

## *Sustainable Security Analysis*

An analysis of the economic cost of investing in sustainable securities

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## ABSTRACT

*This paper examines whether a portfolio of global securities selected only on the basis of their sustainable characteristics exhibit a lower return than the broad global security market and whether the performance can be explained by a sustainable factor. The results do appear to indicate that investments that use sustainable filters may not exhibit lower returns than portfolios built without the sustainable filter. The results do indicate that investors should however, also take into account other risk factors such as country, industry, size and book to market as well as the sustainability factor.*

### 1. The Sustainable Investment issue

Interest in investments selected for their ethical or sustainable characteristics has seen strong worldwide growth in recent years. The Social Investment Forum (SIF) reports that professionally managed sustainable assets have grown by 36% compared to a 22% rise in other managed assets from 1999 to 2001.<sup>1</sup> One consequence of investing in ethical securities is that, if companies selected on their sustainable characteristics perform better than alternative choices, it would be beneficial to both the investors and the society as it encourages other firms to improve their ethical standards.<sup>2</sup> Conversely, if the performance of such ethical investments is inferior, or costly to investors, then the benefit of such investments may not adequately cover such loss, and would in turn cause pressure for relaxation of standards of ethical behaviour by the corporate community.

Historical research of the impact of adopting a sustainable strategy on investment performance has concentrated on the analysis of the returns of sustainable or ethical mutual funds performances with no clear result. There are several problems with the historical research: firstly, by default, the analysis usually has not controlled for mandate restrictions, secondly, the analysis looked at nominal return only in most instances, ie it did not consider causes of the return, and thirdly, the analysis was looking for value added, whereas it is reasonable to say that if investors found that sustainable investment criteria was unlikely to result in lower returns, then given the other benefits to society, the result would be acceptable. Our research has therefore controlled for portfolio construction issues, other causes of security performance than sustainability, and concentrated on determining if there was evidence of underperformance.

### 2. Previous analysis

Past attempts have been made to examine the relationship between sustainable investing and financial return. The analysis can be divided into three distinct categories: Individual Companies, Portfolios and Theoretical Portfolio construction.

Research at the company level typically has tried to identify particular ethical criteria that influence the individual performance of companies. Numerous studies have been done examining the link between the ethical behaviour of a corporate firm and its financial performances. Moskowitz (1972) ranked 67 selected firms in terms of his evaluation of their level of social responsibility, and reported higher than average stock returns for highly ranked firms. Alexander and Bucholtz (1978) found no significant relationship between social responsibility and risk adjusted return on securities using the firms listed in Moskowitz's study. Other studies such as Cochran and Wood (1984) found a positive relationship between corporate social and financial performances. Verschoor (1998) found a significant relationship between strong management commitments to controls that emphasised ethical and socially responsible behaviour, and favourable corporate financial performance. Herrmans, Akathaporn and McInnes (1993) found UK ethical corporate firms had higher

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<sup>1</sup> Social Investment Forum is a US based national non-profit organization promoting the concept, practice and growth of socially responsible investing. (<http://www.socialinvest.org/>)

<sup>2</sup> See Lewis and Mackenzie (2000)

stock market returns, but Spiller (2000) claimed this superior financial performance could be explained by the increasing productivity and loyalty of employees, improvement of customer sales and loyalty, growing supplier commitment and improved environmental quality in an ethical firm. Moore and Robson (2002) found that social performance in the supermarket industry was negatively related to financial performance; however, a positive relationship was found with the lagged three years of financial performance. This study also found that financial performance was positively related to the age and size of the firm, as well as its profitability.

The main criticism of these individual firm studies is their lack of objectivity and rigour. Even if there exists a correlation between socially responsible behaviour and financial performance, it does not prove that the former causes the latter and most have not delved into causality analysis. Griffin & Mahon (1997) summarised the literature that analysed the relationship between corporate social performance (CSP) and corporate financial performance (CFP) over the prior 25 years as shown in Table 2.1.<sup>3</sup>

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**Table 2.1: Past Literature Findings**

The following table lists the literature over the prior 25 years that analysed the relationship between corporate social performance (CSP), which broadly corresponds to our sustainable characteristics, and corporate financial performance (CFP).

| <b>Period</b> | <b>Positive relationship</b> | <b>Inconclusive</b> | <b>Negative relationship</b> |
|---------------|------------------------------|---------------------|------------------------------|
| <b>1970s</b>  | 12/17                        | 4/17                | 1/17                         |
| <b>1980s</b>  | 14/35                        | 5/35                | 16/35                        |
| <b>1990s</b>  | 7/10                         |                     | 3/10                         |

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Research into the performance of ethical portfolios generally has involved measuring the risk and return compared with a benchmark such as the S&P500 broad market index., but there have been problems with the historical analysis. Firstly, the ethical criteria of different investors can vary enormously and secondly, different approaches have been employed to measure the financial performance of ethical assets, and different benchmarks have been used. As well other factors such as the skill of the active fund manager and the period over which performance was measured may all influence the performance evaluation of ethical investments. Mallin, Saadouni and Briston (1995) matched the performance of ethical trusts to non-ethical trusts based on fund size and date of formation. This process eliminated specific characteristics existing in ethical portfolios such as a small firm effect and short life of these funds. Some ethical funds and non-ethical funds outperformed the market, with the majority having positive and significant alphas. However, on a risk-adjusted basis, both ethical and non-ethical funds under performed the market with ethical funds weakly outperforming the non-ethical funds. Gregory, Matatko and Luther (1997) also found that after controlling for a size selection bias in the ethical portfolios, both ethical and non-ethical trust funds under performed the general market. In contrast to Mallin, Saadouni and Briston (1995), they showed ethical funds had a lower alpha than non-ethical funds. Bauer, Koedijk and Otten (2002) applied a multifactor Carhart (1997) model to measure the performance of ethical funds.<sup>4</sup> After controlling for the investment style, the study found little evidence of significant differences in risk-adjusted returns between ethical and conventional funds.

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<sup>3</sup> See Griffin and Mahon (1997) for details.

<sup>4</sup> Carhart (1997) model is a four-factor model where size, book to market, momentum and time variation in betas are controlled.

More recently, Edwards and Samant (2003) applied a new risk adjusted factor, the M-Squared factor that adjusted the investment of a mutual fund to the level of risk in an unmanaged benchmark stock market index, and measured the return on the risk matched fund.<sup>5</sup> This method related the level of risk to level of reward, and after risk adjustment, found the Domini Social Index (DSI)<sup>6</sup> portfolio outperformed the market given the same level of risk.

Another recent development in performance measurement suggested by Basso and Funari (2002), is the use of Data Envelopment Analysis (DEA) to evaluate ethical mutual funds.<sup>7</sup> This method permits the comparison on the basis of fund return and risk, and on the basis of investment costs such as subscription costs and redemption fees.

The choice of benchmarks has also been an issue in the analysis. The introduction of the Domini Social Index (DSI)<sup>8</sup> in 1990 offered a benchmark for ethical investments that specifically included an ethical filter in the benchmark construction. Composition of the DSI is only affected by changes in social concerns and by changes in investment policy, rather than responding to a changing market. Statman (2000) found that a DSI portfolio performed as well as the S&P500 index over the period of 1990-1998, while ethical mutual funds under performed both the market and DSI but not worse than conventional mutual funds.

The inconsistencies in the findings can be attributed to the use of different samples from multiple industries or different sources of data, as well as the multiple dimensions used to measure financial performances where researchers have inconsistently used one or only a few measures to assess financial performance.

Another interesting approach has been to construct theoretical portfolios using ethical criteria. Woodall (1986) attempted to quantify the cost of imposing an ethical investment policy by constructing 40 theoretical portfolios that excluded firms that violated ethical criteria. The results found that in general, the portfolios incurred a loss of 4 – 8 basis points from applying the ethical criteria. The most likely cost was in the form of increased industry specific risk, a bias toward smaller firms, and a corresponding reduction in the marketability of shares and gross yield. A more recent study by Geczy, Stambaugh and Levin (2003) constructed optimal portfolios of mutual funds whose objectives included socially responsible investment. For an investor who believed strongly in CAPM and disregarded managerial skills, the cost of the ethical constraint was found to be a few basis points per month, whereas for an investor who supported more sophisticated asset pricing models such as Fama French 3-factor model or Carhart 4-factor model the ethical constraint was more costly. This cost increases even more if investors believe in fund manager stock selection skills.

### **3. Our Methodology**

The methodology we have employed involved:

- Obtaining a database of securities that were selected solely for their ethical characteristics
- Analysis of the possible causes of returns for the universe of securities that we obtained.

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<sup>5</sup> See Modigliani and Modigliani (1997) for more details on the M-Squared factor.

<sup>6</sup> DSI is a well-diversified portfolio of socially screened securities that reflect mainstream social concerns. DSI excludes firms engaged in the manufacture of alcohol or tobacco, gambling, military weapons, nuclear power and business ties to South Africa. DSI was constructed by applying social screens to firms in the S&P500, select firms with exceptional social and financial performance, and adjusts for the potential negative side effects associated with implementation of socially responsible investment.

<sup>7</sup> See Basso and Funari (2002) for more details on DEA

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A unique set of data has been obtained for global stocks that were selected for their satisfactory grading with respect to internal policies, social policy, economic policy and environmental policy by Ethibell, a research organisation that specialises in the screening and selection of sustainable securities for fund managers.

Ethibell selected the securities in the analysis for their sustainable universe of international securities based on Ethibell's assessment of the corporation's practise and attitude to:<sup>9</sup>

- Internal social policy (terms of employment, working conditions, industrial relations)
- External social policy (societal impact, communication, human rights policies, social investments, developing countries policy)
- Economic policy (economic potential, policies to customers, shareholders, authorities, suppliers)
- Environmental policy (strategy, management process, production policy and products developed)

#### 4 Summary statistics

Data was provided in the form of the list of stocks selected by Ethibell, their total returns in local currency whilst held in the portfolio, corresponding MSCI sector and industry group total returns, and currency values relative to the USD. There were in total 109 stocks in the universe, however in this research we only used 97 stocks due to insufficient data for the remainder for a sufficiently long period. Additional information on stock prices in terms of USD, market value, price to book ratio, country of operation, as well as industry sector were obtained from DataStream for a period of 60 months (July 1998 to June 2003). All analysis was carried out in USD.

Table 4.1 reports the summary statistics and indicates that the returns of the sustainable securities were not normally distributed with a slight skewed distribution to the left.<sup>10</sup> For the purpose of comparison, summary statistics are also provided for MSCI country indices and MSCI sector indices in Table 4.2.

**Table 4.1 Summary Statistics for Sustainable Securities**

| <b>Ethical Securities Monthly Returns (%)</b> |         |
|-----------------------------------------------|---------|
| Mean                                          | 0.0052  |
| Standard Error                                | 0.0090  |
| Median                                        | 0.0058  |
| Sharpe Ratio                                  | 0.0317  |
| Standard Deviation                            | 0.0690  |
| Kurtosis                                      | -0.7208 |
| Skewness                                      | -0.1782 |
| Minimum                                       | -0.1474 |
| Maximum                                       | 0.1250  |
| Confidence Level (95.0%)                      | 0.0178  |

<sup>9</sup> For more details on the selection criteria, please see Appendix A and <http://www.ethibel.be>.

<sup>10</sup> Skewness is defined as a measure of the lack of symmetry in a distribution. A normal distribution has a value near zero; a positive skew has a positive value higher than zero; a negative skew has a negative value. Kurtosis is defined as a measure of the degree of peakedness in the distribution. Normal distributions have a value near zero; flat distributions have a negative value; peaked distributions have a positive value.

**Table 4.2 Summary Statistics for Benchmarks**

| <b>Returns (%)</b>          | <b>MSCI Sector</b>        |                      |
|-----------------------------|---------------------------|----------------------|
|                             | <b>MSCI Country Index</b> | <b>Index Monthly</b> |
|                             | <b>Returns</b>            | <b>Returns</b>       |
| Mean                        | -0.0029                   | -0.0073              |
| Standard Error              | 0.0068                    | 0.0196               |
| Median                      | -0.0065                   | -0.0426              |
| Sharpe Ratio                | -0.1125                   | -0.0687              |
| Standard Deviation          | 0.0526                    | 0.1512               |
| Kurtosis                    | -0.2772                   | 0.3687               |
| Skewness                    | 0.0120                    | 0.2278               |
| Confidence Level<br>(95.0%) | 0.0136                    | 0.0391               |

The summary statistics show that the average returns of the sustainable assets were greater than both the country and sector benchmarks.

The Sharpe Ratio of the ethical portfolio constructed by market capitalisation weighting of the ethical assets is also greater than the Sharpe Ratio for the MSCI portfolios, which implies that the ethical portfolio offers greater reward to variability. However, none of the average returns are significantly different to zero.

### **5. Factor Analysis**

We examined whether the performance of sustainable assets could be accounted for by other determinable risk factors. This was achieved by utilising a Fama French (1993) 3-factor model. In constructing these factor models a series of testing procedures were adopted including the MLE tests developed by Gibbons Ross and Shanken (1989), and the GMM based test statistics of MacKinlay and Richardson (1991). In addition, an inequality test based on the results of Kodde and Palm (1986) was also applied to test the sign of the ethical assets' abnormal returns generated by these factor models.

We followed the methodology of Fama and French (1993), and Black, Jensen and Scholes (1972) in identifying five common risk factors in the returns on stocks and bonds, which included: the overall market factor, SMB, HML and 2 bond market factors, viz, maturity and default risk. Following Fama and French (1993), our analysis did not include negative book equity firms, and only firms with ordinary common equity were included in the tests. The intersection of these 2 sets of portfolios resulted in the formation of 6 portfolios (Small Value, Medium Value, Big Value, Small Growth, Medium Growth and Big Growth) for each of the 17 markets (a total of 102 portfolios every month), which were tracked over the period of July 1998 through June 2003. These portfolios then formed the basis of the factor mimicking portfolios, SMB and HML. With the domestic excess market returns SMB and HML portfolios formed, global factors were constructed by value weighting each of the domestic risk factors according to their MSCI country index market value. Three types of test statistics were utilised in this factor analysis. These were the finite sample GRS test

introduced by Gibbons, Ross and Shanken (1989), the Wald test under the GMM framework by MacKinlay and Richardson (1991), using small sample corrected p-values by bootstrapping the test statistic as shown in Fisher and Sim (1995), and an alpha inequality test outlined in Boudoukh, Richardson and Smith (1993).

The Fama and French 3-factor model tests the hypothesis that alpha is significantly different to zero. However, we were also interested to establish if the alpha was significantly less than zero, and hence, an inequality alpha test is applied following the procedure outlined in Wolak (1989), and Boudoukh, Richardson and Smith (1993).<sup>11</sup>

Table 5.1 lists the number of sustainable securities that rejected the null hypothesis that abnormal performance is not significantly different from zero when using domestic factors. It also compares the number of stocks rejected and the total number of stocks listed beside each country, as well as the percentage of stocks being rejected for each relevant country.

**Table 5.1 Countries Against Domestic Fama French Factors**

The percentage is the number of rejections divided by the total number of stocks in that country.

| Country  | Number of Rejections | Percentage |
|----------|----------------------|------------|
| DKK (4)  | 1                    | 25.00%     |
| BEF (4)  | 3                    | 75.00%     |
| FIM (2)  | 0                    | 0.00%      |
| DEM (15) | 5                    | 33.33%     |
| GBP (10) | 2                    | 20.00%     |
| ITL (2)  | 1                    | 0.00%      |
| CHF (3)  | 0                    | 0.00%      |
| ESP (2)  | 0                    | 0.00%      |
| NOK (1)  | 0                    | 0.00%      |
| FRF (3)  | 0                    | 0.00%      |
| SEK (1)  | 0                    | 0.00%      |
| NLG (2)  | 1                    | 50.00%     |
| JPY (11) | 1                    | 9.09%      |
| AUD (3)  | 0                    | 0.00%      |
| NZD (1)  | 0                    | 0.00%      |
| USD (27) | 9                    | 33.33%     |
| CAD (6)  | 4                    | 66.67%     |

To examine the characteristics of abnormal returns in each of the 17 countries, domestic Fama French risk factors were formed and regressed against the sustainable securities in the relevant country. The results of these tests are listed in Table 5.2

**Table 5.2: Domestic Fama French Risk Analysis For Each Country**

| Currency | GRS                | GMM                  | Empirical P-value | Inequality Wald Test    |
|----------|--------------------|----------------------|-------------------|-------------------------|
| DKK (4)  | 0.8285<br>(0.5128) | 8.0990 *<br>(0.0800) | 0.9580            | 1.0674e-004<br>(0.8629) |
| BEF (4)  | 1.1836<br>(0.3282) | 675.4834<br>***      | 0.1800            | 0.0013<br>(0.9480)      |

<sup>11</sup> See Boudoukh, Richardson and Smith (1993) for derivation details.

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|          |                    |                     |        |                         |
|----------|--------------------|---------------------|--------|-------------------------|
|          |                    | (0.0000)            |        |                         |
| FIM (2)  | 1.2665<br>(0.2896) | 0.1112<br>(0.9459)  | 0.7990 | 1.4590e-005<br>(0.5925) |
| DEM (15) | 0.5479<br>(0.8974) | 347.2886<br>***     | 0.8510 | 2.7659e-004<br>(1.0000) |
|          |                    | (0.0000)            |        |                         |
| GBP (10) | 0.5025<br>(0.8800) | 28.8871<br>***      | 0.9200 | 7.0337e-004<br>(0.9989) |
|          |                    | (0.0013)            |        |                         |
| ITL (2)  | 0.6430<br>(0.5295) | 12.1308<br>***      | 0.6530 | 7.7518e-005<br>(0.7864) |
|          |                    | (0.0023)            |        |                         |
| CHF (3)  | 0.3112<br>(0.8172) | 0.5868<br>(0.8995)  | 0.6960 | 0.0028<br>(0.9516)      |
| ESP (2)  | 0.2961<br>(0.7449) | 1.4102<br>(0.4941)  | 0.6730 | 2.1696e-004<br>(0.6750) |
| NOK (1)  | 0.5897<br>(0.4457) | 1.0684<br>(0.3013)  | 0.5040 | 1.0993e-005<br>(0.4827) |
| FRF (3)  | 0.3388<br>(0.7974) | 4.3873<br>(0.2226)  | 0.3850 | 1.2595e-005<br>(0.7707) |
| SEK (1)  | 0.6077<br>(0.4388) | 0.5694<br>(0.4505)  | 0.6250 | 2.8159e-005<br>(0.4780) |
| NLG (2)  | 0.2329<br>(0.7930) | 4.0172<br>(0.1342)  | 0.6300 | 1.1646e-004<br>(0.6257) |
| JPY (11) | 0.5349<br>(0.8697) | 13.6667<br>(0.2520) | 0.9010 | 1.5657e-004<br>(1.0000) |
| AUD (3)  | 0.2939<br>(0.8296) | 3.3947<br>(0.3347)  | 0.5860 | 2.9414e-005<br>(0.9103) |
| NZD (1)  | 1.0254<br>(0.3155) | 0.6100<br>(0.4348)  | 0.6710 | 7.5590e-005<br>(0.5253) |
| USD (27) | 1.0071<br>(0.4883) | 175.0936<br>***     | 0.9950 | 0.0011<br>(1.0000)      |
|          |                    | (0.0000)            |        |                         |
| CAD (6)  | 0.6315<br>(0.7043) | 364.2287<br>***     | 0.7130 | 3.4377e-005<br>(0.9897) |
|          |                    | (0.0000)            |        |                         |

\*\*\*, \*\*, and \* indicates significance at the 1%, 5% and 10% level, respectively.

It can be seen from Table 5.2 that under the GRS test, alphas are not significantly different to zero across all 17 countries.

From Table 5.2, the inequality test statistics across all 17 countries cannot reject the null hypothesis, which implies the investment of sustainable securities would not significantly cost investors.

But since the number of securities in each country was relatively small the Fama French factor analysis was also carried out using global risk factors. Table 5.3 sets out the number of sustainable securities that reject the null hypothesis that abnormal performance is not significantly different from zero. It also compares the number of stocks rejected when using global risk factors with the total number of stocks listed beside each country, as well as the percentage of stocks being rejected for each relevant country. A joint test of significance of alphas was also carried out across all countries under the global Fama French risk factors, and

the results are shown in Table 5.4. Both the GRS and GMM test statistics cannot reject the hypothesis that alpha is insignificantly different to zero, nor can the inequality test. These results indicate that performance of sustainable securities are generally explained by the Size and Book to market risk factor, but at the same time, these insignificant abnormal performances would not cost investors for the inclusion of sustainable investments.

**Table 5.3: Countries Against Global Fama French Factors**

| <b>Country</b>     | <b>Number of Rejections</b> | <b>Percentage</b> |
|--------------------|-----------------------------|-------------------|
| All Countries (17) | 3                           | 17.65%            |
| DKK (4)            | 3                           | 75.00%            |
| BEF (4)            | 2                           | 50.00%            |
| FIM (2)            | 0                           | 0.00%             |
| DEM (15)           | 1                           | 6.67%             |
| GBP (10)           | 1                           | 10.00%            |
| ITL (2)            | 0                           | 0.00%             |
| CHF (3)            | 0                           | 0.00%             |
| ESP (2)            | 0                           | 0.00%             |
| NOK (1)            | 0                           | 0.00%             |
| FRF (3)            | 0                           | 0.00%             |
| SEK (1)            | 0                           | 0.00%             |
| NLG (2)            | 1                           | 50.00%            |
| JPY (11)           | 1                           | 9.09%             |
| AUD (3)            | 0                           | 0.00%             |
| NZD (1)            | 0                           | 0.00%             |
| USD (27)           | 7                           | 25.93%            |
| CAD (6)            | 2                           | 33.33%            |

**Table 5.4: Joint Test of Alphas Under Global Fama French Factors (Countries)**

| <b>Assets</b>      | <b>GRS</b>         | <b>GMM</b>            | <b>Empirical P-value</b> | <b>Inequality Wald Test</b> |
|--------------------|--------------------|-----------------------|--------------------------|-----------------------------|
| All Countries (17) | 1.0802<br>(0.4025) | 26.0179 *<br>(0.0741) | 0.9650                   | 1.6537e-004<br>(1.0000)     |

\*\*\*, \*\*, and \* indicates significance at the 1%, 5% and 10% level, respectively.

A global factor analysis was also carried out on individual country portfolios. It should be noted that by grouping sustainable securities into country portfolios for the factor analysis, this also controls for the country risk factor in addition to the size and book to market risk factors. These results are presented in Table 5.5., where it can be seen that under the GRS test, only Finland is able to find a significant alpha out of 17 countries. The other 16 countries cannot reject the hypothesis that alpha is insignificantly different from zero. However, the GMM test statistic for Finland is very small, implying it is unable to reject the null hypothesis, and the empirical p-value for Finland also cannot reject the null. Together, they indicate that the test statistic offered under the GRS test may be biased and inaccurate due to the normality distribution assumption. Overall, these results show that under the global risk factors, the joint test of alphas is insignificant both an aggregate portfolio.

**Table 6.5: Global Fama French Risk Analysis For Each Country**

| Currency | GRS                 | GMM                         | Empirical P-value | Inequality Wald Test    |
|----------|---------------------|-----------------------------|-------------------|-------------------------|
| DKK (4)  | 0.7615<br>(0.5548)  | 11.0433 **<br>(0.0261)      | 0.9580            | 2.1361e-004<br>(0.9761) |
| BEF (4)  | 1.3738<br>(0.2550)  | 118.6087<br>***<br>(0.0000) | 0.6080            | 0.0039<br>(0.8777)      |
| FIM (2)  | 3.2183<br>(0.0474)  | 0.6213<br>(0.7330)          | 0.7770            | 6.8821e-005<br>(0.6258) |
| DEM (15) | 0.7656<br>(0.70614) | 19.3530<br>(0.1982)         | 0.8870            | 0.0029<br>(1.0000)      |
| GBP (10) | 0.4514<br>(0.9126)  | 19.5294 **<br>(0.0340)      | 0.9490            | 0.0011<br>(0.9988)      |
| ITL (2)  | 0.6280<br>(0.5373)  | 1.9123<br>(0.3844)          | 0.6730            | 9.2646e-006<br>(0.5018) |
| CHF (3)  | 0.1771<br>(0.9115)  | 0.3339<br>(0.9535)          | 0.7540            | 0.0126<br>(0.9496)      |
| ESP (2)  | 0.2619<br>(0.7705)  | 1.7976<br>(0.4071)          | 0.6560            | 1.7412e-004<br>(0.6251) |
| NOK (1)  | 0.2122<br>(0.6468)  | 0.2205<br>(0.6386)          | 0.7170            | 6.6875e-006<br>(0.4870) |
| FRF (3)  | 0.2466<br>(0.8634)  | 2.3450<br>(0.5040)          | 0.4320            | 2.1113e-004<br>(0.7796) |
| SEK (1)  | 0.0021<br>(0.9634)  | 0.0025<br>(0.9599)          | 0.9670            | 7.8145e-008<br>(0.4809) |
| NLG (2)  | 0.5505<br>(0.5797)  | 7.9405 **<br>(0.0189)       | 0.3680            | 4.0539e-005<br>(0.6354) |
| JPY (11) | 0.7299<br>(0.7046)  | 9.1656<br>(0.6066)          | 0.9550            | 2.5928e-004<br>(1.0000) |
| AUD (3)  | 0.4036<br>(0.7510)  | 1.5036<br>(0.6814)          | 0.8010            | 2.2386e-005<br>(0.7823) |
| NZD (1)  | 1.5703<br>(0.2152)  | 0.9021<br>(0.3422)          | 0.6800            | 1.2453e-004<br>(0.5114) |
| USD (27) | 1.0575<br>(0.4362)  | 127.5316<br>***<br>(0.0000) | 0.9940            | 0.0025<br>(1.0000)      |
| CAD (6)  | 0.5014<br>(0.8045)  | 16.4604 **<br>(0.0115)      | 0.9280            | 1.5445e-004<br>(0.9934) |

\*\*\*, \*\*, and \* indicates significance at the 1%, 5% and 10% level, respectively.

As well as the global factor analysis carried out on individual countries, analysis for individual sectors was carried out to be consistent with the spanning tests. The results of the factor analysis are listed in Table 5.6, where the number of rejections per sector is shown.

**Table 5.6: Sectors Against Global Fama French Factors**

| Industry              | Number of Rejections | Percentage |
|-----------------------|----------------------|------------|
| Consumer Disc (16)    | 11                   | 68.75%     |
| Consumer Staples (11) | 3                    | 27.27%     |

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|                       |   |        |
|-----------------------|---|--------|
| Energy (2)            | 0 | 00.00% |
| Financials (13)       | 1 | 7.69%  |
| Health Care (9)       | 1 | 11.11% |
| Industrials (17)      | 3 | 17.65% |
| Info Technology (14)  | 5 | 35.71% |
| Materials (8)         | 4 | 50.00% |
| Telecommunication (3) | 0 | 0.00%  |
| Utilities (4)         | 1 | 25.00% |

As before, a joint test of the significance of alphas is carried out for all sectors under the global Fama French risk factors, and the results are shown in Table 5.7. The GRS test statistics cannot reject the null hypothesis, whereas the GMM test did show a strong rejection. The empirical p-value observed supports the GRS statistic, which suggests the GMM test statistic may suffer from small sample bias, and should be disregarded. For the inequality test, it also showed that there is a high probability alphas are insignificantly different from zero.

Consistent with the factor analysis on countries, a global factor analysis was also carried out on individual sectors, so that it in addition to the global risk factors of size and book to market, the industry sector risk is also controlled. These results are presented in Table 5.8.

**Table 5.7: Joint Test of Alphas Under Global Fama French Factors (Sectors)**

| Assets           | GRS                | GMM                         | Empirical P-value | Inequality Wald Test    |
|------------------|--------------------|-----------------------------|-------------------|-------------------------|
| All Sectors (10) | 0.7885<br>(0.6396) | 621.5074<br>***<br>(0.0000) | 0.3710            | 1.2188e-004<br>(1.0000) |

\*\*\*, \*\*, and \* indicates significance at the 1%, 5% and 10% level, respectively.

**Table 5.8: Global Fama French Risk Analysis For Each Sector**

| Currency                                                     | GRS                | GMM                        | Empirical P-value | Inequality Wald Test    |
|--------------------------------------------------------------|--------------------|----------------------------|-------------------|-------------------------|
| Consumer Discretionary (Da, auto, hotel, media, retail) (16) | 1<br>(0.5000)      | 1581.1<br>***<br>(0.0000)  | 0.9000            | 0.0069<br>(1.0000)      |
| Consumer Staples (food, drugs, household) (11)               | 1.1913<br>(0.3183) | 32.4520<br>***<br>(0.0006) | 0.7630            | 4.3311e-004<br>(1.0000) |
| Energy (2)                                                   | 0.5278<br>(0.5928) | 2.0070<br>(0.3666)         | 0.6990            | 3.7607e-006<br>(0.7802) |
| Financials (13)                                              | 0.6932<br>(0.7597) | 46.4114<br>***<br>(0.0000) | 0.7520            | 8.3015e-004<br>(1.0000) |
| Health Care (9)                                              | 0.2575<br>(0.9829) | 11.8390<br>(0.2225)        | 0.7310            | 0.0021<br>(0.9999)      |
| Industrials (17)                                             | 0.4699<br>(0.9531) | 35.3412<br>***             | 0.9390            | 0.0062<br>(1.0000)      |

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|                                |                    |                    |        |                         |
|--------------------------------|--------------------|--------------------|--------|-------------------------|
|                                |                    | (0.0056)           |        |                         |
| Information Technology<br>(14) | 0.6404<br>(0.8167) | 262.1524<br>***    | 0.8360 | 0.0013<br>(1.0000)      |
|                                |                    | (0.0000)           |        |                         |
| Materials (8)                  | 0.9494<br>(0.4853) | 398.0765<br>***    | 0.6870 | 0.0190<br>(0.9996)      |
|                                |                    | (0.0000)           |        |                         |
| Telecommunication (3)          | 0.1911<br>(0.9020) | 0.1662<br>(0.9829) | 0.8940 | 4.6794e-004<br>(0.8477) |
| Utilities (4)                  | 0.4676<br>(0.7592) | 6.9504<br>(0.1385) | 0.9410 | 0.0054<br>(0.9257)      |

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\*\*\*, \*\*, and \* indicates significance at the 1%, 5% and 10% level, respectively.

The results demonstrate that after the application of the Fama French 3-factor model, using both global and domestic risk factors, the out performance of ethical assets does not appear significant. This is consistent with the empirical findings reported earlier, in which the country and sector groupings tend to explain the performance in the ethical assets. The results of inequality tests of implied alphas also shows that abnormal returns are never significantly negative, indicating that although ethical investments may not be significantly out performing, they do not indicate inferior investments.

The results obtained show that under the GRS test, all 10 sectors reject the hypothesis that alpha is significantly different from zero. Although the GMM test statistic is inconclusive with respect to the null hypothesis, the empirical p-values again indicate insignificance. Together, they indicate that the test statistic offered under the GMM Wald test may be inaccurate due to the small sampling biases.

### **6. Conclusions**

The objective was to establish whether investment in sustainable securities would induce significant economic cost for investors. By using a Fama French factor analysis on both a global and domestic country basis, there are four key findings from the tests undertaken to resolve the research problem.

First, on the global basis, diversification benefits can be obtained if ethical securities are included in an already globally diversified investment portfolio. Secondly, the abnormal performances of sustainable securities are not significant when other risk factors such as size and book to market ratio are taken into account. The results are similar both on a global basis and on a domestic country basis. These results show strong evidence that sustainability can be accounted for by other known risk factors such as country, industry, size and book to market factors.

But investing in sustainable securities will not significantly cost the economic wealth of investors. The results present strong evidence under the inequality test, that alpha is not significantly negative. This implies that sustainable securities are not inferior investment assets, and will not suffer a significant financial cost. The results are consistent with the hypothesis that investors would not be significantly disadvantaged when investing in sustainable securities.

Overall, this study would suggest that:

- Sustainable securities do not have an expected return cost to investors
- When constructing portfolios, investors do need to consider risk factors other than just “ethical “ issues

This research also has a number of practical applications for pension funds and other institutional investors. Pension funds in particular, have obligations to members to make investments that do not offer compensating expected return for risk. The findings from this research implies that investors can now feel assured that sustainable securities are not inferior

investments, and should not significantly under perform the broader market, but securities should not be selected on sustainable characteristics alone.

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### Appendix A

#### Ethibell selection criteria

##### *Internal Social Policy*

| <b>THEMES AND TOPICS</b>                                                | <b>APPRECIATION<br/>(What is appreciated?)</b>                                                                                    | <b>INDICATOR<br/>(What is assessed?)</b>                                                                                                                         |
|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Societal impact of the company's core activities, products and services | Impact on the quality of the society                                                                                              | Positive or negative impact of the company's activities on the quality of the society development<br>Measures to reduce the negative/improve the positive impact |
| <b>Strategy</b>                                                         |                                                                                                                                   |                                                                                                                                                                  |
| Principles                                                              | The degree to which a company's personnel policy is formalised and the scope and quality of the principles                        | Comprehensiveness and quality of the policy statement                                                                                                            |
| Reporting                                                               | The degree to which a company releases information on its social policy                                                           | Frequency, quantity and quality of information                                                                                                                   |
| <b>Employment</b>                                                       |                                                                                                                                   |                                                                                                                                                                  |
| Employment stability                                                    | The degree to which a company creates and maintains employment                                                                    | Evolution of employment compared to the industry, measures to avoid dismissals                                                                                   |
| <b>Job Content</b>                                                      |                                                                                                                                   |                                                                                                                                                                  |
| Training and education                                                  | The degree to which a company demonstrates efforts to broaden the skills of its workforce                                         | Quantitative (% of employees involved, training hours per employee) and qualitative training efforts (functional, multifunctional, employability)                |
| Job enrichment and career development                                   | The efforts demonstrated by a company for the personal development of its employees                                               | Presence of systems of internal promotion, evaluation talks, individual career plans                                                                             |
| Communication and consultation                                          | The degree to which a company supports open and two-way communication with its employees                                          | Presence of (formal) communication channels and consultative bodies                                                                                              |
| Equal opportunities - Principles                                        | The degree to which a company has formalised its equopps policy and to which it integrates the policy in its business principles. | Absence or presence of a formalised policy, its quality in terms of scope, depth (non- or anti-discrimination) and area of application.                          |
| Equal opportunities - Initiatives                                       | The degree to which a company demonstrates efforts to promote equopps.                                                            | Presence of equopps initiatives and involvement of employees                                                                                                     |

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|                                                          |                                                                                                                                                       |                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Realisations                                             | The degree to which a company realises a reduction of inequalities (in comparison to the community where it is active).                               | The average employment rate of disadvantaged groups and its evolution (as provided by trade unions, industry associations etc.).                                                                                                                                  |
| <b>Terms of Employment</b>                               |                                                                                                                                                       |                                                                                                                                                                                                                                                                   |
| Remuneration policy                                      | The degree to which a company's remuneration policy is considered as internally fair and equitable                                                    | The presence of systems of job classification and performance appraisal                                                                                                                                                                                           |
| Flexibility                                              | The degree to which the organisation of flexibility takes into account the needs and expectations of the employees                                    | Systems of flexible organisation, involvement of employees when organising flexibility                                                                                                                                                                            |
| Quality of contracts                                     | The degree to which a company offers qualitatively good employment                                                                                    | Quality of contracts (temporary contracts, systematic use of overtime and temporary unemployment, ...)                                                                                                                                                            |
| <b>Working Conditions</b>                                |                                                                                                                                                       |                                                                                                                                                                                                                                                                   |
| Health & Safety - Policy                                 | The degree to which a company emphasises the importance of its H&S policy                                                                             | Presence of a formal policy concerning health and safety, and its quality                                                                                                                                                                                         |
| Physical Health and Safety - Initiatives or achievements | The degree to which a company demonstrates efforts to create good physical working conditions or realises a reduction of labour accidents             | Presence of H&S initiatives, safety measures, and involvement of employees<br>Or<br>Frequency and evolution of labour accidents                                                                                                                                   |
| Mental Health and Safety - Initiatives or achievements   | The degree to which a company demonstrates efforts to cope pro-actively with work pressure<br>Or to create a supportive working environment (climate) | Presence of initiatives concerning mental health and stress: stress management, reduction of work pressure, employee lifestyle counselling, psychological assistance, prevention of harassment...<br>Or evaluation of work pressure by employees' representatives |
| <b>Industrial relations</b>                              |                                                                                                                                                       |                                                                                                                                                                                                                                                                   |
| Consultation and negotiation                             | The degree to which employee/trade union(s) representatives are recognised as a dialogue partner                                                      | Presence of formal consultation bodies and the evaluation of the social dialogue by trade unions                                                                                                                                                                  |
| Conflicts                                                | Presence of social conflicts                                                                                                                          | Number, content and nature of conflicts                                                                                                                                                                                                                           |

## Environmental Policy

| THEMES AND TOPICS | APPRECIATION (What is appreciated?)                                                                                                                                                                                    | INDICATOR (What is assessed?)                                             |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| <b>Strategy</b>   |                                                                                                                                                                                                                        |                                                                           |
| Principles        | The degree to which a company has formalised its environmental policy, the quality of the formal environmental principles, and degree to which the environmental policy is integrated in the entire company activities | Comprehensiveness, scope and quality of the (public) environmental policy |

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|                                                                  |                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Public commitment                                                | The degree to which the company enters into the dialogue with environmental stakeholders<br>And/or co-operates with environmental initiatives that surpass the company level (the nature of this cooperation)<br>And/or behave towards legal requirements | Memberships of activist or campaign groups, lobbying, infringements, anticipation on future legislation, membership of co-operation platforms (qualitative and quantitative), quantity and quality of the stakeholders communication                                                                    |
| Publications in the field of environment                         | The extent to which the public is informed about the company's environmental responsibility                                                                                                                                                               | Quality of the publications                                                                                                                                                                                                                                                                             |
| <b>Management</b>                                                |                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                         |
| Environmental management system (EMS)                            | The existence, quality and external certification of an EMS                                                                                                                                                                                               | Comprehensiveness (environmental impacts that are dealt with), completeness (presence of the elements inventory, target and objectives, programs and feedback), field of application (part of the company where the system is implemented) or Number of ISO14001 or EMAS or equivalent certified plants |
| <b>Involvement of employees</b>                                  | The degree to which the employees are involved in the development and the realisation of the environmental policy                                                                                                                                         | Attention paid to environmental matters in training and communication<br>Passive/active involvement                                                                                                                                                                                                     |
| Environmental responsibilities and instruments.                  | The degree to which the environmental responsibility is integrated in the hierarchical structure of the company                                                                                                                                           | Hierarchical level of the highest placed person(s) with environmental responsibilities and supportive staff                                                                                                                                                                                             |
| <b>Production</b>                                                |                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                         |
| Measures to reduce the environmental impact: input               | Degree to which a company does or has done efforts to reduce the use of energy and raw materials                                                                                                                                                          | Measures are evaluated against the background of the state of the technology (BAT), the situation in the industry and the achieved results                                                                                                                                                              |
| Measures to reduce the environmental impact: output              | Degree to which a company does or has done efforts to reduce the emissions into air, water and soil                                                                                                                                                       | Measures are evaluated against the background of the state of the technology (BAT), the situation in the industry and the achieved results<br><br>A separate evaluation is made for every environmental compartment. The global rating for the topic is the rounded off average of the separate scores. |
| Measures to reduce the environmental impact: waste               | Degree to which a company does or has done efforts to reduce the quantity and the harmfulness produced waste and to guarantee the use of environmentally friendly waste treatment methods                                                                 | Measures are evaluated against the background of the state of the technology (BAT), the situation in the industry and the achieved results                                                                                                                                                              |
| Environmental conditions imposed on suppliers and subcontractors | Degree to which a company does efforts to reduce the environmental impact of the supply chain                                                                                                                                                             | Conditions imposed to suppliers and subcontractors                                                                                                                                                                                                                                                      |

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| <b>Products</b>                                         |                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environmental impact                                    | Degree and nature of the environmental impact of products                                                                                                                                                  | Environmental impact during the entire lifecycle                                                                                                                                                                                                                          |
| Measures to reduce the environmental impact of products | Degree to which a company does efforts to reduce the adverse environmental impact of its products or to reduce or avoid adverse environmental effects connected to the use and end of life of the products | Environmentally inspired adaptation of product design (eco-design), research aimed at the development of environmentally friendlier products, elements of product stewardship management, advice to customers on how to use products in a more environmental-friendly way |

## External Social Policy

| <b>THEMES AND TOPICS</b>                           | <b>APPRECIATION (What is appreciated?)</b>                                                                                                                                                             | <b>INDICATOR (What is assessed?)</b>                                                                                                                                                              |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Communication with stakeholders                    | The degree to which the company is transparent for stakeholders about its societal impacts and is freely engaged in stakeholder dialogue                                                               |                                                                                                                                                                                                   |
| <b>Human rights</b>                                |                                                                                                                                                                                                        |                                                                                                                                                                                                   |
| Strategy                                           | Degree to which a company has a formal policy on human rights and the scope and quality of the principles                                                                                              | Global issue:<br>Quality of the policy framework addressing human rights<br><br>Human Resources issue:<br>Completeness of the Human Rights and/or Human Resources policy                          |
| Management and/or Realisations                     | Degree to which a company distinguishes itself (in a positive or negative sense) in the field of respect for human rights                                                                              | Non-compliance, condemnations, realisations, initiatives<br>Responsibilities for and support systems for human rights (reporting, monitoring, training, external verification ...)                |
| Sourcing principles and practices                  | Degree to which a company does efforts to avoid violations of international conventions on human and labour rights by its suppliers and subcontractors                                                 | Sensitive sourcing from developing countries (eg. toys, footwear, textile),<br>Formal conditions imposed on suppliers addressing human rights,<br>Presence of monitoring and verification systems |
| Social investments                                 | Degree to which a company supports external societal initiatives with money, people or logistic support, Societal impact of supported projects (Social investment in developing countries is included) | Nature of the supported initiatives<br>Value of the support                                                                                                                                       |
| Socio-economic relations with developing countries | Degree to which company activities contribute to the realisation of sustainable trade relations and to the local socio-economic development                                                            | Negative reports (eg. pricing policy, bio-piracy),<br>Positive impacts (eg. fair trade involvement, joint ventures, local market development, local workforce, transfer of knowledge)             |

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### Economic Policy

| THEMES AND TOPICS                 | APPRECIATION<br>(What is appreciated?)                                                                                                           | INDICATOR<br>(What is assessed?)                                                                                                                                         |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Economic Potential</b>         |                                                                                                                                                  |                                                                                                                                                                          |
| Value creating Potential          | The degree to which a company guarantees its growth and existence by creating value                                                              | EBITDA/EBIT/Operational profit as % of turnover and share of net profit retained by the company (average over last 3 years)                                              |
| <b>Economic Risks</b>             |                                                                                                                                                  |                                                                                                                                                                          |
| Internal control procedures       | The degree to which a company disposes of internal procedures to cope with internal and external risks to safeguard its assets                   | Presence of a policy, organisation and action plans                                                                                                                      |
| <b>Clients</b>                    |                                                                                                                                                  |                                                                                                                                                                          |
| Quality control                   | The degree to which a company is able to offer quality products                                                                                  | The presence of quality certificates (ISO 9000, EFQM, TQM), awards and quality management systems                                                                        |
| Customers: communication          | The degree to which a company pays attention to customer relations                                                                               | Presence of instruments to establish a dialogue with customers: complaint management, satisfaction, surveys, ...<br>Quality of product information provided to customers |
| <b>Corporate Governance</b>       |                                                                                                                                                  |                                                                                                                                                                          |
| Board of Directors                | The degree to which the Board of Directors safeguards the interests of all shareholders                                                          | Composition and organisation of the Board of Directors                                                                                                                   |
| Reporting                         | The degree to which all shareholders dispose in time of all relevant information                                                                 | Quality of financial information and reporting concerning Corporate Governance                                                                                           |
| <b>Suppliers</b>                  |                                                                                                                                                  |                                                                                                                                                                          |
| Relations with suppliers          | The degree to which a company respects the rights of its suppliers                                                                               | Absence of abuse and the engagement in co-operative relationships                                                                                                        |
| <b>Business ethics</b>            |                                                                                                                                                  |                                                                                                                                                                          |
| Code of ethics                    | The degree to which a company's business ethics (code, mission statement, key values) are formalised and the scope and quality of the principles | Comprehensiveness and quality of the code of conduct                                                                                                                     |
| Management system or achievements | The system the company has established for implementing the code, the way the company complies with economic legislation                         | Seriousness/absence of infringements, initiatives aimed at applying the system, checking and remedying non-compliance                                                    |