ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

Bachelor Thesis Financial Economics

PERFORMANCE COMPARISON OF EUROPEAN SOCIALLY RESPONSIBLE AND CONVENTIONAL MUTUAL FUNDS (2007-2019)

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Abstract

The market of European socially responsible mutual funds is growing steadily for recent years, with approximately 496 billion euros assets under management, as of 2018. The central concern is how does socially responsible mutual funds perform financially compared to their conventional peers. This paper uses data of equity funds, domiciled in European countries, from January 2007 to December 2019 to tackle the question. The results show that, on average, there is no significant difference between the financial performance of socially responsible and conventional funds for the whole sample period. Moreover, socially responsible funds are more exposed to growth stocks overall and show a contrasting tendency towards small- or large-cap stocks according to different measurement models.

1. Introduction

Socially responsible investing (SRI), or also called sustainable and responsible investing has been growing enormously after the launch of The Principles for Responsible Investment in May 2006. Since then, the numbers of signatories worldwide, who are asset owners and managers committing to six established principles, have been rapidly increasing from 73 to nearly 2400 as of June 2019 (European Fund and Asset Management Association, 2016; Principles for Responsible Investment, 2019). SRI is defined as an investment method that considers the environmental, social, and governance (ESG) criteria for both financial and non-financial aspects, during the process of researching, analyzing, and selecting financial securities within a portfolio (Eurosif, 2019). In Europe, the asset under management (AuM) for SRI grew by 11 percent, from nearly 11.1 trillion euros in 2016 to approximately 12.3 trillion euros in 2018, which was equivalent to 49 percent of total global AuM under SRI strategy (Global Sustainable Investment Alliance, 2018). This remarkable evidence partly shows how Europe as a whole is striving for its sustainable 2030 finance goals.

Besides, with all the alarming global issues like climate change, global pandemic, and extreme inequality, investors are not only interested in the financial purposes of their investments but also their contributions to the environment and society. One financial product that can provide both of these aspects to investors is SRI mutual fund (MF). SRI MF is differentiated from conventional peers by the process of integrating ESG criteria into the portfolio selection process. The European SRI MF industry has been expanding significantly and steadily, almost doubled in terms of AuM, from 252 billion euros in 2012 to 496 billion euros in 2018 (KPMG, 2019). Equivalently, the number of outstanding SRI funds, domiciled in European countries, grew from 1584 in 2012 to 2816 in 2018.

The performance of SRI funds has been studied and received controversial results among researchers. For years, researchers have been using either a single-index or multi-factor model to evaluate the portfolios' performance. The single-index model was proposed by Sharpe (1964) and Lintner (1975) independently. The multi-factor model, such as Fama and French's (1992) three-factor model and Carhart's (1997) four-factor model, is more widely used because of their higher explanatory power. In most of the previous studies, researchers usually applied both types of performance evaluation. Besides those unconditional models, conditional models established by Ferson and Schadt (1996) and Christopherson (1998), which allow for variant alphas and betas, are also implemented as they are able to improve the level of statistical significance.

Regarding the performance of SRI funds relative to conventional peers, there are two main arguments from previous researches: there is no statistical difference versus SRI MF underperforms conventional ones. As far as I have acknowledged, earlier studies investigating the performance difference between SRI and conventional funds focus on the period far in the past, or approximately before the global financial crisis. Also, since most of the previous researches examines the US market, it would be appropriate and interesting to conduct an additional analysis for the European one. Thus, this paper aims to answer the following research question:

How was the overall performance of SRI Mutual Funds domiciled in European countries, relative to their conventional peers, from 2007 to 2019?

The answer to this research question can contribute to the knowledge of the investment and asset management industry, specifically for the European markets. With the up-to-date empirical evidence of the performance comparison between SRI and conventional funds, asset managers and investors gain additional information in the process of making investment decisions.

The first aim of this paper is to compare the financial performance between SRI and conventional funds. I applied both unconditional single- and multi-factor models to measure the funds' performance as well as to make comparison using the portfolios' alphas. The sample consists of survived SRI and conventional equity MFs domiciled in European countries. The findings suggest that there is no statistically significant difference between two types of MFs. Besides, the multi-factor indicates that SRI portfolio is more exposed to growth stocks relative to its conventional peer. In term of size bias pattern, the Fama and French's (1992) three-factor model proposes a contradict result to the Carhart's (1997) four-factor model. The former suggests that SRI funds are more exposed to small-cap stocks while evidence from the latter shows the opposite outcome.

The structure of this paper is as follows. The paper starts off by providing the underlying theoretical frameworks and previous findings regarding the SRI MF industry as well as its performance. Then, there will be a thorough description of data sampling and construction, followed by an explanation of the methodology used to evaluate the funds' performance. Next, the obtained results will be interpreted and discussed. After the discussion, the paper's limitations and potential further potential research suggestions will be delivered before the final thesis conclusion.

2. Theoretical frameworks

2.1. Mutual Fund and the SRI Mutual Fund industry

The global mutual fund industry, after its first appearance in the nineteenth century, has been growing steadily thanks to its advantages benefitting the investors. The first explosive growth took place during the 1990s, partly due to the globalization of the finance industry and the expansion of large multinational groups. The average annual growth rate, from 1992 to 1998, in terms of total net assets (TNA), was 22.4% and 17.7% in the US and European countries respectively (Fernando et al., 2003). MF is defined as an investment vehicle, that pools the money of different investors to invest in a portfolio of various financial instruments selected by professional managers. In terms of structure, MF can be categorized into two main types: close-end and open-end fund; in this research, I focus solely on the latter one. An open-end fund is considered as an MF that issues fund shares (or units) which can be redeemed on demand. As most of the MFs issued are open-end, the term MF and the open-end fund will be used interchangeably in this paper. During 10 years from 2009 to 2019, the AuM of MFs doubled, from 26.7 to 54.88 trillion US dollars, equivalent to 82,991 and 122,528 funds respectively (Investment Company Institute, 2019, 2020). With a wide range of asset types hold in one portfolio, MF reduces the risk faced by the investors through a high level of diversification. According to the Modern Portfolio Theory (MPT) of Markowitz (1959), there is always a tradeoff between the return and the variance (which measure the risk) of a portfolio. To deal with this tradeoff, the theory suggests that investors should consider not only the individual characteristics of the assets but also their co-movements in the market. Taking into account this aspect, which means diversifying the portfolio, investors can face a lower risk for a given level of return. Besides, through large pooled investment amounts, it is more accessible and less expensive for investors to participate in various financial offerings, especially which are more difficult to purchase or have high transaction fees, such as foreign securities, compared to when they make the investments themselves. MF also provides shareholders the managerial expertise served by professional managers, alongside with supporting analysts, to accomplish the fund's stated objectives. Additionally, it can be issued in different share classes which represent different fees structure, from which investors can easily choose to match their budgets. The ownership of the fund, which is expressed as a number of shares, depends on the contribution of the investors to the fund and can be redeemed according to the fund's net asset value (NAV). The NAV is calculated daily; therefore, investors can liquidate their shares conveniently whenever they want.

SRI MF, in addition to all those mentioned benefits, also satisfies the needs of investors in terms of social concerns. Originally, SRI MF is characterized as an investment that does not invest in companies producing undesirable products, such as tobacco, gambling, and child labor. Instead, it should invest actively in firms that encourage ethical activities like recycling or natural conservation (The International Investment Funds Association, 2020). Later on, as the SRI industry was growing gradually, asset managers started to incorporate ESG factors and screening strategies into their investment process (Nofsinger & Varma, 2014). There are two main social screening types: negative and positive. Negative screening (or exclusionary screening) simply means that any sectors or firms which do not meet ESG criteria would be excluded from the portfolios. Among all regions, negative screening is applied in European countries the most often, accounting for 55% of all AuM following this strategy, as of 2018. On the other hand, positive screening (or best-in-class screening) is more popular in the US. The strategy invests in sectors or firms that have positive ESG performance relative to their peers in the same industry. However, compared to exclusionary screening with approximately 19,772 billion US dollars AuM, best-in-class screening is less in use, with only nearly 1,900 billion US dollars AuM on a global level, as of 2018 (Global Sustainable Investment Alliance, 2019).

2.2. Performance of SRI mutual funds

As mentioned, the SRI process consists of a security screening stage, intending to ensure that the chosen assets are eligible under the ESG criteria. This leads to the narrower investment universe compared to conventional investment strategies. According to the portfolio theory, the restricted universe would prevent efficient diversification, which should lead to the underperformance of SRI portfolios relative to well-diversified ones (Lee et al., 2010). This argument is consistent with what Rudd (1981) proposed about how social screening leads to a portfolio's size bias and thus, long-run investment performance deterioration. With one additional screen, SRI funds yield on average a 1% lower return per year in comparison with conventional peers (Renneboog et al., 2008). In the research on SRI MFs invested globally, from August 1996 to August 2008, Cortez et al. (2012) found that US and Austrian funds underperformed both conventional peers and SRI benchmarks while applying different performance evaluation models. They proposed negative social screening as one of the various potential causes. Additionally, in the research on Canadian SRI funds, Asmundson and Foerster (2001) suggested that social screening might decrease the risk exposure according to the extent to which the funds invest fully in equity. Another explanation for the lack of diversification is poor management skills, in the case of active funds. An active

fund is an investment vehicle whose managers deliberately pick financial instruments for the portfolios, based on their forecasting ability on the riskiness and potential return of the assets. The empirical evidence supporting this argument was found by Girard et al. (2007) and Renneboog et al. (2008). The first paper used a sample of 116 US SRI open-end funds operated from January 1984 to December 2003, including all equity, bond, and balanced funds. Overall, SRI MFs underperform conventional funds by approximately 7% to 9% per annum, in terms of total returns. It is suggested that equity funds bear the highest cost of diversification while fixed income funds bear the lowest one. Likewise, the second paper reported that SRI alphas are on average 4-7% lower than conventional alphas, specifically for funds in France, Ireland, Sweden, and Japan. The alphas were estimated using Carhart's (1997) four-factor model. Geczy et al. (2005) also supported the argument of poor management skills and even pointed out a higher average annual expense as an additional reason for SRI funds' underperformance relative to conventional ones. Moreover, several papers are comparing the performance of SRI funds with both SRI and conventional benchmarks. For instance, according to the research of Jones et al. (2008), on average, Australian SRI funds statistically underperform their associated benchmarks by 3-5% in terms of the risk-adjusted return. Similarly, Renneboog et al. (2008) found significant negative risk-adjusted returns for SRI funds in the US, UK, European and Asia-Pacific countries, except for France, Japan, and Sweden.

In the paper of Chang & Witte (2010), they researched the US MF industry, including all equity, fixed income, and balanced vehicles in their sample. The authors used expense ratios, annual turnover rates, and tax cost ratios as operating characteristics; historical returns, risks, and risk-adjusted returns as performance measures. The results indicate that SRI funds experienced lower operating characteristics and performance measures than conventional funds in the same asset classes, for ten to fifteen years horizon. Nevertheless, for three years horizon, balanced and fixed income SRI funds tend to perform better with higher returns and lower risks. Thus, it is proposed that there could be no defined pattern of the cost of SRI. On the other hand, Bauer et al. (2006) justified the inconsistency in the performance of SRI funds by the learning effects. They suggested that SRI funds tend to go through a catching-up phrase during their lifetime. In comparison with the conventional funds, Australian SRI funds underperformed during 1992-1996, outperform during 1996-1999, then performed closely during the 1999-2003 period.

The second main argument regarding the performance of SRI MFs is that SRI has no costs at all, or there is no distinguishable difference between the performance of SRI and conventional mutual funds. On a stock level, Guerard (1997a; 1997b) conducted a comparison analysis between the monthly returns of screened versus unscreened equity universe in the US market and found no significant difference, even

though the former produced higher risk-adjusted returns, on average, during the whole sample period. Statman (2000) also documented a similar result in his research on US equity funds from May 1990 to September 1998. However, he also reported that US SRI MFs statistically underperform the Domini Social Index, which is a stock index of socially responsible companies; it works like the S&P500 index. The matching evidence was reported by Bello (2005) as well, using the sample period from January 1994 to March 2001. On the other hand, several studies in the European market also drew the same conclusion in terms of comparable performance between SRI and conventional funds. For example, Cortez et al. (2009) and Leite and Cortez (2014) investigated a sample of open-ended funds domiciled in Europe using both conditional as well as unconditional models and they obtained similar results. Nevertheless, it can be partly because they used two sample periods that are mostly overlapped and had the same data selection procedure. Similarly, other papers focusing on individual countries also suggest no statistically significant difference in the performances between SRI and conventional peers. For instance, in Canada (Asmundson & Foerster, 2001; Bauer et al., 2007), Australia (Bauer et al., 2006) and the Netherlands (Scholtens, 2005). However, it is also mentioned in Bauer et al. (2006) that the results of performance comparison are sensitive to the chosen period as well as the applied model (single- versus multi-factor model or unconditional versus conditional model). Beyond the financial performance, Asmundson and Foerster (2001) pointed out that if there is no difference between SRI and conventional funds, shareholders of SRI funds can be considered as better off overall, as their investments contribute meaningfully to the environment, the society, and the world as a whole.

Interestingly, there is also evidences documented for the outperformance of SRI funds relative to the broad benchmark and conventional funds. Gil-Bazo et al. (2010) found that SRI funds obtained a higher risk-adjusted return with respect to their conventional peers during the period from 1997 to 2005, both before and after accounting for management fees. The superiority is mainly due to the asset-managing companies that specialize in SRI. Thus, investors should consider the characteristics of their management companies before making any investment decisions.

Regarding all the previous researches on SRI MFs' performance, especially those focusing on the European market, the first hypothesis is formulated as follows:

Hypothesis 1: There is no difference in financial performance between European SRI and conventional mutual funds.

2.3. The investment style of SRI mutual funds

In terms of investment style, SRI funds tend to be exposed to small-cap stocks. The evidence of this pattern was recorded in most of the previous studies. Luther et al. (1992) explained this tendency using a small company effect argument. The effect means that ethical firms are likely fast-growing young companies in general. Therefore, SRI investment portfolios are more likely to invest in firms with smaller market capitalization and lower dividend yield. Ethical firms can be seen as firms that do not cause any environmental damage, not involve in using child labor, not taking monetary advantage of their personnel, and not produce dangerous products. The small-cap bias can be a consequence of the stock selection process as the portfolio managers would exclude firms that do not meet screening requirements and pick new entrants, which are smaller in terms of market capitalization (Scholtens, 2005). Cortez et al. (2012) agreed with this explanation while performing analysis on US and European SRI funds. Also, the pattern seems to be stronger for European funds compared to US counterparts (Bauer et al., 2005). For this reason, my second hypothesis is:

Hypothesis 2: European SRI mutual funds are more exposed to small-cap stocks compared to conventional mutual funds.

Moreover, the argument about whether SRI funds are biased toward value or growth stocks is still controversial. Scholtens (2005) found that out of twelve SRI funds he analyzed, nine of them are value-oriented. However, it can be due to his chosen sample period, from 2001 to 2003, which happened to be a recession stage of the business cycle. During financial distress, portfolio managers might choose to invest in value stocks instead of growth stocks as the former tends to outperform the latter (Cochrane, 1999). Nonetheless, Bauer et al. (2005) and Cortez et al. (2012) suggested that SRI funds are more biased toward growth stocks, even when those funds are categorized as value strategy. Bauer et al. (2005) argued that traditional value sectors, like energy and chemical production, usually endangers the environment, hence, they are likely to be excluded from the SRI portfolios. Another potential explanation is that geographical difference influences the investment style of SRI funds (Schroder, 2004). As mentioned before, excluding stocks that do not meet ESG or SRI criteria is called negative screening, and this strategy is employed for a large proportion of European SRI funds. Therefore, the third hypothesis is formulated as follows, to investigate the tendency of the investment style of SRI MFs relative to conventional peers:

Hypothesis 3: European SRI mutual funds are more biased toward growth stocks compared to conventional mutual funds.

3. Methodology

3.1. Single-factor model

The most widely used technique to evaluate MF performance is indeed the single-factor model, which is derived from the theories of the CAPM introduced by Sharpe (1964) and Lintner (1965). CAPM studies the relationship between the expected return and market risk (or systematic risk). Based on this theory, investors are able to optimize their portfolios to be mean-variance efficient, equivalently, to be on the efficient frontier which is introduced in Markowitz's (1959) MPT. The single-factor model, which was first established in a paper of Jensen (1968) on the persistence of MF performance, is fully expressed as follow:

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_m - R_{ft}) + \varepsilon_{it}$$

where, R_{it} is the return on fund i in month t, R_{ft} is the risk-free rate in month t measured by 1-month Euribor rate, R_m is the return on the market proxy – MSCI AC Europe index – in month t and ε_{it} is an error term of MF i in month t. Compared to the original CAPM, Jensen (1968) introduced the α_i term to reflect the forecasting ability of the portfolio managers. He suggested that when the managers have superior predicting skills, the regression intercept, or also called Jensen's alpha in this case, will be positive. It means that the managers do better than a purely random selection buy and hold strategy, when α_i equals to zero. Undoubtedly, α_i can take negative value in case of the failed forecast. It also can be interpreted that Jensen's alpha measured the performance difference between returns on the portfolio and returns on the benchmark estimated by CAPM. Thus, it implies that this single-factor model can explain the cross-section of returns and periods regardless of economic and market conditions. Moreover, the regression coefficient β_i of the market premium $R_m - R_{ft}$ reflects the systematic risk of the MF's portfolio. Systematic risk reflects the impact of macroeconomic factors, such as inflation, financial recession, or political wars. Therefore, it creates an impact on the whole market instead of only a specific industry or company. Systematic risk cannot be diversified like unsystematic risk and it is usually unpredictable.

3.2. Multi-factor model

Bauer et al. (2007) argued that in the case of SRI funds, the single-factor model is unable to distinguish between the returns that are associated with social investment policies from the returns related to

conventional investment styles. Thus, it might lead to the potential spurious performance of MFs. Moreover, it is also suggested that the multi-factor model does better in capturing the cross-sectional variation in stock returns (Fama & French, 1993; Chan et al., 1996).

In this paper, I apply both Fama and French's (1992) three-factor model and Carhart's (1997) four-factor model to evaluate the SRI and conventional funds' performance. Fama and French (1992; 1993) proposed that risk can be captured and proxied by other factors like size and book to market ratio if the financial instruments are deliberately priced. Therefore, they added these two additional factors to the existing single-market equation to come up with the following model:

$$R_{it} - R_{ft} = \alpha_i + \beta_{0i}(R_m - R_{ft}) + \beta_{1i}SMB_t + \beta_{2i}HML_t + \varepsilon_{it}$$

where, SMB_t is the differential return of small and large-cap portfolios in month t, HML_t is the differential return between value and growth portfolio in month t; other variables are the same as in the single-factor model. For the variable SMB_t, the returns of small and big cap portfolios are proxied by MSCI AC Europe Small Cap and MSCI AC Europe Large Cap respectively. Similarly, the return proxies used to estimate HML_t are MSCI AC Europe IMI Growth and MSCI AC Europe IMI Value.

Carhart's (1997) model was built upon Fama and French's (1992; 1993) three-factor model and Jegadeesh and Titman's (1993) price momentum effect. Jegadeesh and Titman (1993) found that stock that performs well in the past three to twelve months would continue to perform well in the following three to twelve months. This is also consistent with the 'hot hands' phenomenon found by Hendricks et al. (1993), where the past winners keep winning and past losers keep losing in the intermediate horizon. However, this common anomaly in the financial market cannot be explained by the three-factor model of Fama and French (1992; 1993). Therefore, Carhart (1997) added the fourth factor to reflect this pattern and established the following model:

$$R_{it} - R_{ft} = \alpha_i + \beta_{0i}(R_m - R_{ft}) + \beta_{1i}SMB_t + \beta_{2i}HML_t + \beta_{3i}WML_t + \varepsilon_{it}$$

where, WML_t is the differential return between the past 12-month winner and loser portfolio in month t; other variables are the same as previously mentioned. Following the method applied by Moskowitz and Grinblatt (1999) and Banegas et al. (2013), I computed the monthly value of WML_t by using the 12-month lagged returns of six top and bottom sectors (value-weighted) from the Dow Jones STOXX 600 Super Sector Indices.

In general, both single-factor and multi-factor models will be analyzed using the seemingly unrelated regression (SUR) framework. SUR is employed in order to easily compare the difference between regression coefficients of two dependent variables, which are the monthly excess returns of SRI and conventional portfolios. In addition, even though two dependent variables seem to be unrelated at first sight, but from the investment decision-making viewpoint, SRI and conventional funds are potential substitutes in the market. Therefore, the SUR approach can improve the estimation by capturing any possible common structure.

4. Data

Mutual funds

In this thesis, I focus on equity MFs, which is classified by the European Fund and Asset Management Association (2008) as funds investing at least 85% of its assets in stocks. The data of both SRI and conventional funds, domiciled in European countries, can be obtained randomly from the Morningstar database. Morningstar identifies SRI MFs using the data point 'Socially Conscious', which indicates funds that are invested according to social issues like environmental responsibility, human rights, or religious views. It can be considered as equivalent to ESG criteria. Additionally, the MFs' issuers must not involve in activities that promote alcohol, tobacco, gambling, or in the defense industry. The sample period goes from January 2007 to December 2019 and consists of only surviving investments whose monthly data should be available at least 36 months. Therefore, any funds that are issued after December 2016 will be excluded. The funds' inception dates are restricted to be starting from January 2007, due to the limited capability of data collecting procedure.

For those MFs that have several share classes, the combining technique in the paper of Cremers and Petajisto (2009) was applied. The monthly returns of each fund, at each month t, are calculated using the value-weighted average returns across different share classes. For the name of the fund, the share class whose TNA is the highest is chosen. Eventually, the final sample consists of 356 SRI and 1128 conventional funds. Table 1 shows the basic characteristics of both SRI and conventional funds, as well as the descriptive statistics of their excess returns with respect to the risk-free rate.

Table 1. Characteristics and descriptive statistics of SRI and conventional funds.

	Number of Funds	Age	Size	Mean Excess Return (%)	Standard Deviation	Skewness	Kurtosis
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SRI	356	7.21	606.59	-0.2862	0.0549	-1.2193***	6.8347***
Conventional	1128	7.30	602.43	-0.2952	0.0563	-1.1688***	6.7905***

Table 1 reports the basic characteristics of both SRI and conventional funds as well as the descriptive summary of the excess return. Excess return is calculated by subtracting the 1-month Euribor rate from the monthly return of each fund and is shown in percentage. Fund age and size are measured in years and millions of US dollars, respectively. The test statistics for skewness and kurtosis are also reported to demonstrate the pattern of the funds' excess return.

* statistically significant at 10% level
** statistically significant at 5% level
*** statistically significant at 1% level

Within this sample, the average ages of SRI and conventional funds are nearly identical. This can be explained partly by the restriction on the inception date. The fund's age is measured as the number of years between the inception date and the last trading days of the sample period (December 31st, 2019). In terms of funds' size, SRI funds seem to be larger than conventional funds on average. The size of the fund is measured in millions of US dollars and is recorded at the end of the month as the sum of TNA of its share classes. Column (4) in Table 1 shows the mean excess return across the whole sample period. The monthly excess returns are calculated as the difference between monthly returns of SRI or conventional portfolios and the monthly rate of Euribor. The SRI and conventional portfolios, at each month t, are formed by equally combining all existing SRI and conventional funds in that month t, respectively. The fund's monthly returns (measured in Euro) are calculated as the change in NAV during the month, inclusive of all reinvestment, capital distribution, and management fees but exclusive of any sale charges like front-end or deferred loads. The mean excess return of the SRI portfolio is -0.28% per month, slightly higher than -0.30% of conventional portfolio for the whole sample period. The test statistics for skewness and kurtosis are also reported in Table 1, indicates that the sample mean excess returns are not normally distributed and their left tails are skewed heavily.

Table 2 reports the specific number of funds in the sample, grouped by Morningstar's style box. The style box consists of two aspects: investment style and market capitalization. In terms of investment style, MFs can be classified into three groups: value, blend, and growth. Portfolios following value strategy contain mostly stocks that are evaluated as undervalued in price. While portfolios following growth strategy hold

stocks that have potential fast-growing earnings in the future. Blend strategy is a combination of value and growth strategies or portfolios consists of stocks that have both value and growth characteristics. Market capitalization is also categorized into three groups: large, mid, and small. The majority of the sample are MFs with a large blend style, for both SRI and conventional ones. There are only a few funds that have small market capitalization.

Table 2. Number of funds by investment style and market capitalization.

	Large Value	**Large Blend**	**Large Growth**	**Mid Value**	**Mid Blend**	**Mid Growth**	**Small Value**	**Small Blend**	**Small Growth**
SRI	50	152	70	10	32	30	3	1	8
Conventional	170	376	255	25	159	73	8	23	39

Table 2 reports the numbers of funds in the sample according to its investment style and market capitalization. The investment style is categorized according to Morningstar's Equity Style Box. There are nine categories: Large Value, Large Blend, Large Growth, Mid Value, Mid Blend, Mid Growth, Small Value, Small Blend, and Small Growth.

Risk-free rate and Indices

The risk-free rate used in both single- and multi-factor models is proxied by a 1-month European Interbank Offered Rate (Euribor), measured in percentage and euros. Euribor is calculated as an average of lending rates from a large panel of active European banks trading in euros. The monthly rates from January 2007 to December 2019 are obtained from Global Financial Data (GFD) database. In addition, the monthly returns of five relevant MSCI indices are collected from the MSCI's end of day index data search. The indices are reviewed quarterly and rebalanced semi-annually. The MSCI AC Europe index acts as the market in this paper; it captures large and mid-cap constituents across 21 countries in Europe, both developed[1] (DM) and emerging markets[2] (EM). This index might be a good proxy as this paper's sample contains mostly large and mid-cap equity portfolios. Similarly, MSCI AC Europe Small Cap and MSCI AC Europe Large Cap indices consist of small and large representations, respectively, across 21 European countries. MSCI AC Europe IMI Growth and MSCI AC Europe IMI Value indices contain large, mid, and small-cap components accordingly.

[1] DM countries are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain Sweden, Switzerland, and the UK.

[2] EM countries are Czech Republic, Greece, Hungary, Poland, Russia, and Turkey.

Besides, the data of Dow Jones STOXX Europe 600 Super Sector Indices is collected through the GFD database. There is a total of 20 supersectors[3], classified by the Industry Classification Benchmark launched by Dow Jones. As I use 12-month lagged value to calculate the independent variable WML_t, the monthly returns of these indices are obtained from January 2006 to December 2018.

Table 3. Summary statistics of all factors.

	Mean (%)	**Standard deviation**	**t-statistics**	**Cross-correlation**			
				$R_m - R_f$	SMB	HML	WML
$R_m - R_f$	-0.3055	0.0490	-0.7788	1.0000			
SMB	0.2587	0.0222	1.4524	0.3083	1.0000		
HML	-0.2601	0.0209	-1.5573	0.3765	0.0263	1.0000	
WML	5.6352	0.0288	24.4194***	0.0000	0.0837	-0.0032	1.0000

* statistically significant at 10% level
** statistically significant at 5% level
*** statistically significant at 1% level

Table 3 shows the summary statistics of four explanatory variables as well as their cross-correlation. According to the t-statistics, only the variable WML has a significant positive mean value (p-value < 0.01); other variables are insignificant. Besides, cross-correlations among four variables are quite low, thus, there is an unlikely multicollinearity problem.

5. Results

Prior to run the multivariate multiple regressions, the White's test (White, 1980) was performed to diagnose heteroskedasticity – the violation of homoskedasticity – within each regression. One assumption of the classical linear regression model (CLRM) is homoskedasticity, which means that the error term is the same and constant across all regressors. The test basically regresses the squared residuals against all independent variables. The null hypothesis is homoskedasticity against the alternative hypothesis of heteroskedasticity. Table 5 (Appendix) shows the test statistics, which follow chi-square distribution, of all models. The null hypothesis is rejected in most of the regressions, indicating that there is enough

[3] 20 super sectors include Automobiles & Parts, Banks, Basic Resources, Chemicals, Construction & Materials, Financial Services, Food & Beverage, Health Care, Industrial Goods & Services, Insurance, Media, Oil & Gas, Personal & Household Goods, Real Estate, Retails, Technology, Telecommunications, Travel & Leisure, and Utilities.

evidence for heteroskedasticity at a specific significance level in those regressions. Fortunately, this issue is resolved by the generalized least squares (GLS) technique under the SUR framework.

Besides, the explanatory power of independent variables is reflected by the values of adjusted R^2 reported in column (6) in Table 4. Adjusted R^2 is computed manually based on the estimated R^2 generated by STATA software program and the following formula:

$$Adjusted\ R^2 = \frac{(1 - R^2)(N - 1)}{N - p - 1}$$

where, R^2 is estimated by STATA, N is the sample size and p is the number of regressors in the model. When adding two more explanatory variables SMB and HML to single-factor model, adjusted R^2 increases but not too much, for both SRI and conventional portfolios. However, when adding the last regressor MOM, the model's explanatory power either does not change (SRI) or goes up very little (conventional).

In the following subsections, the results in Table 4 will be interpreted with respect to each formulated hypothesis one by one.

5.1. Hypothesis 1

The performances of the fund are reflected by the value of Jensen's alphas (or constant terms), which are shown in column (1) in Table 4. There is a clear distinguished pattern between the obtained results of single-factor and multi-factor models. Under CAPM, both SRI and conventional portfolios, outperform the market index with slightly positive alphas. They beat the market only by 2 and 1 basis points, respectively. On the other hand, under two multi-factor models, both portfolios, on average, underperform the broad market. In order to make a comparison between SRI and conventional portfolios of funds, the difference between their alphas was calculated by subtracting the figure of the conventional portfolio from that of the SRI portfolio. In all models, the differences are positive, which means that, on average, the SRI portfolio generates more return than conventional peers. However, all these estimated alphas and differences are not statistically significant. This leads to the conclusion of the first hypothesis that there is no statistical difference in financial performance between SRI and conventional funds, specifically those domiciled in European countries, during the whole sample period. This empirical finding is consistent with what was found in previous papers focusing on the European funds. The comparable financial

performance can be explained by the phenomenon that the advantages of SRI criteria are outweighed by the disadvantages of excluding stocks of companies in shun industries[4] (Statman & Glushkov, 2009).

Table 4. Fund performance using CAPM, Fama and French's 3-factor and Carhart's 4-factor models.

	Alpha	**Market Beta**	**SMB**	**HML**	**WML**	**Adjusted R^2**
	(1)	(2)	(3)	(4)	(5)	(6)
CAPM						
SRI	0.0002	0.9832***				0.7691
Conventional	0.0001	0.9993***				0.7555
Difference	0.0001	-0.0161***				
3-factor model						
SRI	-0.0004	0.9343***	0.2650***	0.0736		0.7796
Conventional	-0.0005	0.9183***	0.2593***	0.1183		0.7685
Difference	0.0001	0.0160	0.0057**	-0.0447***		
4-factor model						
SRI	-0.0007	0.9344***	0.2643***	0.0736	0.0056	0.7796
Conventional	-0.0013	0.9392***	0.2935***	0.1182	0.0136	0.7686
Difference	0.0006	-0.0048	-0.0292**	-0.0446***	-0.0008	

Table 4 reports the results of the three regression equations regarding three different models respectively: single-factor, three-factor, and four-factor. The results are estimated using GLS technique under SUR framework. The difference is constructed by subtracting conventional from SRI portfolio. Adjusted R^2 is computed manually using the following formula:

$$Adjusted\ R^2 = 1 - \frac{(1 - R^2)(N - 1)}{N - p - 1}$$

* statistically significant at 10% level
** statistically significant at 5% level
*** statistically significant at 1% level

5.2. Hypothesis 2

The funds' tendency of exposure to either small or big-cap stocks is demonstrated by the coefficient of the variable SMB in either three- or four-factor models. In the three-factor model, the two portfolios seem to be exposed to small caps in a similar magnitude. The effect of capitalization on SRI and

[4] Tobacco, alcohol, gambling, firearm, military, and nuclear operations.

conventional funds are both positive and significant at 1% level. Nevertheless, this result is not in alignment with the classification of MFs in the sample, which contains more large-cap funds (272 SRI and 801 conventional) than small-cap funds (12 SRI and 70 conventional). This raises the problem of potential misclassification of MFs, which also experienced in the paper of Cortez et al. (2012). Furthermore, the difference in the effect is only 57 basis points and it is statistically significant at a 5% level. This supports the second hypothesis, which indicates that SRI mutual funds, on average, are more exposed to small-cap stocks than conventional funds. However, the evidence of the four-factor model proposes a contradict conclusion, as the difference in the effect is significantly negative 292 basis points. This is caused by the slight decrease in the coefficient of the SRI portfolio as well as the moderate increase in the coefficient of the conventional portfolio when the fourth factor is included. Therefore, the conclusion of the second hypothesis depends on which model is being used. While applying Fama and French (1992)'s three-factor model, there is enough evidence of SRI MFs being more exposed to small-cap stocks than conventional MFs. While applying Carhart (1997)'s four-factor model, there is not enough statistical evidence in favor of the second hypothesis.

5.3. Hypothesis 3

The estimated coefficients for variable SMB in two multi-factor models are almost the same for both SRI and conventional portfolios. This can be possibly explained by the low explanatory power of the fourth variable WML. The positive coefficients show that both portfolios follow value strategy in general, by investing in stocks with high book-to-market ratios. However, this pattern contradicts the classification of funds in the sample, in a way that is similar to what happens to the second hypothesis, which has been mentioned in the previous paragraph. In this case, the sample contains more growth funds (108 SRI and 367 conventional) than value funds (63 SRI and 203 conventional). Besides, the coefficient difference is negative, indicates that the SRI portfolio is less value-oriented, or more growth-oriented, than the conventional portfolio. Even though individual coefficients are not statistically significant, the differences are, at a 1% level. Therefore, it can be concluded that there is enough evidence to accept the third hypothesis, which previously states that SRI MFs, on average, are more exposed to growth stocks compared to conventional peers.

6. Limitations & Further research

One obvious limitation in this paper is that the sample contains only existing funds and leaving out dead funds, meaning that only funds that were active on the day of collecting data[5] are included in the sample. This is due to the difficulty in acquiring data remotely and indirectly during the global coronavirus pandemic. Excluding dead funds potentially leads to survivorship bias, which might overestimate the average performance of funds (Brown et al., 1992). To resolve this issue, a factor capturing how the difference between the characteristics of fund managers influences the survival of funds can be taken into account, or simply, by extending the sample and include non-survived funds.

In addition, a more extensive model, which allows for time-variant alphas and/or betas, can be applied to evaluate the funds' performance. According to Cortez et al. (2009), imposing a restriction, or, assume that betas and expected returns are constant can lead to biased estimations of performance. By using conditional models, such as the ones proposed by Ferson and Schadt (1996) or by Christopherson et al. (1998), empirical results might be more reliable in terms of statistical significance. Furthermore, it would be interesting if the sample can be divided into several subperiods in order to assess the development of the funds' performance as well as the historical difference between SRI and conventional funds. Specifically, it is likely to have a distinguished pattern during and after the period of the financial crisis. By assessing and understanding the tendency of funds' performance during a particular stage of the business cycle, it would be useful for forecasting and analyzing activities. Another potential research could be looking further into the characteristics of funds. Apparently, SRI and conventional funds have some dissimilarities in basic features, such as management fees and tax regularities. These factors are indeed important from the clients' or investors' points of view, as they affect the funds' net returns directly.

7. Conclusion

With the fast expansion of the SRI MF industry, as well as an increase in investors' awareness of social issues, the question regarding how SRI funds perform relative to its conventional peers gain much attention recently. According to previous studies, which mostly focus on the US market, there are two main empirical findings with regard to this topic. First, SRI and conventional funds experience a compatible performance, which means that the restriction on which types of financial assets can be included in SRI funds does not create any financial disadvantage. Moreover, SRI funds even bring more value to investors, compared to conventional funds, through its contribution to the society or environment. Another

[5] Tuesday, April 28th, 2020.

argument is that SRI on average underperforms conventional funds, because of its narrower investment universe.

In this paper, I used the sample of 356 SRI and 1128 conventional funds, domiciled in European countries to analyze the performance comparison. The sample includes equity funds that have inception date from January 1st, 2007 until December 31st, 2016 and was survived on the date of collecting data. Data are on a monthly basis and available from January 2007 until December 2019. Three different portfolio's performance measurements are employed, which are the single-factor model, Fama and French (1992)'s three-factor model, and Carhart (1997)'s four-factor model. Generally, multi-factor models slightly improve the performance estimates and have higher explanatory power, however, the variable capturing price momentum effect seems to not contribute many meanings.

The results show that, for the whole sample period and on average, there is no statistical difference between the financial performance of SRI and conventional funds. This finding is robust to all three applied models and is consistent with previous studies on European funds. Thus, investors and professional MF managers can invest in European SRI equity funds without any financial disadvantages, compared to when investing in conventional MFs. Also, this empirical evidence potentially explains the increasing numbers of SRI funds recently. In addition, the results indicate that SRI funds are more exposed to growth stocks relative to conventional peers. However, whether the former is more or less exposed to small-cap stocks in comparison with the latter depends on the measurement model employed. Statistical evidence from the three-factor model indicates that SRI funds are more exposed to small-cap stocks while evidence from the four-factor model shows the opposite outcome.

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Appendix

Table 5. Test statistics of diagnostic White's test for all models.

CAPM		Three-factor		Four-factor	
SRI	Conventional	SRI	Conventional	SRI	Conventional
12.3286***	11.0424***	18.1464**	15.3002*	21.8393*	18.3892

* statistically significant at 10% level
** statistically significant at 5% level
*** statistically significant at 1% level