** (0.037778)	60	OLS	0.109819	F-stat: 8.278628 (p = 0.005606) Q(10) = 6.2403 (p = 0.795) LM(10) = 9.926413 (p = 0.4470)
2006-2011	0.006148 * (0.003614)	0.091378 ** (0.037273)	60	OLS	0.078273	F-stat: 6.010278 (p = 0.017256) Q(10) = 8.2376 (p = 0.606) LM(10) = 8.241356 (p = 0.6053)
2007-2012	0.000408 (0.003596)	0.098218 ** (0.038656)	60	OLS	0.084646	F-stat: 6.455918 (p = 0.013756) Q(10) = 9.0663 (p = 0.526) LM(10) = 9.416416 (p = 0.4931)
2008-2013	-0.003941 (0.003487)	0.085393 ** (0.037806)	60	OLS	0.065004	F-stat: 5.101881 (p = 0.027676) Q(10) = 11.444 (p = 0.324) LM(10) = 11.82867 (p = 0.2967)
2009-2014	-0.009561 *** (0.003481)	0.094171 * (0.054667)	60	OLS	0.032271	F-stat: 2.967504 (p = 0.090282) Q(10) = 10.229 (p = 0.421) LM(10) = 5.397675 (p = 0.8631)
2010-2015	-0.010695 *** (0.003443)	0.129186 ** (0.051777)	60	OLS	0.081358	F-stat: 6.225257 (p = 0.015463) Q(10) = 12.777 (p = 0.236) LM(10) = 8.564042 (p = 0.5739)
2011-2016	-0.013218 *** (0.003132)	0.052585 (0.048197)	60	OLS	0.128927	F-stat: 5.366274 (p = 0.007323) Q(10) = 5.2247 (p = 0.814) LM(10) = 12.90814 (p = 0.2289)
Full Period	*constant*	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2016	-0.003076 (0.003763)	0.092843 *** (0.032682)	132	OLS	0.095478	F-stat: 7.386149 (p = 0.000947) Q(10) = 10.022 (p = 0.349) LM(10) = 11.89529 (p = 0.2921)

Notes: 1) Standard errors are included in brackets. 2) Statistical significance is indicated as: *** significant at 0.01 level, ** significant at 0.05 level and * significant at 0.1 level. 3) Sample size is reported as the number of months in the respective samples. 4) All regressions are based on time series models. Guide to estimation methods: OLS = Ordinary Least Squares, ARCH = AutoRegressive Conditional Heteroscedasticity and GARCH = Generalised AutoRegressive Conditional Heteroscedasticity, 5) The reported diagnostic tests include the value of the F-test statistic, the value of the Ljung-Box Q statistic with 10 lags as the test for autocorrelation and the value of the LM statistic with 10 lags as the test for any remaining ARCH effects (their respective p-values are reported in brackets).

Table 9a: Estimation results of parameters of model (9) for the returns of the sub-group of the oil related stocks portfolio with the crude oil return as the explanatory factor:

$$^{oil}R_{pt} - R_{ft} = \alpha_p + \beta_p OIL_t + \varepsilon_{pt}$$

Single-year Periods	*constant*	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2006	0.016427 (0.018434)	0.386954 (0.221042)	12	OLS	0.158029	F-stat: 3.064577 (p = 0.110575) Q(10) = 12.787 (p = 0.236) LM(10) = 3.185431 (p = 0.6714)
2006-2007	-0.018067 (0.012290)	0.413061 *** (0.118534)	12	OLS	0.657292	F-stat: 8.032438 (p = 0.008495) Q(10) = 4.0492 (p = 0.945) LM(10) = 4.617622 (p = 0.4643)
2007-2008	-0.002850 (0.025715)	0.162245 (0.353065)	12	OLS	-0.077252	F-stat: 0.211170 (p = 0.655680) Q(10) = 9.0396 (p = 0.528) LM(10) = 6.289636 (p = 0.2790)
2008-2009	-0.035747 (0.029296)	0.408957 * (0.191511)	12	OLS	0.244507	F-stat: 4.560022 (p = 0.058485) Q(10) = 9.8364 (p = 0.455) LM(10) = 6.989250 (p = 0.2214)
2009-2010	0.054679 (0.027414)	-0.187710 (0.293703)	12	OLS	-0.056832	F-stat: 0.408470 (p = 0.537111) Q(10) = 9.6007 (p = 0.476) LM(10) = 2.107653 (p = 0.8341)
2010-2011	-0.005387 (0.014156)	1.032124 ** (0.373066)	12	OLS	0.426722	F-stat: 3.729302 (p = 0.060631) Q(10) = 4.8036 (p =0.851) LM(10) = 6.869374 (p = 0.2305)
2011-2012	-0.017260 (0.025931)	0.418133 (0.487911)	12	OLS	-0.024740	F-stat: 0.734427 (p = 0.411519) Q(10) = 4.1978 (p = 0.938) LM(10) = 4.889842 (p = 0.4295)
2012-2013	0.015987 (0.008226)	0.423327 * (0.240867)	12	ARCH(1)	-0.065106	F-stat: 1.117463 (p = 0.315333) Q(10) = 8.1053 (p = 0.619) LM(10) = 2.125939 (p = 0.8315)
2013-2014	-0.009866 (0.014416)	0.929968 * (0.427553)	12	OLS	0.253277	F-stat: 4.731029 (p = 0.054697) Q(10) = 4.9331 (p = 0.896) LM(10) = 4.315386 (p = 0.5050)
2014-2015	-0.002272 (0.021672)	0.020519 (0.641828)	12	OLS	0.541876	F-stat: 3.602194 (p = 0.075105) Q(10) = 4.8089 (p = 0.683) LM(10) = 4.801464 (p = 0.4406)
2015-2016	-0.006990 (0.016274)	0.321275 (0.322204)	12	OLS	0.090688	F-stat: 1.365684 (p =0.321054) Q(10) = 8.4620 (p = 0.488) LM(10) = 6.949639 (p = 0.2244)

Table 9a: (continued)

Multiple-year Periods	*constant*	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2010	-0.001576 (0.008560)	0.421109 *** (0.103177)	60	GARCH(2,2)	0.234433	F-stat: 10.36251 (p = 0.000148) Q(10) = 4.8300 (p = 0.849) LM(10) = 12.77384 (p = 0.2366)
2006-2011	-0.004541 (0.005821)	0.528070 *** (0.067968)	60	GARCH(2,1)	0.255914	F-stat: 11.29779 (p = 0.000074) Q(10) = 3.4795 (p = 0.942) LM(10) = 11.53660 (p = 0.3173)
2007-2012	-0.009019 (0.008229)	0.560455 *** (0.073379)	60	GARCH(1,1)	0.230921	F-stat: 9.866951 (p = 0.000209) Q(10) = 2.2651 (p = 0.987) LM(10) = 10.53554 (p = 0.3948)
2008-2013	0.000172 (0.007546)	0.533276 *** (0.087896)	60	GARCH(1,1)	0.235620	F-stat: 10.62838 (p = 0.000119) Q(10) = 4.2704 (p = 0.893) LM(10) = 8.509252 (p = 0.5792)
2009-2014	-0.000541 (0.007070)	0.540223 *** (0.116360)	60	GARCH(1,1)	0.162611	F-stat: 6.830306 (p = 0.002192) Q(10) = 4.0323 (p = 0.909) LM(10) = 4.517560 (p = 0.9210)
2010-2015	0.000349 (0.006319)	0.544290 *** (0.096072)	60	GARCH(1,1)	0.138489	F-stat: 6.384180 (p = 0.003149) Q(10) = 5.3902 (p = 0.799) LM(10) = 5.476346 (p = 0.8572)
2011-2016	-0.001945 (0.007747)	0.307001 *** (0.109430)	60	ARCH(1)	0.110257	F-stat: 8.429065 (p = 0.005215) Q(10) = 10.502 (p = 0.398) LM(10) = 6.155713 (p = 0.8020)
Full Period	*constant*	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2016	-0.000895 (0.004858)	0.431828 *** (0.055338)	132	GARCH(1,1)	0.224935	F-stat: 20.03661 (p = 0.000000) Q(10) = 7.2360 (p = 0.613) LM(10) = 13.39322 (p = 0.2025)

Notes: 1) Standard errors are included in brackets. 2) Statistical significance is indicated as: *** significant at 0.01 level, ** significant at 0.05 level and * significant at 0.1 level. 3) Sample size is reported as the number of months in the respective samples. 4) All regressions are based on time series models. Guide to estimation methods: OLS = Ordinary Least Squares, ARCH = AutoRegressive Conditional Heteroscedasticity and GARCH = Generalised AutoRegressive Conditional Heteroscedasticity, 5) The reported diagnostic tests include the value of the F-test statistic, the value of the Ljung-Box Q statistic with 10 lags as the test for autocorrelation and the value of the LM statistic with 10 lags as the test for any remaining ARCH effects (their respective p-values are reported in brackets).

Table 9b: Estimation results of parameters of model (9) for the returns of the sub-group of the non-oil related stocks portfolio with the crude oil return as explanatory factor:

$$^{non\text{-}oil}R_{pt} - R_{ft} = \alpha_p + \beta_p OIL_t + \varepsilon_{pt}$$

Single-year Periods	*constant*	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2006	0.009277 (0.006085)	0.232315 (0.147453)	12	OLS	0.424672	F-stat: 3.706512 (p = 0.061447) Q(10) = 6.0262 (p = 0.737) LM(10) = 6.926928 (p = 0.2261)
2006-2007	0.030802 *** (0.008619)	0.130731 (0.106546)	12	OLS	0.043938	F-stat: 1.505525 (p = 0.247926) Q(10) = 7.2025 (p = 0.706) LM(10) = 6.848408 (p = 0.2322)
2007-2008	0.011772 * (0.005119)	0.182388 (0.104503)	12	OLS	0.799918	F-stat: 9.795490 (p = 0.007506) Q(10) = 4.8235 (p = 0.681) LM(10) = 4.663528 (p = 0.4583)
2008-2009	-0.018199 (0.024901)	0.246789 (0.162782)	12	OLS	0.105579	F-stat: 2.298459 (p = 0.160456) Q(10) = 5.5612 (p = 0.851) LM(10) = 6.878600 (p = 0.2298)
2009-2010	0.024095 (0.015089)	0.046451 (0.193368)	12	OLS	0.296342	F-stat: 2.544202 (p = 0.129406) Q(10) = 8.0785 (p = 0.526) LM(10) = 5.199895 (p = 0.3920)
2010-2011	0.002223 (0.011642)	0.605286 ** (0.211188)	12	OLS	0.396087	F-stat: 8.214536 (p = 0.016780) Q(10) = 3.7641 (p = 0.957) LM(10) = 6.418821 (p = 0.2676)
2011-2012	-0.018375 *** (0.004365)	0.342610 * (0.168452)	12	OLS	0.210515	F-stat: 1.977713 (p = 0.195973) Q(10) = 5.8572 (p = 0.754) LM(10) = 6.333426 (p = 0.2751)
2012-2013	0.004409 (0.014478)	0.206809 (0.214450)	12	OLS	-0.006404	F-stat: 0.930006 (p = 0.357603) Q(10) = 8.8797 (p = 0.544) LM(10) = 5.796295 (p = 0.3265)
2013-2014	0.004233 (0.003131)	-0.571361 (0.426460)	12	OLS	0.664828	F-stat: 4.636495 (p = 0.056737) Q(10) = 5.2551 (p = 0.512) LM(10) = 6.451605 (p = 0.2647)
2014-2015	0.008756 (0.006217)	0.048443 (0.094006)	12	OLS	0.301459	F-stat: 2.582370 (p = 0.126006) Q(10) = 8.3339 (p = 0.501) LM(10) = 2.706670 (p = 0.7451)
2015-2016	-0.017606 (0.020488)	0.218753 * (0.113181)	12	OLS	0.340891	F-stat: 2.896395 (p = 0.101827) Q(10) = 8.6493 (p = 0.470) LM(10) = 3.766433 (p = 0.5835)

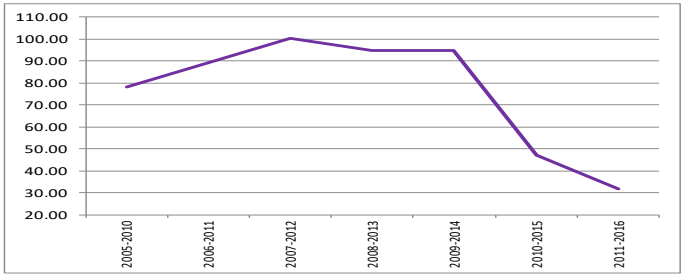
Table 9b: (continued)

Multiple-year Periods	*constant*	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2010	0.013226 * (0.006827)	0.225734 *** (0.076730)	60	GARCH(1,1)	0.119145	F-stat: 5.190157 (p = 0.008676) Q(10) = 13.887 (p = 0.126) LM(10) = 4.094609 (p = 0.9430)
2006-2011	0.012496 * (0.007485)	0.231680 *** (0.065815)	60	GARCH(1,1)	0.131180	F-stat: 10.54134 (p = 0.001942) Q(10) = 9.2969 (p = 0.504) LM(10) = 4.958916 (p = 0.8939)
2007-2012	-0.004635 (0.006794)	0.326651 *** (0.059330)	60	GARCH(1,1)	0.163678	F-stat: 12.90571 (p = 0.000676) Q(10) = 12.274 (p = 0.267) LM(10) = 9.031493 (p = 0.5291)
2008-2013	-0.004636 (0.007220)	0.312489 *** (0.060636)	60	GARCH(1,1)	0.157082	F-stat: 12.33711 (p = 0.000867) Q(10) = 9.4571 (p = 0.489) LM(10) = 14.16047 (p = 0.1658)
2009-2014	0.003701 (0.004102)	0.233488 *** (0.081773)	60	GARCH(1,1)	0.038032	F-stat: 3.268539 (p = 0.045306) Q(10) = 6.1084 (p = 0.729) LM(10) = 10.40855 (p = 0.4054)
2010-2015	0.004130 (0.004494)	0.145209 ** (0.070406)	60	OLS	0.054429	F-stat: 2.132057 (p = 0.106393) Q(10) = 4.7906 (p = 0.852) LM(10) = 4.165753 (p = 0.9396)
2011-2016	-0.002329 (0.004632)	0.142462 ** (0.061355)	60	OLS	0.055374	F-stat: 2.152858 (p = 0.103799) Q(10) = 7.3303 (p = 0.603) LM(10) = 4.777214 (p = 0.9056)
Full Period	*constant*	OIL_t	Sample Size	Method	Adjusted R^2	Diagnostic Tests
2005-2016	0.005287 (0.004350)	0.189720 *** (0.043213)	132	GARCH(1,1)	0.118306	F-stat: 18.88351 (p = 0.000028) Q(10) = 5.0312 (p = 0.889) LM(10) = 8.358295 (p = 0.5939)

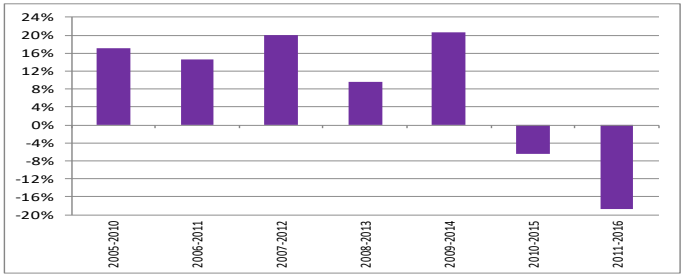
Notes: 1) Standard errors are included in brackets. 2) Statistical significance is indicated as: *** significant at 0.01 level, ** significant at 0.05 level and * significant at 0.1 level. 3) Sample size is reported as the number of months in the respective samples. 4) All regressions are based on time series models. Guide to estimation methods: OLS = Ordinary Least Squares, ARCH = AutoRegressive Conditional Heteroscedasticity and GARCH = Generalised AutoRegressive Conditional Heteroscedasticity, 5) The reported diagnostic tests include the value of the F-test statistic, the value of the Ljung-Box Q statistic with 10 lags as the test for autocorrelation and the value of the LM statistic with 10 lags as the test for any remaining ARCH effects (their respective p-values are reported in brackets).

Figure 2: Crude oil price and SRI E&RC stocks portfolio performance.

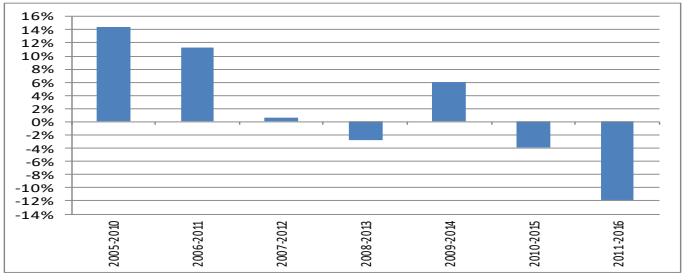
A. Crude oil price



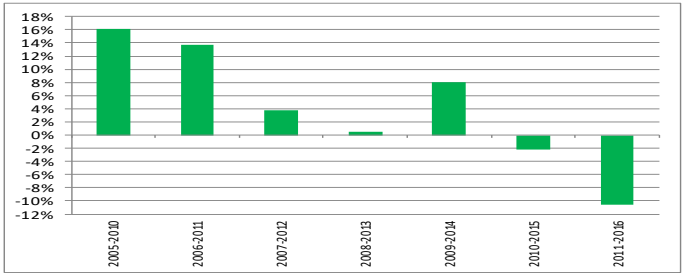
B. Crude oil price returns



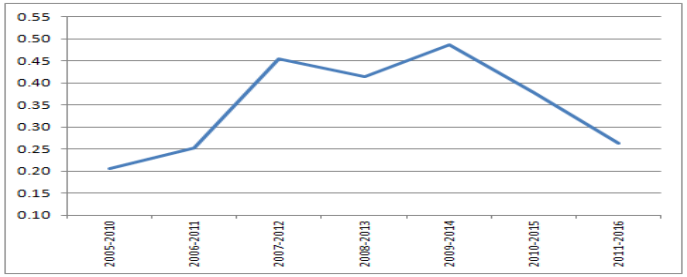
C. SRI E&RC stocks portfolio raw returns



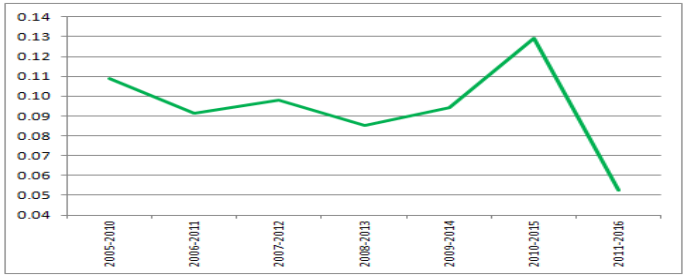
D. SRI E&RC stocks portfolio excess returns



E. Estimate for the OIL variable from model (9) with simple returns



F. Estimate for the OIL variable from model (10) with *excess* returns



Appendix

Results in the Appendix depict the returns for the individual sub-sectors within the entire SRI E&RC stocks portfolio as well as the returns for the oil related companies (without dividends) and the non-oil related companies (without dividends).

Table A1 presents the returns for the whole 11-year period (February to January) from 2005 to 2016 for the individual sub-sectors within the SRI E&RC stocks portfolio (with dividends).

Tables B1 – B4 present the returns for the whole 11-year period (February to January) from 2005 to 2016 for the oil related companies stocks portfolio (without dividends) and the non-oil related companies stocks portfolio (without dividends) and for the price index versions of the benchmark indexes: 1) Global broad market (S&P Global 1200), 2) Global energy market (MSCI World Energy) 3) Global SRI market (FTSE4GOOD Global 100) and 4) Global alternative energy market (FTSE ET50).

Table A1: Average annual geometric returns (with dividends) for the whole 11-year period (February to January) from 2005 to 2016 for the various sub-sectors within the SRI E&RC stocks portfolio.

Single-year Periods	Alternative Energy	Electric Utilities	Electricity	Energy Equipment & Services	Gas, Water & Multiutilities	Industrial Engineering	Mining	Oil Equipment, Services & Distribution	Oil & Gas Producers
2005-2006	**15.34%**	0.00%	**19.60%**	0.00%	**21.87%**	**66.75%**	**24.48%**	**89.23%**	**46.33%**
2006-2007	**68.46%**	0.00%	**36.16%**	0.00%	**33.75%**	**125.17%**	0.00%	**0.44%**	-9.97%
2007-2008	**38.87%**	0.00%	**12.93%**	0.00%	**12.59%**	**116.67%**	0.00%	**19.76%**	**8.04%**
2008-2009	0.00%	0.00%	-29.85%	0.00%	-31.56%	-48.03%	-77.51%	-54.62%	-46.72%
2009-2010	**15.34%**	0.00%	**19.60%**	0.00%	**21.87%**	**66.75%**	**24.48%**	**89.23%**	**46.33%**
2010-2011	0.00%	0.00%	**13.35%**	0.00%	**36.71%**	-34.22%	**21.90%**	0.00%	**16.78%**
2011-2012	0.00%	0.00%	-18.05%	0.00%	-1.35%	-65.46%	-20.70%	0.00%	-15.76%
2012-2013	0.00%	0.00%	**13.37%**	0.00%	**16.55%**	-45.19%	-7.73%	0.00%	**6.36%**
2013-2014	0.00%	0.00%	-2.25%	0.00%	**5.41%**	0.00%	-26.44%	-18.47%	-10.44%
2014-2015	0.00%	0.00%	**12.35%**	0.00%	**4.60%**	0.00%	-28.56%	-25.18%	-9.75%
2015-2016	0.00%	-48.33%	-27.57%	-24.05%	-20.55%	0.00%	-50.97%	0.00%	-8.84%
Multiple-year Periods									
2005-2010	**21.96%**	0.00%	**7.29%**	0.00%	**9.24%**	**44.61%**	-9.87%	**17.74%**	**2.05%**
2006-2011	**18.53%**	0.00%	**6.15%**	0.00%	**11.78%**	**20.06%**	-10.25%	**3.64%**	-2.46%
2007-2012	**6.79%**	0.00%	-4.10%	0.00%	**5.18%**	-17.48%	-14.31%	**3.55%**	-3.74%
2008-2013	0.00%	0.00%	-4.03%	0.00%	**5.91%**	-37.31%	-15.68%	-0.12%	-4.04%
2009-2014	0.00%	0.00%	**2.56%**	0.00%	**15.46%**	-28.54%	**6.87%**	**12.30%**	**6.46%**
2010-2015	0.00%	0.00%	**2.95%**	0.00%	**11.62%**	-34.07%	-14.06%	-9.41%	-3.29%
2011-2016	0.00%	-12.37%	-5.87%	-5.35%	**0.14%**	-28.31%	-28.37%	-9.41%	-7.97%
Full period	**9.44%**	-5.83%	**1.60%**	-2.47%	**7.17%**	-2.15%	-16.55%	**2.97%**	-1.43%
Bull market	**16.21%**	-1.18%	**15.46%**	**1.27%**	**19.25%**	**15.32%**	**7.90%**	**16.90%**	**15.84%**
Bear market	-11.57%	-20.62%	-35.49%	-14.68%	-26.66%	-45.40%	-66.50%	-34.38%	-44.46%

Notes: 1) Bold numbers indicate positive figures. 2) Cells highlighted in grey identify the sub-sector with the highest average annual geometric return for the analysed period: 2005 – 2016.

Table B1: Average annual geometric returns for the 11-year period (February to January) 2005 to 2016 for oil related companies stocks portfolio (without dividends) and for price index versions of the benchmark indexes: 1) Global broad market (S&P Global 1200), 2) Global energy market (MSCI World Energy), 3) Global SRI market (FTSE4GOOD Global 100) and 4) Global alternative energy market (FTSE ET50).

Single-year Periods	Portfolio without dividends	S&P Global 1200 Index			MSCI World Energy Index			FTSE4GOOD Global 100 Index			FTSE ET50 Index		
	Return	Return	Difference	t-stat	Return	Difference	t-stat	Return	Difference	t-stat	Return	Difference	t-stat
2005-2006	38.30%	15.11%	23.19%	1.3309	**41.06%**	-2.75%	-0.2389	8.99%	29.31%	1.5652	33.27%	5.04%	0.3031
2006-2007	-13.01%	-4.81%	-8.20%	-0.4925	-8.52%	-4.48%	-0.4343	**-3.11%**	-9.89%	-0.6587	-14.33%	1.33%	0.049
2007-2008	3.94%	-1.38%	5.32%	0.3973	15.53%	-11.59%	-1.2982	-6.02%	9.96%	0.7277	**31.93%**	-27.98%	-1.8113*
2008-2009	-54.42%	-43.03%	-11.39%	-0.4394	**-33.89%**	-20.54%	-1.8181*	-44.51%	-9.91%	-0.3401	-47.21%	-7.21%	-0.2592
2009-2010	**60.65%**	34.51%	26.14%	1.4196	20.63%	40.02%	2.5402**	33.19%	27.47%	1.5367	25.34%	35.31%	1.4366
2010-2011	15.40%	16.88%	-1.48%	-0.1607	**23.11%**	-7.71%	-0.8117	10.25%	5.15%	0.5971	3.63%	11.77%	1.3343
2011-2012	-18.62%	**-5.07%**	-13.55%	-1.0069	-5.52%	-13.10%	-1.1969	-6.78%	-11.85%	-0.7998	-25.03%	6.40%	0.6192
2012-2013	0.83%	13.25%	-12.42%	-1.0757	3.21%	-2.38%	-0.3451	**14.20%**	-13.37%	-1.2298	2.73%	-1.89%	-0.1408
2013-2014	-19.77%	12.50%	-32.27%	-1.7576	1.99%	-21.76%	-1.2865	11.91%	-31.68%	-1.7364	**35.32%**	-55.09%	-3.4828***
2014-2015	-17.57%	**5.00%**	-22.57%	-1.4741	-13.06%	-4.51%	-0.5056	3.21%	-20.77%	-1.333	-2.58%	-14.99%	-0.8558
2015-2016	-21.54%	-7.20%	-14.33%	-0.5829	-23.04%	1.50%	0.105	**-6.21%**	-15.33%	-0.6268	-8.96%	-12.58%	-0.4658
Multiple-year Periods													
2005-2010	-1.75%	-3.70%	1.96%	0.1047	**3.52%**	-5.27%	-0.4107	-6.01%	4.27%	0.218	-0.07%	-1.68%	-0.0737
2006-2011	-5.24%	-3.41%	-1.83%	-0.1052	**0.74%**	-5.98%	-0.4781	-5.79%	0.56%	0.0309	-4.97%	-0.27%	-0.0122
2007-2012	-6.50%	-3.46%	-3.03%	-0.1794	**1.40%**	-7.89%	-0.6236	-6.52%	0.02%	0.0013	-7.47%	0.98%	0.0511
2008-2013	-7.06%	**-0.75%**	-6.31%	-0.379	-0.86%	-6.20%	-0.4992	-2.80%	-4.26%	-0.2421	-11.99%	4.93%	0.2668
2009-2014	4.07%	**13.72%**	-9.65%	-0.644	8.11%	-4.05%	-0.3058	11.84%	-7.77%	-0.5186	6.25%	-2.18%	-0.1291
2010-2015	-8.93%	**8.22%**	-17.15%	-1.24	1.26%	-10.19%	-0.9271	6.27%	-15.21%	-1.0835	1.02%	-9.96%	-0.6776
2011-2016	-15.70%	**3.34%**	-19.04%	-1.1303	-7.82%	-7.87%	-0.6538	2.89%	-18.59%	-1.0973	-1.56%	-14.14%	-0.7796
Full Period	-7.00%	**1.20%**	-8.21%	-0.4722	-0.24%	-6.76%	-0.5574	-0.63%	-6.37%	-0.356	-0.42%	-6.58%	-0.3324
Bull market	11.23%	16.53%	-5.30%	-0.3234	15.25%	-4.02%	-0.3326	14.17%	-2.94%	-0.1788	**19.75%**	-8.52%	-0.4454
Bear market	-50.75%	**-38.67%**	-12.08%	-0.5885	-40.24%	-10.51%	-0.8818	-39.31%	-11.45%	-0.5123	-48.28%	-2.48%	-0.1123

Notes: 1) * - means statistical significance at the 10% level. 2) The *t*-statistic was calculated based on the paired difference test. 3) Bold numbers indicate positive figures. 4) Cells highlighted in grey identify the portfolio or index with the highest average annual geometric return for the analysed period: 2005 – 2016.

Table B2: Average annual geometric returns for the 11-year period (February to January) 2005 to 2016 for non-oil related companies stocks portfolio (without dividends) and for the price index versions of the benchmark indexes: 1) Global broad market (S&P Global 1200), 2) Global energy market (MSCI World Energy) 3) Global SRI market (FTSE4GOOD Global 100) and 4) Global alternative energy market (FTSE ET50).

Single-year Periods	Portfolio without dividends	S&P Global 1200 Index			MSCI World Energy Index			FTSE4GOOD Global 100 Index			FTSE ET50 Index		
	Return	Return	Difference	t-stat	Return	Difference	t-stat	Return	Difference	t-stat	Return	Difference	t-stat
2005-2006	20.78%	15.11%	5.67%	0.4376	**41.06%**	-20.28%	-1.0485	8.99%	11.79%	0.8912	33.27%	-12.49%	-0.7367
2006-2007	**41.33%**	-4.81%	46.14%	2.1853*	-8.52%	49.85%	2.3557**	-3.11%	44.44%	2.3031**	-14.33%	55.66%	1.7542
2007-2008	22.57%	-1.38%	23.95%	2.0096*	15.53%	7.04%	0.4675	-6.02%	28.59%	2.332**	**31.93%**	-9.35%	-0.4714
2008-2009	-35.61%	-43.03%	7.42%	0.4937	**-33.89%**	-1.73%	-0.0654	-44.51%	8.90%	0.4877	-47.21%	11.60%	0.6188
2009-2010	17.81%	**34.51%**	-16.70%	-1.3088	20.63%	-2.82%	-0.1759	33.19%	-15.38%	-1.0183	25.34%	-7.53%	-0.5589
2010-2011	13.57%	16.88%	-3.31%	-0.3698	**23.11%**	-9.54%	-0.6525	10.25%	3.32%	0.3314	3.63%	9.94%	0.6445
2011-2012	-18.18%	**-5.07%**	-13.11%	-0.9553	-5.52%	-12.66%	-0.6174	-6.78%	-11.41%	-0.8408	-25.03%	6.84%	0.3249
2012-2013	0.57%	13.25%	-12.69%	-1.2816	3.21%	-2.65%	-0.2159	**14.20%**	-13.63%	-1.3644	2.73%	-2.16%	-0.2403
2013-2014	-2.39%	12.50%	-14.89%	-1.6051	1.99%	-4.39%	-0.3543	11.91%	-14.30%	-1.5523	**35.32%**	-37.71%	-3.1344***
2014-2015	4.50%	**5.00%**	-0.50%	-0.0593	-13.06%	17.56%	1.3359	3.21%	1.29%	0.1353	-2.58%	7.08%	0.5486
Multiple-year Periods													
2015-2016	-29.60%	-7.20%	-22.40%	-2.3321**	-23.04%	-6.56%	-0.5492	**-6.21%**	-23.39%	-2.2985**	-8.96%	-20.64%	-1.3275
2005-2010	**9.68%**	-3.70%	13.38%	0.8662	3.52%	6.16%	0.3051	-6.01%	15.69%	0.9759	-0.07%	9.75%	0.4573
2006-2011	**8.34%**	-3.41%	11.75%	0.7816	0.74%	7.59%	0.3936	-5.79%	14.13%	0.8988	-4.97%	13.31%	0.6352
2007-2012	-2.88%	-3.46%	0.58%	0.0447	**1.40%**	-4.28%	-0.2309	-6.52%	3.64%	0.2524	-7.47%	4.59%	0.2621
2008-2013	-6.65%	**-0.75%**	-5.90%	-0.481	-0.86%	-5.79%	-0.32	-2.80%	-3.85%	-0.2808	-11.99%	5.34%	0.3403
2009-2014	1.45%	**13.72%**	-12.27%	-1.1377	8.11%	-6.67%	-0.4438	11.84%	-10.39%	-0.9008	6.25%	-4.80%	-0.3231
2010-2015	-0.96%	**8.22%**	-9.18%	-0.9146	1.26%	-2.21%	-0.15	6.27%	-7.23%	-0.6928	1.02%	-1.98%	-0.1336
2011-2016	-9.99%	**3.34%**	-13.33%	-1.294	-7.82%	-2.17%	-0.1514	2.89%	-12.88%	-1.2146	-1.56%	-8.43%	-0.5639
Full Period													
2005-2016	0.57%	**1.20%**	-0.63%	-0.0474	-0.24%	0.81%	0.0472	-0.63%	1.21%	0.0871	-0.42%	1.00%	0.0548
Bull market	15.10%	16.53%	-1.43%	-0.1044	15.25%	-0.15%	-0.0089	14.17%	0.93%	0.0677	**19.75%**	-4.65%	-0.261
Bear market	**-37.71%**	-38.67%	0.96%	0.0773	-40.24%	2.53%	0.1324	-39.31%	1.60%	0.1128	-48.28%	10.57%	0.5629

Notes: 1) * - means statistical significance at the 10% level. 2) The *t*-statistic was calculated based on the paired difference test. 3) Bold numbers indicate positive figures. 4) Cells highlighted in grey identify the portfolio or index with the highest average annual geometric return for the analysed period: 2005 – 2016.

Table B3: Modified Sharpe ratios (*MSR*) and Standard Deviations (*SD*) from 2005 to 2016 for oil related companies stocks portfolio (without dividends) and for the price index versions of the benchmark indexes.

Single-year Periods	Portfolio without dividends			S&P Global 1200 Index			MSCI World Energy Index			FTSE4GOOD Global 100 Index			FTSE ET50 Index		
	MSR	TR	SD	MSR	TR	SD	MSR	TR	SD	MSR	TR	SD	MSR	TR	SD
2005-2006	**1.60**	**0.20**	21.90%	1.44	0.12	8.29%	1.60	0.17	23.73%	0.92	0.08	6.35%	1.30	0.13	23.19%
2006-2007	-0.03	-0.36	16.59%	-0.02	-0.10	19.70%	-0.03	-0.15	21.57%	**-0.01**	**-0.09**	17.61%	-0.06	-0.12	31.96%
2007-2008	0.00	0.00	21.95%	-0.01	-0.06	12.67%	0.56	0.08	19.84%	-0.01	-0.10	13.07%	**0.95**	**0.14**	28.99%
2008-2009	-0.21	-0.48	38.07%	-0.11	-0.44	24.13%	-0.11	-0.38	31.23%	**-0.11**	-0.49	23.03%	-0.21	**-0.28**	43.79%
2009-2010	**2.27**	**0.68**	26.72%	1.57	0.34	21.88%	0.96	0.24	21.46%	1.52	0.33	21.84%	0.82	0.20	30.65%
2010-2011	0.57	0.12	26.99%	0.84	0.17	20.07%	**0.94**	**0.20**	24.59%	0.44	0.09	22.80%	0.13	0.03	27.17%
2011-2012	-0.06	-0.12	29.94%	**-0.01**	-0.05	18.56%	-0.01	**-0.04**	26.17%	-0.01	-0.07	18.72%	-0.07	-0.21	26.13%
2012-2013	0.03	0.00	22.49%	1.02	0.13	12.93%	0.17	0.02	18.10%	**1.03**	**0.13**	13.68%	0.20	0.03	13.13%
2013-2014	-0.04	-0.21	20.82%	1.22	0.13	10.24%	0.18	0.02	11.18%	1.13	0.12	10.58%	**3.18**	**0.41**	11.10%
2014-2015	-0.03	-0.14	17.74%	**0.67**	**0.05**	7.48%	-0.02	-0.09	17.94%	0.42	0.03	7.60%	0.00	-0.01	15.72%
2015-2016	-0.07	-0.15	31.78%	-0.01	-0.07	14.92%	-0.05	-0.20	22.80%	**-0.01**	**-0.06**	15.79%	-0.02	-0.09	17.65%
Multiple-year Periods															
2005-2010	-0.01	-0.04	27.98%	-0.01	-0.06	19.49%	**0.03**	**0.01**	24.24%	-0.02	-0.09	18.78%	-0.01	-0.02	32.72%
2006-2011	-0.02	-0.07	28.53%	-0.01	-0.06	21.07%	**0.00**	**-0.01**	24.16%	-0.02	-0.08	21.07%	-0.02	-0.05	33.09%
2007-2012	-0.02	-0.06	30.52%	-0.01	-0.05	20.88%	**0.01**	**0.00**	24.97%	-0.02	-0.08	21.24%	-0.03	-0.06	32.26%
2008-2013	-0.02	-0.06	30.58%	**0.00**	**-0.01**	20.98%	0.00	-0.01	24.66%	-0.01	-0.03	21.42%	-0.04	-0.10	29.90%
2009-2014	0.16	0.03	25.85%	**0.80**	**0.14**	17.04%	0.39	0.07	20.49%	0.66	0.11	17.84%	0.27	0.05	23.01%
2010-2015	-0.02	-0.06	23.56%	**0.57**	**0.08**	14.32%	0.06	0.01	19.92%	0.41	0.06	15.28%	0.05	0.01	19.84%
2011-2016	-0.04	-0.11	24.41%	**0.25**	**0.03**	13.13%	-0.02	-0.06	19.45%	0.21	0.03	13.57%	0.00	-0.01	17.75%
Full Period	-0.02	-0.07	26.29%	**0.00**	**0.00**	16.88%	0.00	-0.01	22.20%	0.00	-0.02	16.97%	0.00	-0.01	26.21%
Bull market	0.42	0.08	23.39%	**1.08**	**0.15**	13.97%	0.71	0.12	19.55%	0.90	0.13	14.28%	0.85	0.14	21.60%
Bear market	-0.15	-0.48	28.85%	**-0.08**	-0.40	18.96%	-0.10	-0.42	25.36%	-0.08	-0.42	18.69%	-0.16	**-0.32**	33.16%

Notes: 1) The modified Sharpe ratio was calculated based on the formula from Israelsen (2005): MSR = $ER/SD^{(ER/absER)}$, where ER is the excess return defined as mean monthly difference between the portfolio (or index) return and the risk-free return computed for n equal to 12, 60 or 132 months, respectfully, and SD is the sample standard deviation of the monthly differences of returns. 2). Bold numbers indicate positive MSR and SD figures. 3) Cells highlighted in grey identify the portfolio or index with the highest MSR ratio for that period 4) Single-year period covers 12 months from 1st February to 31st January. 5) Multiple-year period covers five consecutive single-year period.

Table B4: Modified Sharpe ratios (*MSR*) and Standard Deviations (*SD*) from 2005 to 2016 for non-oil related companies stocks portfolio (without dividends) and for the price index versions of the benchmark indexes.

Single-year Periods	Portfolio without dividends			S&P Global 1200 Index			MSCI World Energy Index			FTSE4GOOD Global 100 Index			FTSE ET50 Index		
	MSR	TR	SD	MSR	TR	SD	MSR	TR	SD	MSR	TR	SD	MSR	TR	SD
2005-2006	1.25	**0.24**	14.08%	1.44	0.12	8.29%	**1.60**	0.17	23.73%	0.92	0.08	6.35%	1.30	0.13	23.19%
2006-2007	**3.54**	**5.86**	10.29%	-0.02	-0.10	19.70%	-0.03	-0.15	21.57%	-0.01	-0.09	17.61%	-0.06	-0.12	31.96%
2007-2008	**0.97**	**0.16**	18.76%	-0.01	-0.06	12.67%	0.56	0.08	19.84%	-0.01	-0.10	13.07%	0.95	0.14	28.99%
2008-2009	-0.11	-0.34	29.99%	-0.11	-0.44	24.13%	-0.11	-0.38	31.23%	**-0.11**	-0.49	23.03%	-0.21	**-0.28**	43.79%
2009-2010	0.76	0.20	23.37%	**1.57**	**0.34**	21.88%	0.96	0.24	21.46%	1.52	0.33	21.84%	0.82	0.20	30.65%
2010-2011	0.81	0.18	16.55%	0.84	0.17	20.07%	**0.94**	**0.20**	24.59%	0.44	0.09	22.80%	0.13	0.03	27.17%
2011-2012	-0.02	-0.46	10.68%	**-0.01**	-0.05	18.56%	-0.01	**-0.04**	26.17%	-0.01	-0.07	18.72%	-0.07	-0.21	26.13%
2012-2013	0.03	0.00	17.76%	1.02	0.13	12.93%	0.17	0.02	18.10%	**1.03**	**0.13**	13.68%	0.20	0.03	13.13%
2013-2014	0.00	-0.02	15.98%	1.22	0.13	10.24%	0.18	0.02	11.18%	1.13	0.12	10.58%	**3.18**	**0.41**	11.10%
2014-2015	0.47	**0.07**	9.51%	**0.67**	0.05	7.48%	-0.02	-0.09	17.94%	0.42	0.03	7.60%	0.00	-0.01	15.72%
2015-2016	-0.05	-0.35	15.87%	-0.01	-0.07	14.92%	-0.05	-0.20	22.80%	**-0.01**	**-0.06**	15.79%	-0.02	-0.09	17.65%
Multiple-year Periods															
2005-2010	**0.33**	**0.09**	21.18%	-0.01	-0.06	19.49%	0.03	0.01	24.24%	-0.02	-0.09	18.78%	-0.01	-0.02	32.72%
2006-2011	**0.29**	**0.08**	21.48%	-0.01	-0.06	21.07%	0.00	-0.01	24.16%	-0.02	-0.08	21.07%	-0.02	-0.05	33.09%
2007-2012	-0.01	-0.05	21.38%	-0.01	-0.05	20.88%	**0.01**	**0.00**	24.97%	-0.02	-0.08	21.24%	-0.03	-0.06	32.26%
2008-2013	-0.01	-0.08	20.98%	**0.00**	**-0.01**	20.98%	0.00	-0.01	24.66%	-0.01	-0.03	21.42%	-0.04	-0.10	29.90%
2009-2014	0.08	0.02	17.20%	**0.80**	**0.14**	17.04%	0.39	0.07	20.49%	0.66	0.11	17.84%	0.27	0.05	23.01%
2010-2015	0.00	-0.01	14.35%	**0.57**	**0.08**	14.32%	0.06	0.01	19.92%	0.41	0.06	15.28%	0.05	0.01	19.84%
2011-2016	-0.01	-0.13	14.48%	**0.25**	**0.03**	13.13%	-0.02	-0.06	19.45%	0.21	0.03	13.57%	0.00	-0.01	17.75%
Full Period	0.00	-0.01	18.14%	**0.00**	**0.00**	16.88%	0.00	-0.01	22.20%	0.00	-0.02	16.97%	0.00	-0.01	26.21%
Bull market	0.90	**0.22**	15.17%	**1.08**	0.15	13.97%	0.71	0.12	19.55%	0.90	0.13	14.28%	0.85	0.14	21.60%
Bear market	-0.08	-0.41	21.55%	**-0.08**	-0.40	18.96%	-0.10	-0.42	25.36%	-0.08	-0.42	18.69%	-0.16	**-0.32**	33.16%

Notes: 1) The modified Sharpe ratio was calculated based on the formula from Israelsen (2005): $MSR = ER/SD^{(ER/absER)}$, where ER is the excess return defined as mean monthly difference between the portfolio (or index) return and the risk-free return computed for n equal to 12, 60 or 120 months, respectfully, and SD is the sample standard deviation of the monthly differences of returns. 2). Bold numbers indicate positive MSR and SD figures. 3) Cells highlighted in grey identify the portfolio or index with the highest MSR ratio for that period. 4) Single-year period covers 12 months from 1st February to 31st January. 5) Multiple-year period covers five consecutive single-year period.

Figure A1: Countries of origin and the number of SRI energy and resource companies in the analysed SRI E&RC stocks portfolio in the period February 2005 - January 2016.