

**PERFORMANCE OF SOCIALLY RESPONSIBLE INDICES
DURING MARKET CRISIS IN NORTH AMERICA AND EUROPE**

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Abstract

This paper investigates whether socially responsible investment indices in the United States, Canada, the Eurozone and the United Kingdom provide downside protection during market crisis when compared to their respective market indices. Socially responsible investment indices in US and Canada perform similarly to their market indices during market crisis periods between 2000 and 2014, offering neither downside protection nor excess return in overall market conditions. In Eurozone, the socially responsible investment index we selected performs worse than their market index during both the Financial Crisis and the Euro Crisis but not during the Tech Bubble. In the United Kingdom, socially responsible investment index underperforms its respective market index during all crisis periods, including the Tech Bubble, Financial Crisis and the Euro Crisis but outperforms during non-crisis periods. Overall, we do not find that SRI indices offer downmarket protection in North America and Europe.

Keywords: Social Responsible Investment; ESG, ethical investing, SRI; SRI Index; Performance Comparison; CAPM; Fama French Three Factors Model; Carhart Four Factors Model; Alpha; Non-Crisis; market crisis, downside protection

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1: Introduction

Socially responsible investments (SRI) have been growing steadily since its origin in the Religious Society of Friends (Quakers), a faith-based community, in the 1700's. At the time, the investment philosophy behind SRI was to refrain from investing in companies whose business "harm your neighbours". Companies like tobacco manufacturers are considered sinful and avoided. Poor labour practice such as not providing workers with proper protection when carrying out dangerous activities is considered unethical by SRI funds. In the modern day, SRI values have extended to environmental protection and corporate governance. There is a growing awareness that environmentally and socially sustainable practices are necessary to ensure investors continue to generate sustainable returns over a long time horizon such as in the case for pension funds or over a perpetual horizon as in the case of endowment funds. And shareholder advocacy and activism can play an important part of SRI through proxy voting and corporate engagement on environmental, social and governance (ESG) issues. As a reflection of this growing awareness, by 2005 asset owners around the world created the United Nations-supported Principles of Responsible Investment (UNPRI) to take ESG issues into account when making investment decisions. The idea is that ESG risks such as water scarcity, human rights violation and management structure have material impacts on investment returns and investment managers need to consider these factors in order to fulfil their fiduciary duty.

There are several SRI strategies:

1) Negative Screening: This investment strategy avoids investing in companies with low ESG ratings, including companies involved in controversies and lawsuits. A stricter version of negative screening is the product-related exclusionary screen. This traditional approach screens out certain industries from the investor's investment universe. Typical examples are sin stocks like tobacco and weapon manufacturers. Concerns over climate change have led environmentally-conscious investors to screen out fossil fuel companies. The advantage of this approach is that it allows the investor to divest from companies which do not coincide with the investor's particular ethical value or risk management framework. The disadvantage is that the investor is at the risk of receiving lower returns by limiting his/her investable universe for diversification, particularly regarding to potentially high return sin stocks. However, most research on SRI funds or indices using product-related exclusionary screen has shown this is untrue.

2) Positive screening/Best-in-Class: This investment approach favours companies with high ESG ratings and does not screen out any particular industries. The advantage is that the investor is able to express his/her ESG views without limiting his/her investable universe. Some argue that by selecting high ESG-rated companies, the investor will receive excess return. It has been found that investors receive positive alpha from high ESG-rated companies during the period 1992-2004 (Borgers et al. 2013) but the positive alpha has been disappearing post-2004 (Derwall et al., 2011; Guenster 2012; Bebcuk et al. 2013). Borgers et al. (2013) attribute the positive alpha to pricing errors resulting from the lack of attention for stakeholder issues pre-2004. The positive alpha disappears as investors started to consider stakeholder issues when setting return expectations post-2004.

The disadvantage of positive-screening is that if the investor has a strong ethical view or risk attitude against a particular industry in its entirety, the investor cannot completely eliminate the industry from the portfolio.

3) Shareholder Advocacy:

Shareholder advocacy aims to actively influence the behaviour of corporations through proxy voting and corporate engagement on ESG issues and other types of shareholder interest. Nofsinger and Varma (2013) found that funds that are active in shareholder advocacy significantly outperform conventional funds in crisis periods. The advantage of shareholder advocacy is that shareholders are more in touch with the management and have more influence on corporate activities. The disadvantage is that shareholder advocacy is costly both in time and resources. Progress is not always guaranteed.

Between 2004 and 2015, the assets under management according to UNPRI principles have increased from US\$4 trillion to US\$59 trillion¹ or at 28% CAGR. During the financial crisis between 2007 and 2009, assets under management underwent a high growth period, growing at 30% from 2007-2008 and 38% from 2008-2009. The reason behind it is that the financial crisis exposed serious governance issues and investors needed to pay strong attention on governance issues to manage risk.

To determine whether SRI strategies provide investors more protection by considering ESG risks, we compare SRI indices in North American and Europe with their market benchmarks in both market crisis and non-crisis periods.

¹ The \$59 trillion figure comes from the UNPRI Fact Sheet, 2015. Detailed assets under management are also available at www.unpri.org/news/pri-fact-sheet/

This paper is organized as follows: Literature review examining the arguments for and against SRI investments. Hypothesis Development proposes that managing ESG risks can provide investors better downmarket protection in market crises. Data and Methods describes the indices selected, methodology for identifying crisis periods and evaluation models used. Performance presents results from evaluation models. Finally, Summary concludes our major findings.

2: Literature Review and Hypothesis Development

2.1 Literature Review

There is a long-standing view within the investment community that socially responsible investments underperform their conventional counterparts because socially responsible investments restricts the investable universe for diversification and excludes many profitable defensive stocks such as alcohol and tobacco. Research from Fabozzi and Oliphant (2008) showed that a portfolio sin stocks outperforms common benchmarks in terms of both magnitude and frequency between 1970 and 2007. Hong and Kacperczyk (2009) concluded the outperformance of sin stocks is the result of large institutional investors shunning such type of investments. However, when sin stocks are eliminated from SRI indices or funds, most empirical research have found that there is no significant difference in return between SRI funds (indices) and their conventional funds (indices).

Supporters of SRI argue that socially responsible behaviour of corporations can better manage ESG risks. Oikonomou (2012) discovers that socially responsible behaviour of corporations is weakly negatively related to systematic risk while irresponsible behaviour is strongly positively related to systematic risk. For this reason, Cox (2004, 2001) discovered that long-term institutional investors like pension plans and life insurance companies favour firms with strong corporate social performance. Certain ESG factors such as high employee satisfaction has been linked with positive abnormal returns (Edmans, 2011) while poor corporate governance is associate with negative abnormal returns between 1990 and 2003 (Bebchuk et al., 2009). A follow-up study by Bebchuk et al. (2013) discovered a learning effect for corporate governance and diminishing positive

abnormal returns from good corporate governance. Such finding is supported by Guenster (2012) and Derwall et al. (2011).

Most research found SRI funds do not perform differently from conventional funds (Hamilton et al., 1993; Reyes and Grieb 1998; Goldreyer and Diltzl., 1999; Statman, 2000; Shank et al., 2005., Kreander, Gray, Power, and Sinclair (2005), Bauer, Koedijk, and Otten (2005), and Utz and Wimmer (2014)). Other papers such as Sauer (1997), Statman (2000), Schröder (2004), Statman (2006), and Lee and Faff (2012) do not find SRI indices to perform different from conventional indices.

Statman (2000) found no difference between the performance of Domini Social Index, an index consisting of SRI stocks, and the S&P 500 Index over 1990-1998. In addition, his study shows that SRI mutual funds performed worse than the Domini Social Index and the S&P 500 but no worse than conventional mutual funds. Bello (2005) found that, in spite of ESG screening, SRI funds are not significantly different from conventional funds in terms of characteristics of assets held and diversification attributes. He found that the effect of diversification on investment performance is not different between the two groups where both SRI funds and conventional funds underperformed the Domini 400 Social Index and S&P 500 from 1994-2001. Statman's conclusion is consistent with the findings of Renneboog et al (2007) which demonstrates that SRI funds in many European, North-American and Asia-Pacific countries strongly underperform domestic benchmark portfolios but do not underperform their conventional funds in most cases.

To explain why so few studies are able to establish a link between alpha's and SRI, Galema, Plantinga and Scholtens (2008) attribute it to the fact that socially responsible

investing impacts on stock returns by lowering the book-to-market ratio and not by generating positive alphas.

Due to the wide range of conclusions on SRI investments, it is necessary to examine the performance of SRI funds in more detail by separating performance according to market conditions. To investigate whether strong ESG factors within SRI funds protect investors during market/economic crisis, Nofsinger and Varma (2013) tested the performance of US SRI funds against style-matching conventional funds during market crisis periods and non-market crisis periods. The study found that SRI funds outperform during periods of market crisis but at the cost of underperformance during non-crisis periods. Hence, the overall performance between SRI funds and conventional funds is not significant different. SRI funds' asymmetric return pattern is derived from funds using positive ESG screening techniques. A similar study on SRI funds in France confirmed that SRI funds significantly underperforms characteristics-matched conventional funds during non-crisis periods (Leite and Cortez, 2015). In contrast, Leite and Cortez found that French SRI funds only match the performance of their peers during market downturns, which is different from Nofsinger and Varma (2013)'s results in the US. Leite and Cortez (2015) show that SRI funds underperform conventional funds during non-crisis period as the result of negative ESG screening utilized by SRI funds. Funds that only use positive screens perform similarly to conventional funds through different market conditions (Leite and Cortez, 2015).

2.2 Hypothesis Development

Looking back in history, the Tech Bubble in 2000 and Financial Crisis in 2007 were the result of excessive risk-taking by corporations and investors.

Both the Tech Bubble in 2000 and Financial Crisis in 2007 affected market systems globally. Tech Bubble was caused by the over-valuation of the Technology sector and the Financial Crisis was caused by over-valuation of the financial sector. Similar to the Financial Crisis, climate change is a risk that is also global and “off-balance sheet”, with particular concern to the valuation of the Energy sector. The dilemma is that in order to manage climate change risk, energy companies cannot burn their fossil fuels reserves, rendering these energy assets worthless to investors, and potentially causing another bubble in the market.

Since largest market crises were caused by excessive-risk taking, we hypothesize that by managing overall ESG risks, SRI investors can better protect themselves in market crisis. We draw inspiration from the paper published by Nofsinger and Varma (2013). The paper argues that SRI mutual funds in the US outperform their characteristics-matched conventional funds during periods of market crisis at the cost of underperforming their matching conventional funds during non-crisis periods. Hence, investors seeking downside protection would benefit from SRI funds during downmarket, especially in SRI funds using positive screening techniques or active in shareholder advocacy. Our extension to their paper is that we expands their geographical coverage to analyse SRI indices in the US as well as in Canada, Eurozone and UK to determine whether SRI indices outperform the market benchmark consistently in different developed markets around the globe.

3: Data and Methods

3.1 SRI and Market Indices

We look at SRI and market indices' performances in major developed markets globally, namely US, Canada, Eurozone (Europe ex UK) and UK during the period between 2000 and 2014. Within this period, we identify 2-3 market crisis periods, depending on the geographic location. The data we used to analyze is monthly total return with net dividend of different indices downloaded from Bloomberg. We calculate monthly logarithmic returns and the performance of SRI and market indices are shown in Appendix A.

3.1.1 United States of America

MSCI KLD 400 Social Index (KLD400) represents the SRI index and MSCI USA IMI Index (MSCI USA) is the corresponding market index, comprised of 2495 stocks or 99% of float-adjusted market capitalization in the US. The market capitalization-weighted KLD400 consists of 400 companies with outstanding/positive ESG ratings according to MSCI and uses product-related/exclusionary screens. KLD400 uses:

- Product-related exclusionary screen: military weapons, nuclear power, tobacco, alcohol, gambling, GMO and adult entertainment
- Positive ESG screen: companies must have an MSCI ESG Rating above 'BB' and an Impact Monitor Score greater than 2 to be eligible

Characteristics of the KLD400 and the MSCI USA indices are shown in Table 3.1.1. The KLD400 has less negative skewness and lower kurtosis than the market index

from 2000 to 2014. Therefore, KLD400 appears to offer better downside protection than the market index at the cost of lower risk-adjusted returns.

Table 3.1.1 Statistics of MSCI KLD 400 Social Index and MSCI USA IMI Index (Mar 2000-Dec 2014)

USA	Arithmetic Mean Return	Standard Deviation of Returns	Skewness of Returns	Kurtosis of Returns	Sharpe ratio
KLD400	0.81%	15.60%	-2.17	3.24	0.07
MSCI USA	1.11%	16.10%	-2.90	5.24	0.13

All numbers presented are annualized. The average return of the KLD400 SRI index is slightly smaller than the one of market index. The standard deviation of SRI index, 15.60%, shows that the SRI index is less volatile than the market index. Negative skewness means that both SRI and market indices have frequent positive returns and a few extreme losses, consistent with the occurrence of market crises. However, KLD400 offers better downside protection than the MSCI USA. The kurtosis for MSCI USA is higher than the kurtosis for KLD400, showing the MSCI USA has more chance for extreme outcomes in both upside and downside.

3.1.2 Canada

We use the Jantzi Social Index (JSI) as the SRI index. The S&P/TSX 60 is selected as the market indices. JSI is a market capitalization-weighted index modeled on the S&P/TSX 60, a large cap index structured to reflect the sector weights of the S&P/TSX. JSI comprises of 60 Canadian large capitalization companies after applying a set of product-related exclusionary screen and negative ESG screen. Types of screening by Jantzi:

- Product-related exclusionary screen: military contracting, nuclear power and tobacco
- Negative ESG screen: companies involved in significant controversies are excluded

According to the statistics shown in Table 3.1.2, the JSI and the S&P/TSX 60 have almost identical performance and risks characteristics between 2001 and 2014.

Table 3.1.2 Statistics of Jantzi Social Index and S&P/TSX 60 Index (Jun 2001-Dec 2014)

Canada	Arithmetic Mean Return	Standard Deviation of Returns	Skewness of Returns	Kurtosis of Returns	Sharpe ratio
JSI	1.97%	13.91%	-3.78	11.02	0.39
S&P/TSX 60	1.96%	13.71%	-3.78	11.02	0.39

All numbers presented are annualized. These two indices have similar returns and similar standard deviation. Both indices have similar negative skewness or similar downside risk in market crises. Both of them have fat tails proven by the extremely high kurtosis. The similar Sharpe ratios of these indices means they generate same amount of return with each unit of risk.

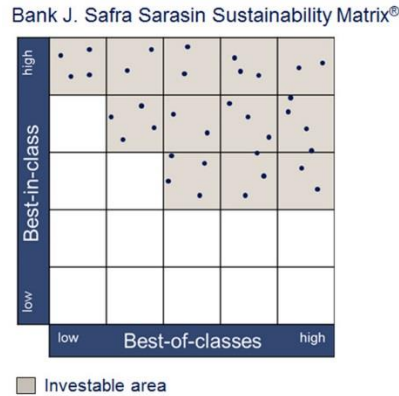
3.1.3 Eurozone (Europe ex. UK)

EURO STOXX Sustainability (EURO Sustainability) market capitalization-weighted index is used as the SRI index for Eurozone². EURO Sustainability consists of 221 companies in the Eurozone countries that are leaders in terms of long-term environmental, social and governance criteria according to Bank J. Safra Sarasin's Sustainability matrix (Figure 3.1.1). The corresponding market index is the EURO STOXX, representing 291 large, mid and small cap stocks in the Euro zone. The type of screening by EURO Sustainability:

- Positive ESG screen: All companies with a positive sustainability rating will be included in the index. A rating is defined as positive, if the combination of the company and the sector rating result in a shaded matrix field of the Sarasin Sustainability Matrix

² From 12 Eurozone countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain.

Figure 3.1.1 Sustainability Matrix



Source: SustainableInvestment.org

In Table 3.1.3, the EURO Sustainability index has a slightly higher kurtosis than the EURO STOXX market index. Investors should avoid investing in the EURO Sustainability index due to its negative Sharpe ratio of the whole period.

Table 3.1.3 Statistics of EURO STOXX Sustainability Index and EURO STOXX Index (Nov 2001-Dec 2014)

Eurozone	Arithmetic Mean Return	Standard Deviation of Returns	Skewness of Returns	Kurtosis of Returns	Sharpe ratio
EURO Sustainability	0.17%	19.48%	-3.03	7.52	-0.04
EURO STOXX	1.18%	18.43%	-3.14	6.83	0.15

All numbers presented are annualized. The average return of EURO STOXX SRI Index has lower return but higher deviation, resulting in a negative risk-adjusted return and lower Sharpe ratio than the market index. Both indices have the similar downside risk as seen in the negative skewness. Both of them have high fat tail risk in the kurtosis, with the EURO STOXX SRI index more prone to extremely outcomes.

3.1.4 United Kingdom

FTSE4GOODUK (FTSE4GOOD) is selected as the SRI index for UK and FTSE All-Share (ASX) index is selected as the market index. FTSE4GOOD comprises of 232 stocks selected based on positive FTSE ESG ratings and removed based on negative ESG

ratings. FTSE All-Share represents 643 companies listed on the London Stock Exchange, capturing 98% of UK’s market capitalization. FTSE4GOOD employs:

- Product-related exclusionary screen: Weapon systems, controversial weapons and tobacco. Nuclear power and infant formula companies must meet 95% of sector specific criteria to be included
- Positive ESG screen: FTSE ESG rating of 3.3 or above will be added to the index
- Negative ESG screen with engagement period: Companies with FTSE ESG rating below 2.5 will be informed and deleted from FTSE4GOOD if their ESG rating is not improved during the subsequent 12 months. Companies with zero score in their high exposure ESG theme will be excluded
- Controversy monitoring: companies with significant controversies will not be included

As seen in Table 3.1.4, the FTSE4GOOD has less negative skewness and lower kurtosis. The FTSE4GOOD index appears to offer some downside protection at the cost of lower risk-adjusted returns.

Table 3.1.4 Statistics of FTSE4GOODUK Index and FTSE All-Share Index (Jul 2001-Dec 2014)

UK	Arithmetic Mean Return	Standard Deviation of Returns	Skewness of Returns	Kurtosis of Returns	Sharpe ratio
FTSE4GOOD	0.57%	14.34%	-2.54	3.07	0.04
ASX	1.54%	14.55%	-3.01	4.56	0.27

All numbers presented are annualized. The average return of FTSE4GOODUK SRI Index is smaller than the FTSE All-Share Index. But the volatilities of these two indices are very similar. FTSE4GOODUK index has less downside risk than the ASX due to less negative skewness. The market index has higher fat tail risk than the FTSE4FOOD UK SRI index.

3.2 Crisis Periods

In order to investigate whether the performance of SRI and market indices in different countries show similar patterns across market crisis and non-crisis periods, we identify market crisis periods occurring between 2000-2014 for four major developed markets: US, Canada, Eurozone and UK.

Pagan and Sossounov (2003) stated that if prices keep declining for a substantial period after the previous peak, the peak point is a starting point showing that the stock market turns to a bear state from a bull. We identify the crisis periods by using the theories and approaches of Pagan and Sossounov (2003). They determine the initial turning points by selecting peaks or bottoms, which are the highest or lowest value compared to the surrounding points in a window of eight months. Specifically, if $(P_t - 8, \dots, P_t - 1 < P_t > P_t + 1, \dots, P_t + 8)$, the location of P_t can be considered as one peak, where P_t represents the price of stock index in month t . Similarly, the location of P_t can be regarded as one trough, as long as $(P_t - 8, \dots, P_t - 1 > P_t < P_t + 1, \dots, P_t + 8)$.

In order to identify the crisis periods in selected developed markets, we decide to use the four market indices we mentioned earlier as benchmarks. By calculating the change of points of these market indices, we choose those periods when the changes are higher than 10 percent and identify three crisis periods for the stock markets in Canada, Eurozone and United Kingdom, and two crisis periods for US. The periods of crisis and the difference of market indices points are demonstrated in Table 3.2.1.

Table 3.2.1 Crisis Periods in USA, Canada, Europe and UK between 2000 and 2014

Country	Market Index	Crisis	Start Date	End Date	Change in Market Index
USA	MSCI USA IMI Index	Technology Bubble	2000/03 [938.93]	2002/09 [506.45]	-46.06%
		Financial Crisis	2007/10 [1010.66]	2009/02 [482.39]	-52.27%
CANADA	The S&P/Toronto Stock Exchange 60 Index	Technology Bubble	2000/08 [687.08]	2002/09 [345.06]	-49.78%
		Financial Crisis	2007/10 [848.82]	2009/02 [489.56]	-42.32%
		Natural Gas Crisis	2011/02 [813.28]	2012/05 [656.5]	-19.28%
EUROZONE	EURO STOXX Index	Technology Bubble	2000/02 [444.35]	2003/03 [179.32]	-59.64%
		Financial Crisis	2007/05 [439.24]	2009/02 [184.27]	-58.05%
		Euro Crisis	2011/04 [293.2]	2012/05 [213.87]	-27.06%
UK	FTSE All-Share Index	Technology Bubble	2000/08 [3207.99]	2003/03 [1735.72]	-45.89%
		Financial Crisis	2007/05 [3438.7]	2009/02 [1929.75]	-43.88%
		Euro Crisis	2011/04 [3155.03]	2012/05 [2767.09]	-12.30%

The points of market indices are presented in brackets.

Each developed market has experienced the same global market crisis such as the Tech Bubble and the Financial Crisis but other market crisis are geographically specific to that particular developed market. According to Table 3.2.1, in the US, based on the trends of the MSCI USA Index, we characterize two crisis periods: one from March 2000 to September 2002 and another from October 2007 to February 2009. For Canadian stock market, there are one more crisis periods with different time span: August 2000 to September 2002, October 2007 to February 2009, February 2011 to May 2012. In both Eurozone and UK, three periods of crisis are identified through analysing the downtrends

of stock market indices: February 2000 (August 2000 in UK) to March 2003, May 2007 to February 2009, and April 2011 to May 2012.

Due to the burst of Tech Bubble, the first crisis period started in 2000 among the four markets, and the second crisis period was triggered by global financial crisis happened during 2007-2008. The third crisis was the euro sovereign debt crisis in Eurzone, which had negative effects on UK as well. However, the third one in Canada was impacted by the sharp decline of natural gas prices.

3.3 Performance Evaluation Model

To evaluate the performance of SRI and matched market indices, we use three different factor models to do the regression: Capital Asset Pricing Model (CAPM), Fama and French (1993) three factors model, and Carhart (1997) four factors model.

Using the monthly time series prices with net dividends among crisis and non-crisis periods (2000-2014), we calculate the alpha parameters and compare the performance of SRI indices with market indices to observe the trends and patterns. We estimate the alphas for the CAPM in different market states, crisis and non-crisis, by using the following regression:

$$R_t - R_{f,t} = \alpha_{NC}D_{NC,t} + \alpha_C D_{C,t} + \beta_1(R_{m,t} - R_{f,t}) + \varepsilon_t$$

where R_t represents the total returns with net dividends of the SRI over period t , $R_{f,t}$ is the risk free rate (30-day Treasury bill rate) during the same period, α_{NC} represents the monthly alpha parameter of regression during non-crisis periods, α_C is the monthly

alpha in crisis periods, $D_{NC,t}$ ³ is the dummy variable and the value is 1 if time t is identified as non-crisis periods and 0 otherwise, $D_{C,t}$ is the dummy variable that equals to 1 when time t is defined as crisis periods and 0 otherwise, β_1 is the systematic risk, $R_{m,t}$ refers the total returns with net dividend of the four market indices we chose to be benchmarks, ε_t measures the residual. Extending the CAPM with two more factors, we have the Fama French three factors model:

$$R_t - R_{f,t} = \alpha_{NC}D_{NC,t} + \alpha_C D_{C,t} + \beta_1(R_{m,t} - R_{f,t}) + \beta_2SMB_t + \beta_3HML_t + \varepsilon_t$$

where β_2 and β_3 are the loadings on the small minus big (SMB) and high minus low (HML) factors, respectively. Last but not least, we use Carhart four factors model (1997) to evaluate crisis and non-crisis alphas:

$$R_t - R_{f,t} = \alpha_{NC}D_{NC,t} + \alpha_C D_{C,t} + \beta_1(R_{m,t} - R_{f,t}) + \beta_2SMB_t + \beta_3HML_t + \beta_4WML_t + \varepsilon_t$$

where β_4 is the coefficient on the winners minus losers (WML) factor. The data for $R_{f,t}$, SMB_t , HML_t and WML_t are downloaded from Kenneth French's (2015) website and all regressions in this paper are done with confidence level of 95 percent.

Because we examine the performance of those indices across various countries and areas, we decide to use country-specific factors obtained from Kenneth French's (2015) website, which have less pricing error and can explain the time-series variation in portfolio

³ Since Nofsinger and Varma (2013) used two dummy variables, we decided to replicate their regression models with two dummy variables, in order to explain the models more clearly. We also tested the models with one dummy variable and received the same results.

stock returns more accurately, according to Griffin's (2002) theory. Specifically, for the US, we used Fama French US factors and, for Canada, we use Fama French North America factors and, for Europe and United Kingdom, we use Fama French European factors⁴ instead.

⁴ Including Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

4: Performance

4.1 Replication of Nofsinger and Varma's (2014) Results

Above all, in order to check the accuracy of our model, we replicate the method Nofsinger and Varma (2014) used to investigate the relationship between SRI index, MSCI KLD 400 Social Index, and benchmark, S&P 500 Index, during 2000-2012 by using three asset pricing models: CAPM, Fama and French (1993) three factors model, and Carhart (1997) four factors model. The data for $R_{f,t}$, SMB_T , HML_t and WML_t are downloaded from Kenneth French's (2015) website and is based on U.S. research returns data. Average returns and alpha parameters estimated from the three models for this period (2000-2012) are demonstrated in Table 4.1.1 and all of them shown are annualized.

Table 4.1.1 Performance of KLD400 SRI index vs S&P500 market indices

KLD400	Whole Period		Non Crisis		Crisis	
	SRI	Market	SRI	Market	SRI	Market
Average Return	-1.57%	-1.29%	9.12%	9.49%	-9.86%	-9.91%
Excess Return	-0.28%		-0.37%		0.05%	
CAPM Alpha	-0.30%	[0.70]	-0.47%	[0.77]	0.04%	[0.97]
FF3 Alpha	-0.49%	[0.53]	-0.61%	[0.54]	0.47%	[0.74]
Carhart 4 Alpha	-0.49%	[0.53]	-0.63%	[0.55]	0.41%	[0.78]

Replication of Nofsinger and Varma (2013) SRI fund and conventional fund returns. All estimates are annualized. None of the alphas is statistically significant (p -values at the 5% significance level), indicating no difference between SRI index returns and market index performance in non-market crisis or crisis periods. P values are demonstrated in the brackets.

The KLD 400 SRI index has an annualized average return of -1.57% during the whole period, 9.12% during non-crisis period and -9.86% during crisis period. All of the average returns are very similar to the ones of benchmark. The annualized alpha estimates of this SRI index calculated by three models are negative and not significantly different

from 0 during the period from 2000 to 2012. During the non-crisis periods, the SRI index provided excess return of -0.37% and 0.05% during crisis period. However, all alphas estimated by these three models are nearly or not statistically significant at 95% confidence level. In conclusion, the results we received are very similar to the reference paper. However, due to the fact we chose to use indices, the difference between the KLD 400 SRI index and market is less pronounced than the difference between SRI funds and conventional funds shown in the reference paper. We find that the KLD400 SRI index shows little difference compared to market index during two economic conditions (outperform during crisis and underperform otherwise), but not significantly different from zero.

4.2 Our Results

By utilizing the same method but with country-specific Fama French factors instead, we estimate alphas and average returns of our selection of four SRI indices. All results reported in Table 4.2.1 are monthly.

In the US, it is found that the KLD400 SRI index offers the same performance as the MSCI USA market index during market crisis and non-market crisis periods between 2000 and 2014. None of alphas for KLD400 are significant yet KLD400 has lower Sharpe ratio than the MSCI USA market index in all periods. Investors will do just as well in market crisis with MSCI USA market index and receive a relatively higher risk-adjusted return. The KLD400 index comprises of 400 stocks versus 2495 stocks in the MSCI USA. Despite being much less diversified than the market, KLD400's product-related exclusion and positive screening strategies are able to match the market index in terms for performance but not on a risk-adjusted basis.

Table 4.2.1 Performance of SRI and market indices

USA	Whole Period		Non-Crisis		Crisis	
	SRI	Market	SRI	Market	SRI	Market
Average Return	0.32%	0.23%	0.93%	1.04%	-0.70%	-0.72%
Excess Return	0.09%		-0.11%		0.02%	
Sharpe ratio	0.07	0.13	0.97	1.09	-0.84	-0.83
CAPM Alpha	-0.08%	[0.26]	-0.08%	[0.90]	-0.06%	[0.66]
FF3 Alpha	-0.06%	[0.40]	-0.08%	[0.52]	0.02%	[0.87]
Carhart4 Alpha	-0.05%	[0.44]	-0.08%	[0.54]	0.02%	[0.87]
Canada	Whole Period		Non-Crisis		Crisis	
	SRI	Market	SRI	Market	SRI	Market
Average Return	0.57%	0.57%	1.17%	1.12%	-0.60%	-0.55%
Excess Return	0%		0.05%		-0.05%	
Sharpe ratio	0.39	0.39	1.50	1.45	-0.74	-0.69
CAPM Alpha	0.01%	[0.91]	0.12% **	[0.06]	-0.22%	[0.12]
FF3 Alpha	0.02%	[0.80]	0.13% **	[0.06]	-0.21%	[0.15]
Carhart4 Alpha	0.04%	[0.56]	0.13%	[0.13]	-0.14%	[0.33]
Eurozone	Whole Period		Non-Crisis		Crisis	
	SRI	Market	SRI	Market	SRI	Market
Average Return	0.05%	0.34%	1.09%	1.25%	-1.04%	-0.91%
Excess Return	-0.29%		-0.16%		-0.13%	
Sharpe ratio	-0.04	0.15	1.08	1.32	-0.86	-0.81
CAPM Alpha	-0.30% *	[0.00]	-0.33%	[0.59]	-0.24% **	[0.07]
FF3 Alpha	-0.26% *	[0.00]	-0.22%	[0.48]	-0.33% *	[0.01]
Carhart4 Alpha	-0.24% *	[0.00]	-0.20%	[0.59]	-0.29% *	[0.02]
UK	Whole Period		Non-Crisis		Crisis	
	SRI	Market	SRI	Market	SRI	Market
Average Return	0.16%	0.45%	0.85%	1.02%	-0.69%	-0.58%
Excess Return	-0.29%		-0.17%		-0.11%	
Sharpe ratio	0.04	0.47	1.06	1.33	-0.82	-0.47
CAPM Alpha	-0.36%	[0.11]	0.18% *	[0.00]	-1.27% *	[0.00]
FF3 Alpha	-0.43% *	[0.05]	0.24% *	[0.00]	-1.36% *	[0.00]
Carhart4 Alpha	-0.56% *	[0.01]	0.38% *	[0.01]	-0.87% *	[0.01]

All returns and alphas are monthly. The Sharpe ratios are annualized. Sharpe ratios show that all SRI indices perform worse than market indices during crisis periods. Results indicate there is no significant difference between the performance of SRI indices and market indices in USA and Canada as none of the alphas are significant in non-market crisis or crisis periods. In Eurozone and UK, SRI indices underperform the market indices in market crisis periods. Absence of asterisks implies abnormal return is not statistically significant. The p-values of each alpha are presented in brackets.

* Represents the statistically significant alphas at the 5% significance level

** Represents the statistically significant alphas at the 10% significance level

In Canada, we find that the JSI performs similarly to the S&P/TSX 60 market index during market crisis but significantly outperforms the S&P/TSX 60 during non-market crisis between 2000 and 2014. Since the Sharpe ratio for JSI is smaller than the Sharpe ratio of the S&P/TSX 60 in crisis periods, investors should not rely on the JSI for crisis protection. The product-related exclusions and negative screening techniques employed by the JSI does not offer investors more protection during market crisis. During non-crisis periods, JSI is a superior choice because it does offer better performance than the market on a risk-adjusted basis. On a side note, since the JSI and the S&P/TSX 60 both consist of 60 largest companies in Canada, we think that large cap bias that exists within the S&P/TSX 60 will be neutralized by the SML factor in the FF3 model. In addition, we compare JSI with S&P/TSX Composite as the broad market index and receive similar results as using S&P/TSX 60 as the market index.

In the Eurozone, the EURO Sustainability index significantly underperforms the EURO STOXX market index by 0.13% per month during market crisis, more specifically during the Financial Crisis and the Euro Crisis but not the Tech Bubble. Overall, the EURO Sustainability index significantly underperforms the market index by 0.29% per month between 2000 and 2014. The two indices are invested in 200+ companies, offering a fair comparison. The positive screening techniques (Bank J. Safra Sarasin's Sustainability matrix) utilized by EURO STOXX Sustainability index has a negative impact on performance in market crisis. Investors in the Eurozone are worse off in downmarket by buying the EURO STOXX Sustainability index.

Finally, in the UK, the FTSE4Good significantly underperforms the FTSE All-Share market index by 0.11% per month during market crisis periods but has a positive

alpha during non-crisis periods between 2000 and 2014. FTSE4Good index utilizes the most screening techniques, including product-related exclusion, negative screening with corporate engagement and positive screening. Its SRI strategy appears to harm returns in market crisis but improves return in non-crisis periods. However, it should be mentioned that there are only 232 companies in the FTSE4Good index and 643 companies in the FTSE All-Share index. The FTSE All-Shares index is invested in nearly three times more companies than the FTSE4Good index. Hence, it is not surprising that FTSE4Good index underperforms the market index on a risk-adjusted basis considering it is much less diversified than its market benchmark. Consequently, FTSE4GOOD investors are worse off in downmarket.

To further explore the performance of SRI indices during poor economic conditions, we examine their performance independently for each crisis period in different markets.

Table 4.2.2 reports the alpha of each crisis period in North American markets and none of them shows statistically significant difference between the SRI and market indices. For the US, monthly average returns for both SRI and market indices very similar in Tech Bubble and Financial Crisis, indicating the KLD500 index does not offer downmarket protection in either type of crisis.

In Canada, the monthly average returns for both SRI and market indices are also similar in the Tech Bubble and Financial Crisis but the JSI had 3.52% excess return per month during the Natural Gas Crisis. Although, in Canada, the alphas are positive but insignificant, investing in the SRI index provides relatively higher return than the market index during only the Natural Gas Crisis.

Table 4.2.2 Performance of SRI and market indices in North America

USA	Technology Bubble		Financial Crisis			
	SRI	Market	SRI	Market		
Average Return	-1.79%	-1.80%	-4.03%	-4.25%		
Excess Return	0.01%		0.22%			
CAPM Alpha	-0.13%	[0.67]	-0.16%	[0.58]		
FF3 Alpha	-0.10%	[0.76]	-0.25%	[0.43]		
Carhart4 Alpha	-0.13%	[0.68]	-0.21%	[0.53]		
Canada	Technology Bubble		Financial Crisis		Natural Gas Crisis	
	SRI	Market	SRI	Market	SRI	Market
Average Return	-2.03%	-1.78%	-3.15%	-2.80%	-0.73%	-4.25%
Excess Return	-0.25%		-0.35%		3.52%	
CAPM Alpha	-0.28%	[0.23]	-0.50%	[0.26]	0.12%	[0.60]
FF3 Alpha	-0.02%	[0.94]	-0.61%	[0.24]	0.27%	[0.23]
Carhart4 Alpha	-0.03%	[0.87]	-0.57%	[0.29]	0.34%	[0.17]

Results show that there is no significant difference between the performance of SRI indices and market indices in North America during any crisis period. The *p*-values of each alpha are presented in brackets.

According to Table 4.2.3, the EURO Sustainability index shows no significant difference from the market in the Tech Bubble but underperforms during the Financial Crisis and Euro Crisis. It shows that the EURO Sustainability index is sensitive to financial-related crisis as both the Financial Crisis and Euro Crisis are of financial nature.

In the UK, the FTSE4GOOD index significantly underperform the market index in all three type of market crisis with the worse occurred in the Financial Crisis. In particular, the CAPM alpha is negative for all three types of crisis, indicating the stringent screening methods used by FTSE4GOOD has an adverse systematic impact on returns in all three types of market crisis.

Table 4.2.3 Performance of SRI and market indices in Europe

Eurozone	Technology Bubble		Financial Crisis		Euro Crisis	
	SRI	Market	SRI	Market	SRI	Market
Average Return	-3.12%	-2.63%	-3.71%	-3.52%	-2.07%	-1.56%
Excess Return	-0.50%		-0.19 %		-0.51%	
CAPM Alpha	0.04%	[0.83]	-0.42%	[0.14]	-0.63% *	[0.03]
FF3 Alpha	0.28%	[0.23]	-0.58% *	[0.04]	-0.11%	[0.80]
Carhart4 Alpha	0.28%	[0.25]	-0.56% *	[0.06]	-0.31%	[0.52]
UK	Technology Bubble		Financial Crisis		Euro Crisis	
	SRI	Market	SRI	Market	SRI	Market
Average Return	-2.17%	-1.89%	-2.56%	-2.19%	-0.64%	-0.42%
Excess Return	-0.28%		-0.37%		-0.22%	
CAPM Alpha	-2.28% *	[0.07]	-0.48% *	[0.01]	-0.24% *	[0.05]
FF3 Alpha	-0.83%	[0.58]	-0.54% *	[0.00]	-0.03%	[0.90]
Carhart4 Alpha	-0.57%	[0.60]	-0.50% *	[0.00]	0.06%	[0.72]

Results indicate that, during technology bubble, the SRI indices perform similarly to market indices with non-statistically significant alphas. During financial crisis, the SRI underperform the benchmarks in both Eurozone and United Kingdom. And the SRI indices have no significant different with the market indices during Euro crisis period. The p-values of each alpha are presented in brackets.

* Represents the statistically significant alphas at the 5% significance level

5: Summary

To summarize, the performance of SRI indices in various developed markets vary between 2000 and 2014. In Canada, the Jantzi SRI index performs similarly to its well-matched market index of similar Sharpe ratios but does not offer extra protection in down markets. In the US, the KLD400 SRI index, with a slightly lower Sharpe ratio, performs similarly to a much more diversified broad market index, but the KLD400 SRI index does not offer extra protection in down markets. The story is different for developed markets in Europe. In the Eurozone, the EURO STOXX Sustainability index has a worse Sharpe ratio than its market index and significantly underperforms the market index overall by 0.29% per month, magnifying negative return in the Financial Crisis and Euro Crisis. In the UK, the FTSE4Good index has a worse Sharpe ratio than its broad market index and underperforms the index by 0.29% per month overall and magnify negative return in all crisis periods. Our results show that SRI indices, with a range of screening methods, do not offer down market protection in North America and Europe. Furthermore, the SRI index underperforms its market benchmark in the Eurozone during both types of financially-related downmarket, the Financial Crisis and the Euro Crisis. The SRI index in UK underperforms its market benchmark in all three crises. Therefore, we do not find that the SRI indices we selected offer downmarket protection in North America and Europe.

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Appendix

Appendix A SRI Indices Performance & Market Indices Performance

In order to visually inspect data, we download monthly prices with net dividend of four SRI indices and four market indices from Bloomberg and calculate monthly logarithmic return by using the formula: Monthly logarithmic return = $\ln\left(\frac{p_t}{p_{t-1}}\right)$. Then we plot the monthly returns of SRI index (Shown by red dots) and market index (Shown by blue lines) for each market in order to compare their trends. According to the figures demonstrated in the following pages, overall, the SRI index in each market has a very similar performance with the market index.

Figure 1 United States of America: KLD 400 & MXUSIM (The SRI index has a very similar trend with the market index.)

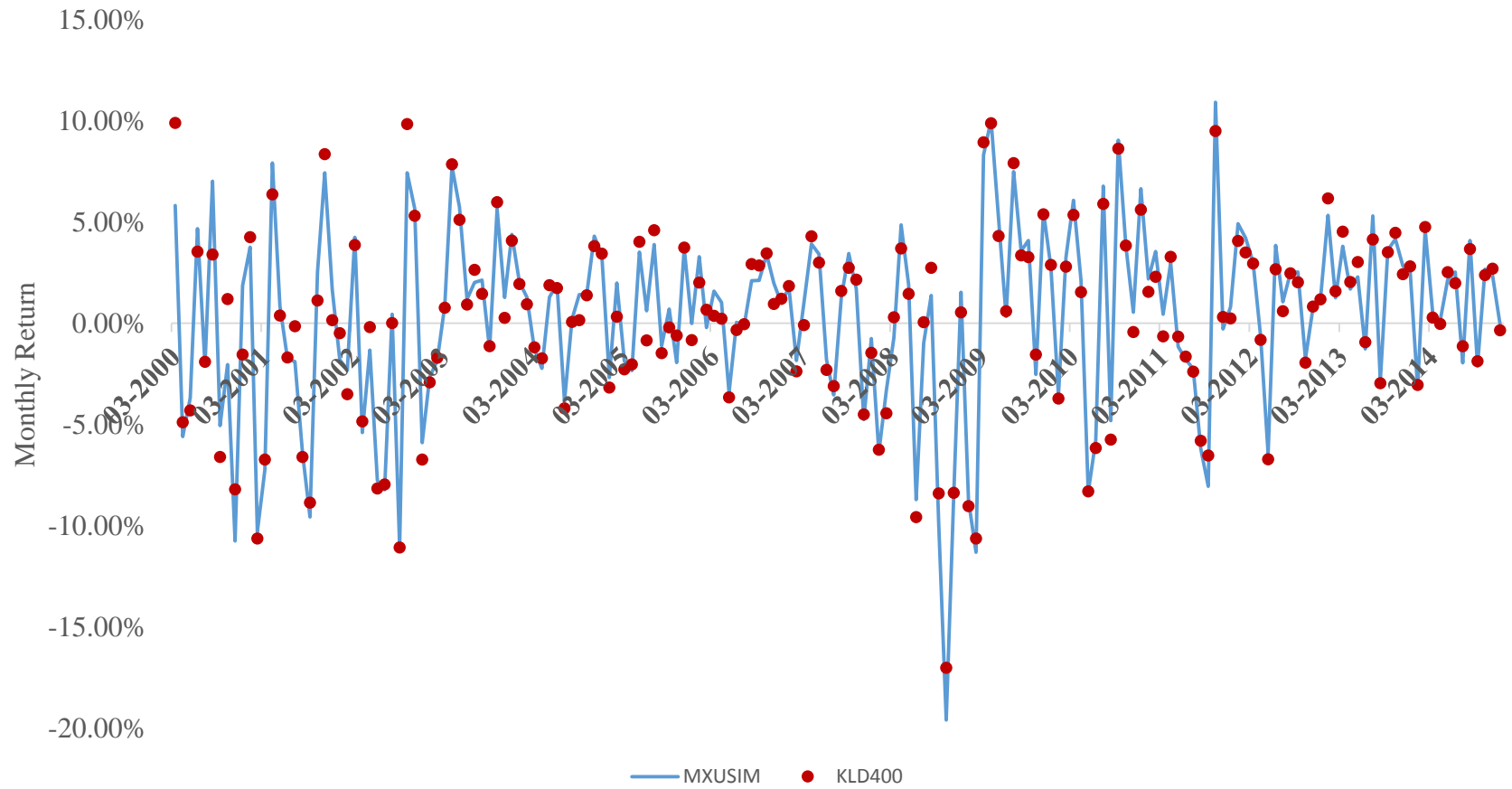


Figure 2 Canada: JSI & SPTSX60 (The SRI index has a very similar trend with the market index.)

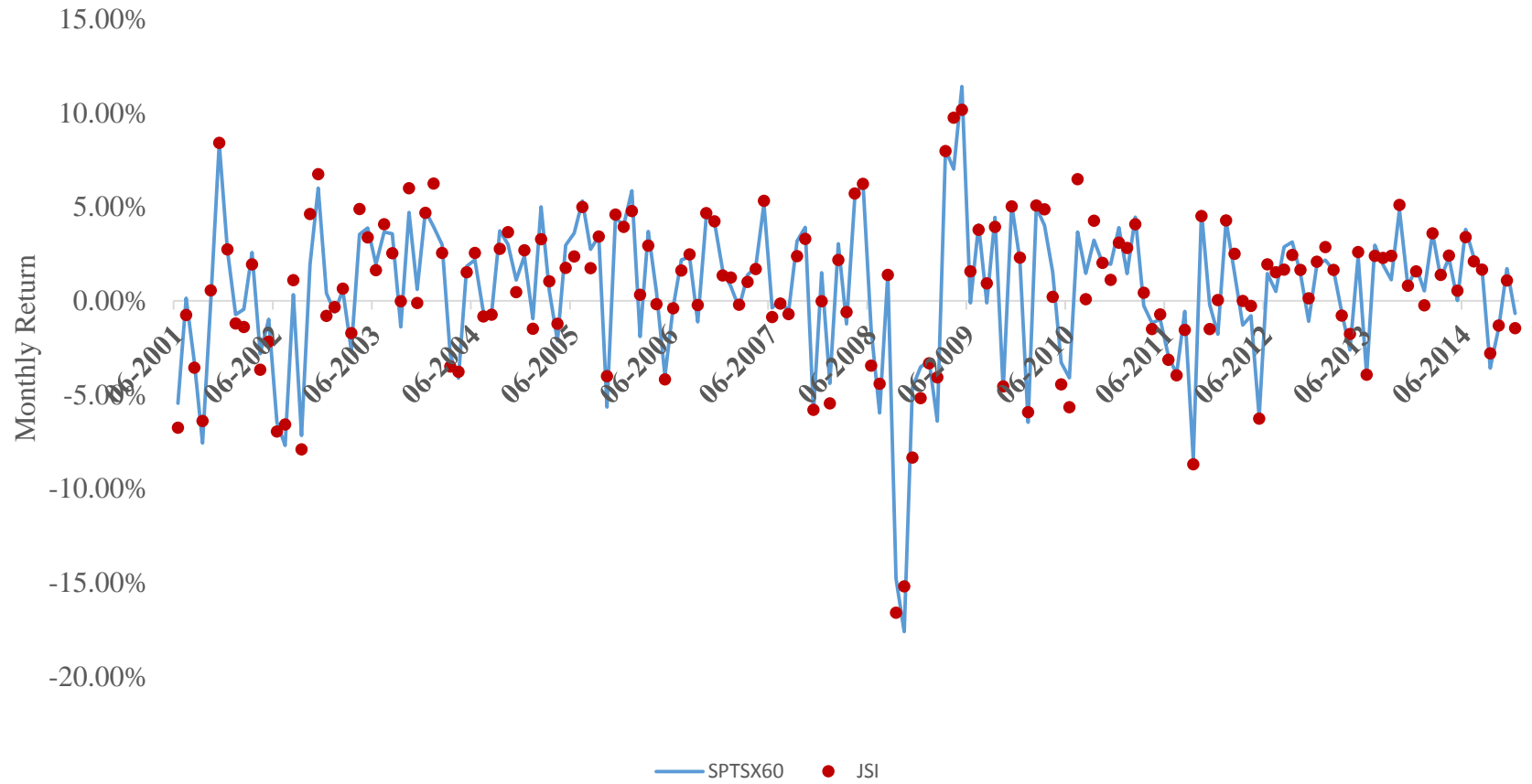


Figure 3 Europe: SUTE & SXXE (The SRI index has a very similar trend with the market index.)

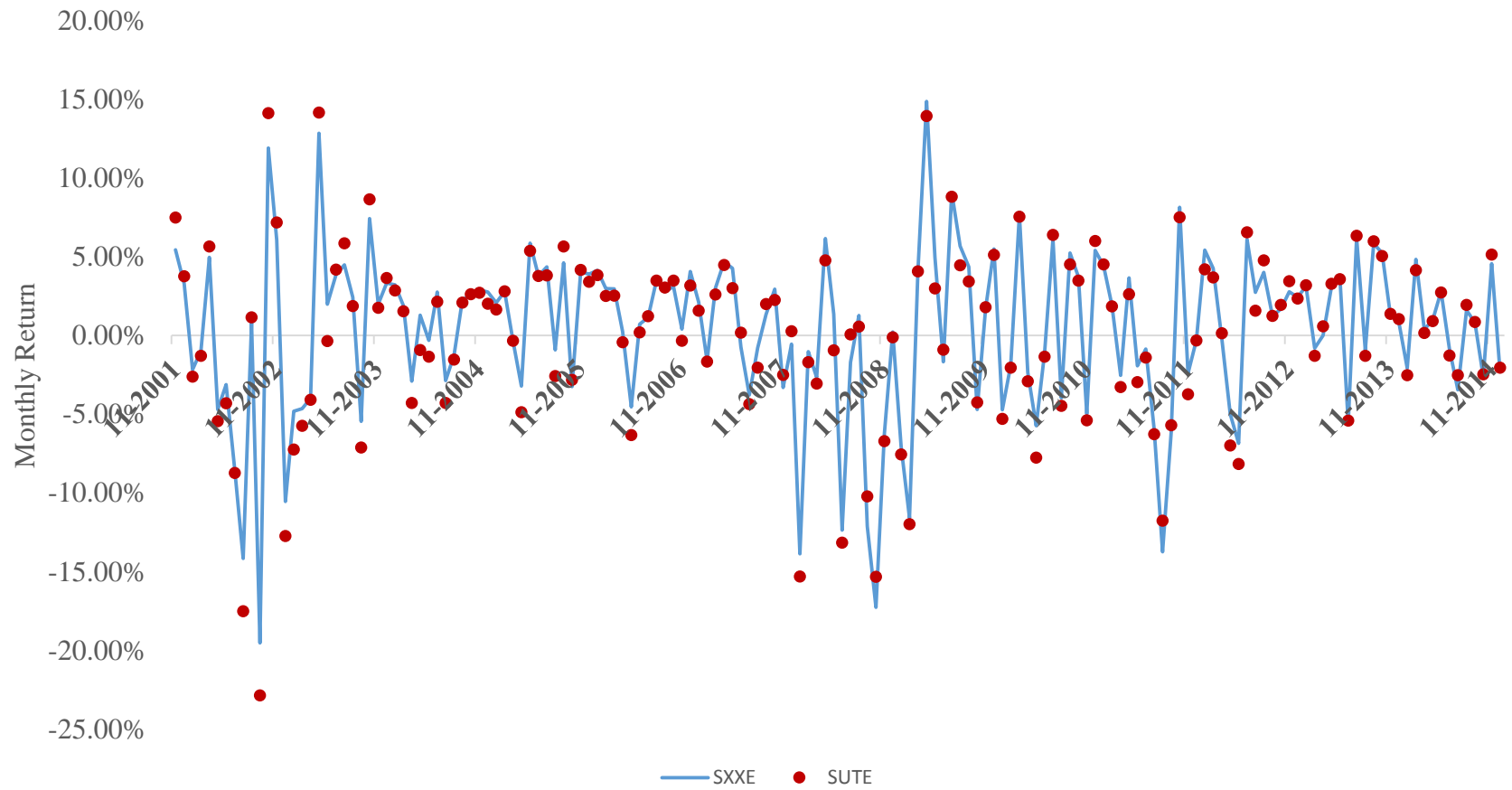


Figure 4 United Kingdom: 4GUK & ASX (The SRI index has a very similar trend with the market index.)

