Does it pay to be Ethical – A Marginal Conditional Stochastic Dominance analysis of the FTSE4Good

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Abstract

The empirical mean-variance evidence comparing the performance of ethical and non-ethical investments suggests that there is no significant difference between the two. This paper reexamines the problem in the context of Marginal Conditional Stochastic Dominance (MCSD). Comparing the performance of the ethical FTSE4Good Series of indices with that of similar conventional indices, it provides strong evidence that the conventional indices in the UK, US and Globally dominate the ethical FTSE4Good Series. Thus, there is a price for investing ethically – on average, investors can increase their mean returns by 233.16% and reduce their standard deviation by 3.23% by choosing not to invest ethically.

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Introduction

Ethical Investments, also known as Socially Responsible Investments, have a long and noble history, but have only grown to prominence in the recent past. In the beginning, ethical investing was treated as a fad by the wider finance community, a fad that would either disappear or confine itself to the fringes (Renneboog et. al., 2008). Lately, ethical investments account for 11% ($2.71 trillion out of $25.1 trillion) of assets under management in the US, and 22% (£764 billion out of £3,400 billion) of assets under management in the UK[4]. Such widespread prominence puts it in a position where it can no longer be neglected.

Given the importance of the sector and its implications for resource allocation, the question we ask in this paper is whether there is a price to be paid for restricting investment opportunities to the ethical subset of the overall investment opportunity universe. Mean-variance theory suggests that reduced diversification opportunities should be reflected in inferior investment performance. But, a close look at the literature, which is reviewed in the following section, shows that there is no conclusive evidence that this is the case. These studies, however, are subject to serious shortcomings in how performance has been measured and tested.

Some studies have compared the performance of ethical funds with conventional funds (Hamilton et. al., 1993 and Bauer et. al., 2005). This approach ignores the fact that the difference in performance may arise due to other factors like fund size, age, investment universe, etc. To overcome these problems, others, such as Mallin et. al. (1995), Gregory et. al. (1997), and Kreander et. al. (2005), used a matched pair approach, i.e. they first matched the ethical funds with similar conventional funds using the criteria of size, age, investment universe and country. This approach, although an improvement, ignores the fact that

[4] These figures are provided by the Social Investment Forum website (2008) and UK Social Investment Forum website (2008) respectively.

differences in performance may be due to differences in the ability of fund managers rather than to the nature of the investments (ethical vs. conventional). Statman (2000, 2006) and Schroder (2007) provide a solution to this issue by comparing the performance of ethical indices with conventional indices based on the argument that indices are immune to biases associated with specific funds, such as management quality, operating costs, size, age, etc. and hence serve to isolate the impact of the ethical factor on performance.

All of the foregoing studies suffer from a common weakness. Performance measurement has been limited to the first two moments of equity return distributions and testing has concentrated on differences in first moments (equity returns) or some form of the mean-variance framework, often, but not always, based on the capital asset pricing model (CAPM). By neglecting higher moments of return distributions, potentially pertinent information on performance is being eliminated, while tests of performance based on specific mean-variance models may have more to say about the models themselves than about performance. There are no studies that generalize the measurement of performance by considering all the moments of the distributions of equity returns and test the effects directly, that is, outside the context of a specific asset pricing model. This paper is a first step to fill this gap.

We argue that besides the mean and variance, performance measures should reflect the third and higher moments of equity return distributions. There are strong reasons to believe that third moments and higher are important determinants of performance. First of all, it is well known that the first and second moments are only appropriate for quadratic utility maximizers or normally distributed returns. It is also well known that quadratic utility functions have many shortcomings[5] and it is a well documented fact since Mandelbrot (1963)

[5] For example, third derivatives and higher are equal to zero or do not exist, which rules out prudent and temperant behaviour. For a discussion of prudence and temperance see Eeckhoudt and Schlesinger (2006)

that asset distributions are generally not normally distributed. More importantly, it has been shown that the third and the fourth moments of return distributions – skewness and kurtosis respectively – do matter to investors, who show a preference for positive skewness and an aversion to kurtosis (see, Kraus and Litzenberger 1976; Fang and Lai 1997;Dittmar 2002; Post et. al. 2008).

With this in mind, we use indices and an innovative performance measure to compare ethical and conventional investments. More specifically, we use the FTSE4Good Index Series as the ethical investment universe and the concept of Marginal Conditional Stochastic Dominance (MCSD) developed by Shalit and Yitzhaki (1994) to estimate investment performance. Under the general assumption that investors are risk averse, MCSD provides the probabilistic conditions under which all risk-averse investors prefer one risky asset over another. In the terminology of stochastic dominance, MCSD provides the tools to assess the "dominance" or superiority of one asset over another. Dominance means that the utility of all risk averse investors can be improved by increasing the share of the dominant asset at the expense of the dominated asset and, thus, represents a diversification opportunity.[6]

There are no assumptions regarding the efficiency of the global market portfolio or the distributions of equity returns. The only assumption is that investors are risk averse and that part of their investment decision process is to improve the return distribution of their portfolios, i.e. they diversify but do not necessarily aim to create efficient portfolios in the sense of Markowitz portfolio optimization. MCSD tells us if investors will prefer an index because it can improve their portfolio's characteristics, or if they avoid it because it affects their portfolio negatively.

[6] The size of the diversification adjustment can also be calculated (see: Clark and Jokung 1999). Shalit and Yitzakhi (2010) show how MCSD rules can be easily applied for portfolio choices. In this paper we are only interested in identifying the diversification opportunities.

Previous related work

There are very few published studies on the performance of ethical indices. Two of the first studies by Sauer (1997) and Statman (2000) compared the performance of the Domini Social Index (an ethically screened version of the conventional S&P 500) with the S&P 500. They used the Sharpe ratio and the CAPM to estimate Jensen's alpha for the comparison. They found no significant difference in the performance of the two indices.

Statman (2006) extended his earlier study and compared the performance of four popular ethical indices with the S&P500 index. The four ethical indices used were: Domini Social Index, Calvert's Social Index, Citizen's Index and Dow Jones Sustainability US Index. This study also had a larger time horizon extending up to 2004 and, as with his previous paper was limited to the US. He found evidence that the returns of the ethical indices exceeded the returns of the S&P500, but the results were not statistically significant. He concluded, "We cannot reject the hypothesis that returns of socially responsible companies are equal to those of conventional companies" (p. 108).

Schroder (2007) was the first study on this topic to look outside the US. He studied the performance of 29 ethical indices worldwide. Using the CAPM to estimate alpha as the performance parameter, he found no significant evidence of under/over performance. Collison et. al. (2008) was the first study to look exclusively at the performance of the FTSE4Good ethical index series. Their data period was 1996 – 2005; although the FTSE4Good indices were launched in July 2001, FTSE4Good provided the authors with simulated historical data from 1996 for promotional purposes. They found that for the overall period the ethical indices outperformed the respective market indices.

Data and Sample Description

The FTSE4Good series covers four geographical regions: US, UK, Europe and Global. It has one tradeable index for each region. The FTSE4Good advisory committee decides whether a company is ethical enough to be included in the index series. Broadly speaking they look at the following issues: corporate social responsibility, non-discriminatory labour policies, fair stakeholder practices, environmental sustainability and transparent management.

Rather than comparing the performance of the FTSE4Good series with their relevant benchmarks we compare their performance with a similar conventional index and use the relevant benchmarks to represent the parent market portfolio for both the ethical as well as conventional indices. This is an approach used by Sauer (1997) and Statman (2000, 2006). On the other hand, Schroder (2007) and Collison et. al. (2008) compare the performance of the ethical index with the relevant market/benchmark index. We believe the former makes for a reasonable comparison while the latter is unfair since it's comparing two indices one of which is far more diversified than the other, thereby violating the canon of likewise comparisons. For example, the latter approach compares the performance of the FTSE4Good-UK-50 which is an ethical index comprised of 50 stocks with that of the FTSE-Allshare which is composed of almost all listed stocks in the UK. We believe it would make for a fairer comparison if one were to use the FTSE-Allshare to represent the market index/portfolio while comparing the performance of the ethical FTSE4Good-UK-50 with the conventional FTSE-100 or the FTSE-250.

All the indices that were used in this study have been listed in Table 1. Since we will be making pair wise comparisons the indices are grouped together with each group consisting of one market index, one ethical index and one conventional index. We have 7 such groups

and in all 15 individual indices. The market index is used as the market portfolio in the MV approach and for wealth ranking in the MCSD approach.

[INSERT TABLE 1 HERE]

We collect weekly data from DataStream for all the indices. We also collect weekly data for the risk-free rates in the currency that matches the currency of the indices in each of the 7 groups. Within each group we ensure that weekly values for all the 3 indices included are collected in the same currency. The study period starts from July 2001 i.e. when the FTSE4Good index series was launched and ends at November 2010. This gives us almost 10 years of weekly data amounting to 488 observations. We then calculate the weekly returns for each index using the following formula.:

$r_{i,t} = (P_{i,t} / P_{i,t-1}) - 1$

Where:

$r_{i,t}$ = Return for index i in week t

$P_{i,t}$ = Closing value for index i in week t

$P_{i,t-1}$ = Closing value for index i in week t-1

Table 2 shows descriptive statistics of the weekly return series for all the indices included in this study

[INSERT TABLE 2 HERE]

Looking at the raw mean returns in Table 2, we find that the FTSE4Good indices underperform their conventional counterparts in all seven cases. In five out of those seven cases the FTSE4Good indices also have higher risk as estimated using standard deviation. All the indices in the sample have negative skewness and excess kurtosis that are significant at

the 5% level. We note that risk averse investors dislike negative skewness and kurtosis and perform the Shapiro-Wilk test on the return series of all the indices. We find that none of the returns are normally distributed. This provides further evidence that MV analysis is ill-suited for this data set. It has been argued that stock returns data is more likely to be log-normally distributed than normally distributed since stock prices cannot be negative, hence we also test to see if the data is log-normally distributed using the Shapiro-Wilk test. We reject normality in all cases. We list here only the results for the arithmetic returns series since that is the one used in our study. We must use arithmetic returns while working with MCSD because log returns although additive across time are not additive across asset weights within a portfolio, whereas arithmetic returns are.

Ours is the third study on the performance of FTSE4Good index series. It is important to note that neither of the previous two studies have discussed the issue of normality nor presented any tests to show that the returns are normally distributed. They have either assumed that the returns are normally distributed or have proceeded under the assumption that the returns being non-normally distributed has no bearing on the results. This, in our view, is an oversight that casts a shadow of doubt on their results.

Methodology

To allow comparison with earlier studies we first perform MV analysis. We calculate the Sharpe Ratios using the following formula. The Sharpe Ratio (Sharpe, 1966) is defined as the excess return of a portfolio per unit of risk which is measured as the standard deviation of the return. Results are shown is Table 3.

Sharpe Ratio = ———

Where:

r_i = mean return of index i

r_f = risk free rate for the given period in the respective currency

σ_i = standard deviation of the index i returns

In step 2 we use the CAPM regression to estimate Jensen's alpha. As in Schroder (2007), we too find high adjusted R-squares (all greater than 90%) for the alpha regressions, which suggests that the model has been well specified. The CAPM regression equation used is shown below.

$$r_{it} - r_{ft} = \alpha_i + \beta_i (r_{mt} - r_{ft}) + \varepsilon_{it}$$

Where:

r_{it}= return of index at time t; r_{ft}= risk free rate at time t

α_i= Excess return or Jensen's alpha for index i; β_i= Beta for index i

r_{mt}= return of the market at time t; ε_{it}= random error term at time t

Jensen's alpha (Jensen, 1968) is used to calculate the excess return of a portfolio. Simply speaking, this is the alpha term in the CAPM regression. If this alpha is positive then the fund is said to outperform the market portfolio and vice versa. We test the alphas we find to see if they are statistically significant using the t-test and the White and Newey-West

standard errors which are robust to the ill effects of heteroskedasticity and serial correlation[7]. We find that alphas are significant in 2 out of the 7 cases. Results are shown is Table 3.

Next we compute the Treynor Ratios using the following formula. Treynor Ratio (Treynor, 1965) is similar to the Sharpe Ratio; it calculates the excess return of a portfolio per unit of risk which is measured as the Beta of the portfolio. It has been argued that the Treynor Ratio provides a better estimate of performance since it only takes into account risk that cannot be diversified away. Results are shown is Table 3.

Treynor Ratio = ——

Where:

r_i = mean return of index

r_f = risk free rate for the given period in the respective currency

β_i = Beta of the index relative to the market portfolio

Next we proceed to test performance using the MCSD approach. Marginal Conditional Stochastic Dominance (MCSD) was first proposed by Shalit and Yitzhaki (1994). It is best described in their own words as, "Given a portfolio of risky assets, under what conditions do all risk-averse investors prefer marginally increasing the share of one asset over another?" (p. 672). Thus in our case with respect to the matched pair of ethical and conventional indices using the above we can answer the question: which type of index is preferred by all risk averse utility maximizing investors. Clearly the one that dominates the other (according to the MCSD criteria) will be preferred by all investors and hence is the one

[7] In order to ensure the robustness of our regressions, we also test all the index return series for stationarity using the Augmented Dickey-Fuller (ADF) test. Since we find that the return series are stationary in all cases, we do not report the detailed results here.

that has outperformed the other. According to the MCSD theorem developed by Shalit and Yitzhaki (1994), given a portfolio α, asset k dominates asset j for all concave utility functions if and only if:

ACC(k) ≥ ACC (j) with at least one strong inequality

Where:

ACC = Absolute Concentration Curves

More simply, asset k dominates asset j if the ACC of asset k lies above the ACC of asset j. The same paper illustrates with a simple example how to calculate the said ACCs. The MCSD test is implemented as shown below.

In each set we have 3 indices: 1 ethical, 1 conventional and 1 market. We take the already obtained weekly returns for the 3 indices; we have N = 487 returns in each series. We use the market index returns as the wealth index and sort (or rank) them from lowest to highest. The returns of each index are then matched to the return on the wealth index. For example, if the lowest return on the wealth index was for the 10th week of observations we match the returns of each index for the 10th week of observations. Next, each of the terms in the two index returns series (ethical and conventional) is multiplied by 1/N to obtain equally weighted returns. Each observation is given an equal weight of 1/N since it has an equal probability of occurring. We now take the cumulative sum of this weighted returns series for each index i.e. each term in the cumulative sum series is the sum of all previous terms of the weighted returns series. For example, the 3rd term of the cumulative return series of index A is the sum of the 1st and 2nd terms from the weighted return series for index A. This cumulative return series for index A is known as the ACC for index A. Similarly we calculate the ACC for the other index. Next we compare the two ACCs calculated above at each of the

487 points. According to the MCSD criteria, one index dominates the other if its ACC is either equal to or lies above the ACC of the other at all the points. We repeat the aforementioned procedure for all the 7 cases or sets of indices. Results of the MCSD tests are shown in Table 3.

[INSERT TABLE 3 HERE]

Results and Analysis

Table 3 lists the results of both MV and MCSD testing. Looking at Table 3, we find that all the Sharpe and Treynor Ratios are negative. Negative values of those ratios render them meaningless; here's why. Both Sharpe and Treynor Ratios calculate the excess return over the risk free rate per unit of risk; now, say we have two investments both with identical and positive excess returns and differing values for risk; the investment which has higher risk will give us a smaller value of the Sharpe/Treynor Ratio and thus that investment can be said to underperform the other one. But when we have negative excess returns, a higher level of risk produces a smaller negative number hence in the earlier example even though the excess returns are identical, the investment with the higher risk comes out on top. This is antithetical to the concept of performance. As pointed out earlier, the Jensen alphas are significant only in 2 out of the 7 cases.

These results are in line with what was found in the Collison et. al. (2008) study for the post July 2001 period. They too found all negative Sharpe and Treynor ratios and insignificant Jensen alphas. However, they did not discuss the interpretation of negative values of these ratios, instead they ignored the question and wrote: "Indeed, all of the indices had negative Sharpe ratios in the years 2001–2005 but those of the FTSE4Good indices were

worse than the markets from which the securities were drawn. The results for the Treynor measures are similar to the findings for the Sharpe ratios" (p.26).

Using the MCSD approach we find conclusive results in 5 out of the 7 cases. We find that the FTSE4Good-US-100 ethical index is dominated by the similar conventional S&P 100 index; MCSD dominance implies outperformance. The FTSE4Good-US-100 is also found to be dominated by two other conventional indices: the more well diversified S&P-500 as well as the less diversified DJIA-30. We also find that the FTSE4Good-Global-100 ethical index is dominated by the conventional S&P-Global-100 index and that the FTSE4Good-UK-50 is dominated by the FTSE-250 but not the FTSE-100. Thus over all we find that conventional indices outperformed the ethical indices in the UK, US and Global context. In the European context both conventional and ethical indices performed equally.

Table 4 shows the benefits of not choosing to invest ethically in terms of mean and variance for the 5 cases where MCSD dominance has been established[8]. On average, investors can increase their mean returns by 233.16% and reduce their standard deviation by 3.23% by choosing not to invest ethically. The superior performance of conventional indices could be due to the presence of sin stocks[9] in them which are known to be resilient to the effects of economic downturns (Hong and Kacperczyk, 2009).

[INSERT TABLE 4 HERE]

[8] In the other 2 cases since there is no MCSD dominance we cannot reject the hypothesis of equal performance.
[9] Alcohol, tobacco and gambling

Conclusion

In this study we compare the performance of the FTSE4Good Series of ethical indices that were launched in July 2001 with that of similar conventional indices. This is the first study to do so; previous two studies on the FTSE4Good index series (Schroder, 2007; Collison et. al., 2008) compare their performance with the market benchmark but not with similar conventional indices, a more intuitively relevant comparison. It is also the first study to use a Marginal Conditional Stochastic Dominance (MCSD) approach to compare performance; all previous studies on the performance of ethical indices have used the Mean-Variance (MV) approach, whose well-known shortcomings are related to the assumptions of normally distributed returns or quadratic utility functions.

In all we study 15 indices over a period of almost 10 years since the launch of the FTSE4Good index series in July 2001. The MV analysis produced largely inconclusive results – the Sharpe and Treynor ratios are all negative and thus meaningless while most Jensen alphas are insignificant. The MV methodology is further weakened by the fact that none of the index return series are normally distributed.

The MCSD methodology provides more conclusive results. We find that the ethical indices are dominated by conventional indices in the UK, US and Globally. Thus in those contexts an ethical investor has to pay a price for being ethical – they can on average increase their mean return by 233.16% and reduce their standard deviation by 3.23% by choosing not to invest ethically. In the European context the ethical investor pays no such price. Therefore, investors can significantly improve the risk-return profiles of their investments by choosing not to invest ethically.

References

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), pp. 1751-1767.

Clark, E. and Jokung, O. (1999). 'Asset Proportions, Stochastic Dominance and the 50% Rule'. *Management Science.* 45 (12), pp. 1724-1727.

Collison, D., Cobb, G. and Stevenson, L. (2008). 'The Financial Performance of the FTSE4Good Indices.' *Corp. Soc. Responsib. Environ. Mgmt.* 15, pp. 14–28.

Dittmar, R. (2002). 'Nonlinear Asset Kernels, Kurtosis Preference, and Evidence from Cross Section of Equity Returns'. *Journal of Finance.* 57 (1), pp. 369-403.

Eeckhoudt, L. and Schlesinger, H. (2006). 'Putting Risk in its Proper Place.' *American Economic Review.* 96, 280-289.

Fang, H. and Lai, T. (1997). 'Co-Kurtosis and Capital Asset Pricing'. *Financial Review.* 32 (2), pp. 293–307.

Gregory, A., Matatko, J. and Luther, R. (1997). 'Ethical unit trust financial performance: small company effects and fund size effects'. *Journal of Business Finance and Accounting.* 24 (5), pp. 705-725.

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

Hong, H. and Kacperczyk, M. (2009). 'The price of sin: the effect of social norms of markets'. *Journal of Financial Economics.* 93 (2009), pp. 15-36.

Jensen, M. (1968). 'The performance of mutual funds in the period 1945-1964' *Journal of Finance*. 23 (2), pp. 389-416.

Kraus, A and Litzenberger, R. (1976). 'Skewness Preference and the valuation of Risky assets'.*Journal of Finance.* 31 (4), pp. 1085-1099.

Kreander, N., Gray, G., Power D. and Sinclair, C. (2005). 'Evaluating the performance of Ethical and Non-SRI funds: a matched pair analysis'. *Journal of Business, Finance and Accounting.* 32(7), pp. 1465-1493.

Mallin, C., Saadouni, B. and Briston, R. (1995). 'The financial performance of ethical investment funds'. *Journal of Business Finance and Accounting.* 22 (4), pp. 483-496.

Mandelbrot, B. (1963). 'The Variation of Certain Speculative Prices'. *The Journal of Business.* 36(4), pp. 394-419.

Post, G., Levy, H. and Vlient, P. (2003). 'Risk Aversion and Skewness Preference: A Comment'. *Working Paper*.

Renneboog, L., Horst, J. and Zhang, C. (2008). 'Socially Responsible Investments: Institutional aspects, performance, and investor behavior'. *Journal of Banking & Finance.* 32 (2008), pp. 1723–1742.

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, pp.23–35.

Schröder M. (2007). 'Is there a difference? The performance characteristics of SRI equity indices.'*Journal of Business Finance and Accounting.* 34, pp. 331–348.

Shalit, H. and Yitzhaki, S. (1994). 'Marginal Conditional Stochastic Dominance. *Management Science.* 40 (5), pp. 670-684.

Shalit, H. and Yitzhaki, S. (2010). 'How does beta explain stochastic dominance efficiency?' *Review of Quantitative Finance and Accounting*. 35 (4), pp. 431-444.

Sharpe, W. (1966). 'Mutual fund performance'. *Journal of Business.* 39(1), pp. 119-138.

Social Investment Forum. (2008). Socially Responsible Investing Facts. http://www.socialinvest.org/resources/sriguide/srifacts.cfm, 24 August 2008.

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

Statman, M. (2006). 'Socially Responsible Indexes: Composition, performance, and tracking error'. *Journal of Portfolio Management*. 32 (3), pp. 100-109.

Treynor, J. and Mazuy, K. (1966). 'Can mutual funds outguess the market?' *Harvard Business Review*. 44 (4), pp. 131-136.

UK Social Investment Forum. (2008). Mission, values and facts. http://www.uksif.org/about/values_principles, 31 July 2008.

Table 1 – Indices used in this study

Index Type	Index Names	Country	Currency
ETHICAL (E)	FTSE4GOOD-UK-50	UK	£
CONVENTIONAL (C)	FTSE-100	UK	£
MARKET (M)	FTSE-ALL SHARE	UK	£
ETHICAL (E)	FTSE4GOOD-UK-50	UK	£
CONVENTIONAL (C)	FTSE-250	UK	£
MARKET (M)	FTSE-ALL SHARE	UK	£
ETHICAL (E)	FTSE4GOOD-US-100	US	$
CONVENTIONAL (C)	SP-100	US	$
MARKET (M)	DJ-TSMI-US	US	$
ETHICAL (E)	FTSE4GOOD-US-100	US	$
CONVENTIONAL (C)	SP-500	US	$
MARKET (M)	DJ-TSMI-US	US	$
ETHICAL (E)	FTSE4GOOD-US-100	US	$
CONVENTIONAL (C)	DOW JONES - 30	US	$
MARKET (M)	DJ-TSMI-US	US	$
ETHICAL (E)	FTSE4GOOD-EU-50	EU	€
CONVENTIONAL (C)	STOXX-50	EU	€
MARKET (M)	STOXX-TM	EU	€
ETHICAL (E)	FTSE4GOOD-GLOBAL-100	GLOBAL	$
CONVENTIONAL (C)	SP-GLOBAL-100	GLOBAL	$
MARKET (M)	FTSE-ALL WORLD	GLOBAL	$

Table 1 shows the indices used in this study. Since we make pair wise comparisons the indices have been grouped as follows: 1 ethical index, 1 conventional index and 1 market index.

Table 2: Descriptive statistics of the Indices

Type	Index Name	Min	Max	Mean	SD	Skewness	Excess Kurtosis
E	FTSE4GOOD-UK-50	-0.12978	0.16798	-0.00015	0.02709	-0.23246	6.24343
C	FTSE-100	-0.12532	0.16689	0.00000	0.02665	-0.25559	5.96409
M	FTSE-ALL SHARE	-0.11853	0.16581	0.00015	0.02602	-0.25487	5.76553
E	FTSE4GOOD-UK-50	-0.12978	0.16798	-0.00015	0.02709	-0.23246	6.24343
C	FTSE-250	-0.12268	0.17345	0.00114	0.02794	-0.14800	4.29900
M	FTSE-ALL SHARE	-0.11853	0.16581	0.00015	0.02602	-0.25487	5.76553
E	FTSE4GOOD-US-100	-0.15863	0.11603	-0.00039	0.02709	-0.62937	5.35700
C	SP-100	-0.13991	0.13236	-0.00033	0.02599	-0.44257	5.01291
M	DJ-TSMI-US	-0.16620	0.11907	0.00022	0.02663	-0.72910	5.45943
E	FTSE4GOOD-US-100	-0.15863	0.11603	-0.00039	0.02709	-0.62937	5.35700
C	SP-500	-0.15766	0.12375	-0.00005	0.02634	-0.66029	5.45236
M	DJ-TSMI-US	-0.16620	0.11907	0.00022	0.02663	-0.72910	5.45943
E	FTSE4GOOD-US-100	-0.15863	0.11603	-0.00039	0.02709	-0.62937	5.35700
C	DOW JONES - 30	-0.13852	0.11950	0.00009	0.02479	-0.47110	4.54216
M	DJ-TSMI-US	-0.16620	0.11907	0.00022	0.02663	-0.72910	5.45943
E	FTSE4GOOD-EU-50	-0.15164	0.13536	-0.00110	0.03027	-0.46256	4.68550
C	STOXX-50	-0.14877	0.14565	-0.00089	0.03340	-0.44893	3.45514
M	STOXX-TM	-0.14273	0.16196	-0.00055	0.03152	-0.38910	3.60632
E	FTSE4GOOD-GLOBAL-100	-0.11813	0.11368	-0.00044	0.02775	-0.33170	2.97959
C	SP-GLOBAL-100	-0.10980	0.11253	-0.00014	0.02665	-0.27752	2.77667
M	FTSE-ALL WORLD ($)	-0.13127	0.13044	0.00045	0.02674	-0.46875	3.37907

Table 2 shows the key descriptive statistics of the index return series. All the skewness and excess kurtosis values are significant at the 5% level. We also performed the Shapiro-Wilk test for normality on each of the index return series and found that none of the return series were normally distributed. E = Ethical, C = Conventional, M = Market and SD = Standard Deviation.

Table 3: Performance Testing – Summary of Results

Type	Index Name	Sharpe Ratio	Treynor Ratio	Jensen's Alpha	MCSD Dominance
E	FTSE4GOOD-UK-50	-0.032	-0.0008	-0.0003	No Dominance
C	FTSE-100	-0.027	-0.0007	-0.0001	
M	FTSE-ALL SHARE	-0.022	-0.0006	NA	
E	FTSE4GOOD-UK-50	-0.032	-0.0008	-0.0003	Conventional Dominates Ethical
C	FTSE-250	0.015	0.0005	0.0010	
M	FTSE-ALL SHARE	-0.022	-0.0006	NA	
E	FTSE4GOOD-US-100	-0.030	-0.00083	-0.00061*	Conventional Dominates Ethical
C	SP-100	-0.029	-0.00079	-0.00056*	
M	DJ-TSMI-US	-0.008	-0.0002	NA	
E	FTSE4GOOD-US-100	-0.030	-0.0008	-0.0006*	Conventional Dominates Ethical
C	SP-500	-0.018	-0.0005	-0.0003*	
M	DJ-TSMI-US	-0.008	-0.0002	NA	
E	FTSE4GOOD-US-100	-0.030	-0.0008	-0.0006*	Conventional Dominates Ethical
C	DOW JONES - 30	-0.014	-0.0004	-0.0001	
M	DJ-TSMI-US	-0.008	-0.0002	NA	
E	FTSE4GOOD-EU-50	-0.052	-0.0017	-0.0006	No Dominance
C	STOXX-50	-0.041	-0.0013	-0.0003	
M	STOXX-TM	-0.033	-0.0009	NA	
E	FTSE4GOOD-GLOBAL-100	-0.031	-0.0009	-0.0009*	Conventional Dominates Ethical
C	SP-GLOBAL-100	-0.021	-0.0006	-0.0006	
M	FTSE-ALL WORLD ($)	0.001	0.0000	NA	

Table 3 shows summary of results of all the tests carried out to evaluate performance. * Indicates significance at the 5% level. E = Ethical, C = Conventional and M = Market.

Table 4: Performance improvements when investors no longer invest ethically

Type	Index Name	Mean	SD	Δ Mean* (increase in Mean)	Δ SD** (decrease in SD)
E	FTSE4GOOD-UK-50	-0.00015	0.02709	870.46%	3.13%
C	FTSE-250	0.00114	0.02794		
M	FTSE-ALL SHARE	0.00015	0.02602		
E	FTSE4GOOD-US-100	-0.00039	0.02709	16.16%	-4.06%
C	SP-100	-0.00033	0.02599		
M	DJ-TSMI-US	0.00022	0.02663		
E	FTSE4GOOD-US-100	-0.00039	0.02709	86.63%	-2.79%
C	SP-500	-0.00005	0.02634		
M	DJ-TSMI-US	0.00022	0.02663		
E	FTSE4GOOD-US-100	-0.00039	0.02709	123.40%	-8.49%
C	DOW JONES - 30	0.00009	0.02479		
M	DJ-TSMI-US	0.00022	0.02663		
E	FTSE4GOOD-GLOBAL-100	-0.00044	0.02775	69.15%	-3.94%
C	SP-GLOBAL-100	-0.00014	0.02665		
M	FTSE-ALL WORLD ($)	0.00045	0.02674		
			Average Δ =>	233.16%	-3.23%

Δ Mean ——————— Δ SD ————

SD = Standard Deviation

* Since we are dealing with negative mean returns we must use a modulus function to get an estimate of improvement in mean.

** A negative number implies that SD has decreased by that many percentage points.

Excepting the first case, mean increases and SD decreases in all cases when investors move from investing in the Ethical index to the Conventional one. In the first case even though moving from Ethical to Conventional increases SD by 3.13% it is more than compensated by a substantial 870.46% increase in mean.

On average, investors can increase their mean returns by 233.16% and reduce their SD by 3.23% by not choosing to invest ethically.