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A reassessment of the European SRI Funds "underperformance": does the intensity of extra-financial negative screening matter?

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Abstract

Social responsible investment is surging in all industrial countries, despite the conventional wisdom that the inclusion of extra-financial criteria in the stock selection process should arm the financial performance of these funds. As a consequence, many papers have attempted to measure the financial performance of SRI funds and compared it to the performance of conventional funds with similar characteristics. According to this literature, we use a traditional CAPM model that allows for time-varying volatility to compare the risk-adjusted returns of several portfolios of SRI funds with differences in the intensity of extra-financial negative screening. Our key result shows that both alpha and beta are negatively correlated to the intensity of negative screenings. Thus, it appears that the risk-adjusted returns of SRI funds significantly differ from the returns of conventional funds if this latter criterion is taken into account.

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1 Introduction

Social responsible investment (SRI), defined as the combination of financial performance objectives with concerns about social, environmental and ethical issues, is surging and in Europe reached EUR 1.033 trillion at the end of December 2005. However a difference should be made between broad and core SRI. There are indeed various SRI practices, mutually non-exclusive, from negative screenings to so-called "best-in-class" approach: negative screenings lead fund managers to exclude from the fund investment universe companies involved in "non-ethical" activities (for example, alcohol, weapons, fur trade...) whereas the best-in-class approach conducts to consider any economic sector as eligible for the investment portfolio and to overweight, within each economic sector considered, companies with higher environmental, social or corporate governance standards. As a matter of fact, the SRI universe cannot be considered as homogeneous. Yet, academic literature on European ethical finance often opposes SRI funds to conventional funds, regardless of the specific nature of SRI criteria used by fund managers and traditionally conclude that risk-adjusted returns of both type of funds are close. By aggregating SRI funds, this methodology creates a bias that mitigates the potential impact of negative screening on the size of the investment universe and, as a consequence, may mislead on their effective financial performance. Barnett and Salomon [2006] and Renneboog et al. [2008a] did consider the intensity and the type of screenings used by SRI funds. However, they posited a functional relationship between social and financial performance that might correspond to empirical evidence but has no proven theoretical foundations and remains controversial. The authors did indeed consider that the screening used by SRI funds has curvilinear, no monotonic effects and financial performance whereas Renneboog et al. [2008a] implemented a linear specification of the link between screening activity and risk-adjusted performance. Considering European ethical finance on the contrary to Barnet and Salomon [2006] who worked solely on US SRI universe and in order to avoid a too restrictive representation, we make no assumption on the functional link between social motivations and financial performance. To do so, we constitute SRI funds portfolios with similar negative screening strategies and investigate to what extent the investment style of these ethical funds, measured in terms of CAPM betas, and their financial performance, measured in terms of Jensen's alphas, are affected by the intensity of excluding criteria. We also propose a GARCH framework in order to take into account possible ARCH effects in volatility of SRI excess returns, which contributes to improve the academic knowledge on ethical finance. It should indeed be noted that Barnett and Salomon [2006], and Renneboog et al. [2008a] considered, in line with the existing literature on ethical finance, a conventional econometric framework based on OLS regressions to estimate the CAPM and four factors models, whereas financial series are often characterized by ARCH effects. Mill [2006] did use a GARGH model to incorporate timevarying volatility clustering but focused solely on the financial performance of a UK Unit trust that adopted SRI principles.
The paper is organized as follows: section 2 presents both the CAPM and the Carhart-Fama-French model implemented in our analysis; section 3 reports data and results. Finally, section 4 concludes.

2 Review of literature

A growing literature exists on the evaluation of SRI fund financial performances. Most articles investigate the traditional wisdom that those types of funds should under-perform traditional ones, since extra-financial criteria are taken into account. As the potential investment universe is restricted to firms satisfying social responsibility criteria, the mean-variance optimization is supposed to be altered. However, it appears that there is no particular evidence that any such assertion is grounded if risk-adjusted measures of financial performance are used. Models implemented in these studies are mainly either based on the Fama-French three-factor asset pricing model, allowing for differences in return not only between small cap and large cap portfolios but also between high and low book-to-market ratios portfolios, or on its extension developed by Carhart [1997] that controls for momentum bias. The early studies focused on both the US and UK markets and predominantly showed that social and environmental screenings do not affect financial performance, measured in terms of alphas (see for example Luther et al. [1992] and Hamilton et al. [1993]).

Evidence from multi-country analysis leads to the same conclusion regarding conventional and ethical fund performances. Focusing on 103 European and US ethical mutual funds for the 1990-2001 period, Bauer et al. [2005] have particularly shown that there is no significant difference in risk-adjusted returns between conventional and SRI funds, in spite of a higher expense ratio for SRI funds. However, the authors have pointed out differences in investment styles since ethical funds appeared to be less exposed to market return volatility. The existence of a small cap bias has also been highlighted for both UK and German SRI funds. Similarly, Renneboog et al. [2008a] have brought to the fore the fact that SRI funds in the US, the UK, but also in many European and Asia-Pacific countries under-performed their domestic benchmarks. However, their risk-adjusted returns are similar to returns of their conventional counterparts. They have also noticed that there is mixed evidence of a "smart money" effect for SRI funds. Whereas investors are unable to identify funds that will outperform in the future, they may on the contrary have the ability to distinguish those that will perform poorly. In an original approach initiated by Bollen [2007], Benson and Humphrey [2008] have assessed for the January 1991-September 2005 period the determinants of fund flows, defined as the monthly difference between total net assets, for both conventional and SRI funds. They have shown that the average total net assets of SRI funds are higher than conventional funds and that these funds are less sensitive to changes in returns. According to previous literature, the authors have also underlined that SRI funds exhibit the same asymmetric relationship between performance and fund flows observed in conventional funds. They have finally highlighted that ethical investors are less likely to switch funds than conventional investors since they are restricted by the limited number of SRI funds available.

Surprisingly, the fact that non-financial criteria significantly differ from one SRI fund to another has not much been taken into account in previous studies. Most studies indeed define social responsible investment as the inclusion of ethical criteria regardless of the specific nature of ethical screenings (best in class approach vs. exclusion) or their intensity. However, Barnett and Salomon [2006] recently measured how variation in the intensity and type of screening affect their monthly financial performance and showed that the relationship between financial and social performance is curvilinear: high financial returns are associated with both high and low levels of social screenings whereas moderate levels of social responsibility leads to lower financial performance. To do so, they added a squared screening intensity term to their model and found indeed a negative and significant coefficient for screening intensity and a positive and significant coefficient for its quadratic. Similarly, Renneboog et al. [2008a] recently investigated the influence of both screening activities (intensity, nature and investment styles) and fund characteristics (size, age, risk and load fees) on risk-adjusted returns but, disregarding Barnett and Salomon article, posited a linear

relationship between financial returns and screening activity. Different dummy variables have hence been used by the authors to characterise the nature of ethical strategies (activism, involvement with local communities, Islamic finance, existence of an in-house SRI research team) followed by fund managers while their intensity has been proxied by the number of screens. Using control variables to take into account for fund characteristics, investment style, country and time effects, the authors have underlined that SRI funds in many European, North-American and Asia-Pacific countries strongly underperform domestic benchmark portfolios but also that there was no statistically significant evidence that SRI funds underperform their conventional counterparts. They have also shown that returns are negatively correlated to screening intensity on social and corporate governance. Any additional screen is indeed associated with a 1% lower return per annum. Considering that Islamic finance is close to traditional SRI regarding the values they intend to defend, but very different in the way they implement their financial strategies (prohibition of speculative activities and interest practices for Islamic funds), we deemed that any generalization would be hardly meaningful and chose to focus on a narrower view of ethical finance: only traditional SRI funds based on negative screening are studied here.

3 Methodology

In order to overcome the simplicity of single index models and give a better explanation of funds' behaviour, more recent empirical studies of mutual funds' financial performance use a multi-factor model, known as the Carhart-Fama-French model (hereafter CFF model). We constitute a benchmark portfolio r_w^* (where r_w^* is the expected real return on a value weighted portfolio of global assets (hereafter the benchmark)) and K portfolios for which the included funds are in accordance with the criterion k of the number of negative screens. The expected return of the portfolio k, called r_k^* is equal to:

$$r_k^* = \frac{1}{N_k}\sum_{i}^{N_k} r_{i,k}^*$$

where $r_{i,k}^*$ is the expected real return on the asset *i* to the criterion *k*,
Hereafter, we consider the adjusted returns of our portfolios defined as:

$$R_k = r_k^* - r_f$$
$$R_W^* = r_w^* - r_f$$

where r_f is a worldwide risk-free interest rate.

Surprisingly, with the notable exception of Mill [2006] who however worked on a unique Unit trust that was initially conventional and turned to ethical finance, empirical studies on SRI funds do not consider the time-varying volatility to our knowledge (see Bauer et al. [2005]) whereas financial series are often characterized by ARCH effects. In order to take into account these effects, we estimate the following GARCH system[1]:

$$R_{k,t}^* = \alpha_k + \beta_{1,k}R_{w,t} + \beta_{2,k}SMB_t + \beta_{3,k}HML_t + \beta_{4,k}UMD_t + \varepsilon_{k,t} \qquad \varepsilon_{k,t} \sim N\left(0, h_{k,t}^2\right)$$
$$with\ \varepsilon_{k,t}/I_{t-1} \sim N(0, h_t)$$
$$and\ h_{k,t}^2 = a_0 + a_1\varepsilon_{k,t-1}^2 + b_1 h_{k,t-1}^2$$

[1] Variations on ARCH models, such as E-GARCH, were also explored by Brooks [2002] and the GARCH (1,1) model proved to be sufficient.

where $\beta_{1,k}$ is the world beta of the portfolio k that measures its covariance with the world market return standardized by the variance of the world market return. α_k measures the degree to which managers are earning significant returns after accounting for market risk, as measured by beta. SMB and HML are small minus big and high minus low benchmark factors which respectively measure the excess returns of small caps over large stocks and value stocks with high book-to-market ratio and growth stocks, as proposed by Fama-French [1993]. UMD stands for up minus down and captures the persistence in mutual fund performance (Carhart [1997]).

Once our system is estimated, we test the equality of the different α_k in order to appraise if the intensity of negative screening modifies the performance of SRI portfolios.

4 Data and Results

Our weekly data is extracted from Datastream International. Data covers the period 3/25/1998-4/01/2008. Our database is formed by 71 European SRI euro-denominated equity mutual funds identified by the Eurosif database, regardless of their investment style or geographical investment area. We have also collected the number (from 0 for funds with best-in-class approach to 16) of negative criteria adopted by each fund as defined by the Eurosif database. Unsurprisingly, very different kinds of SRI funds coexist from broad SRI funds with single criteria (human right violations, oppressive regimes...) or "moral" funds to core SRI funds. Unsurprisingly, "weapons and military contracting" is the most common excluding criteria used by ethical funds.

Table 1: Categories of negative screens

Type of negative screen	Number of funds
Firearms	46
Weapons and Military	50
Nuclear Energy	34
Tobacco	43
Gambling	31
Human rights violations	36
Oppressive regimes	17
Pornography	33
Alcohol	24
Animal testing	15
Factory farming	5
Furs	10
Excessive environmental impact	22
GMO	20

Products dangerous to health/environment	18
Labor right violations	34

Source: Eurosif

We rank SRI funds by intensity of negative screening and consequently by size of investment universe. We then constitute three portfolios based on the number of negative screens: the first portfolio includes funds with 1 to 4 negative screens, i.e. 24 funds, the second portfolio is composed of funds with 5 to 8 negative screens (23 funds) and finally the third fund includes funds with 9 to 16 negative screens (24 funds)[2]. However, load fees and management fees are not considered[3]. Our benchmark is the Advanced Sustainable Performance Indices (ASPI Eurozone), which is the European index of reference of companies and investors "wishing to commit themselves in favor of sustainable development and corporate social responsibility". In order to strengthen our results, we also use as benchmark the Morgan Stanley Capital International index of Euro area (Hereafter MSCI Euro). To get the excess returns of funds and benchmark, we subtract from the raw returns, the weekly Euribor 1 month. The maximum number of observations for each series rises to 523 observations.

To construct our benchmark factors for the multifactor regression we used the S&P euro constituents list. We have built weekly regressors for a period ranging from 25th March 1998 to 1st April 2008.The SMB factor is obtained by considering two portfolios: the smallest capitalizations and the largest ones. We then consider the return on an equiponderate portfolio based on these two portfolios. In our paper, each portfolio is rebuilt every week according to the median of capitalization. The HML factor is the result of book-to-market (BTM) equity groups based on the breakpoints for the bottom 30% and the top 30% of the ranked BTMV, excluding the negative BTMV. UMD is a 52-weeks momentum factor which is calculated as an equally weighted average returns of funds with the highest 30% 51 week returns (lagged 1 week) minus the equally weighted average returns of firms with the lowest 30% 51 week returns lagged 1 month.

We conduct a series of stationarity tests for our data. Two criteria to test for non-stationarity are employed: ADF and DF-GLS. Both Augmented Dickey-Fuller and Dickey-Fuller with GLS de-trending (Eliot, et. al. [1996]) test for the null hypothesis of non-stationarity against the alternative of stationarity. Careful inspection of our data series suggests that only the drift term should be included in the null hypothesis for considered series. Table 2 displays the results.

Table 2: ADF and DF-GLS unit root tests with drift but no time trend

Variables	Criterion	ADF	DF-GLS
SRI funds returns	1 to 4 screening criteria of exclusion (k=1)	-9.71***	-9.71***
	5 to 8 screening criteria of exclusion (k=2)	-9.58***	-9.59***
	9 to 16 screening criteria of exclusion (k=3)	-9.68***	-9.69***
SRI funds risk-adjusted return	1 to 4 screening criteria of exclusion (k=1)	-5.80***	-1.79*
	5 to 8 screening criteria of exclusion (k=2)	-5.86***	-3.92***
	9 to 16 screening criteria of exclusion (k=3)	-5.88***	-5.14***
ASPI Eurozone risk-	_	-6.63***	-5.49***

[2] Each fund is introduced into the portfolio while data is available. Hence, the weight of each fund in portfolio can evolve through time.

[3] As European funds have the lowest management fees, we decided not to take them into account (Renneboog et al. [2008b]).

adjusted return			
MSCI Europe risk-adjusted return	_	-6.08***	-5.74***
HML	_	-8.04***	-2.80***
SMB	_	-11.58***	-2.38**
UMD	_	-4.19***	-2.84***

Note: *, **, * respectively indicates rejection of the null at 1%, 5% and 10% significance levels. The number of lags in unit root tests has been fixed to 4.**

Table 3 reports univariate statistics of fund's weekly returns. As we may expect, skewness and kurtosis suggest that data is non-normal. This result is reinforced by the Jarque-Bera statistic: we reject the hypothesis of normality for each fund. The Ljung-Box Q-statistics for raw returns reveal autocorrelation. Moreover our series seem to be characterized by conditional heteroscedasticity. Hence, the choice of GARCH representation appears to be accurate.

Table 3: Descriptive statistics of raw returns

Negative screens	Number of funds	Mean	S.D.	SK	EK	JB stat	Max	Min	Qstat(5)	ARCH(5)
1 to 4	24	0.00031	0.02183	-0.5	4.63	80.35**	0.09	-0.08	4.12	18.32**
5 to 8	23	0.00013	0.0227	-0.42	4.86	91.39**	0.1	-0.1	7.8	8.26**
9 to 16	24	0.00025	0.0222	-0.36	5	98.40**	0.1	-0.09	8.13	13.69**

Note: SK is the skewness coefficient. EK is the excess kurtosis coefficient. JB stat is the Jarque-Bera statistic. Max is the largest observation. Min is the smallest observation. Qstat(5) is the Ljung-Box statistic, calculated with five lags, for raw returns. ARCH(5) is the ARCH test, calculated with five lags, for residuals from an AR(5) regression on raw returns.
**** indicates rejection of the null at 5% significance level.**

According to table 4a, our results first show that SRI funds outperform traditional ones. Aphas associated with the ASPI Eurozone index are lower than those obtained with the MSCI Europe index, and appeared to be non-significant: whatever the number of excluding criteria, one cannot conclude either on abnormal returns of SRI funds relative to their corresponding SRI market index. However, if we turn to the MSCI Europe index, outperformance of European SRI funds is proven. We also demonstrate that the number of negative screens worsens the performance of portfolio but diminishes market risk, which is consistent with Renneboog et al. [2008a] results. Indeed, the Jensen's alpha associated with the first and second portfolios is larger than the alpha of the third portfolio whatever the method of regression. It finally appears that higher screening intensity is associated with lower betas. Funds based on many exclusion criteria seem to adopt a more defensive investment strategy. The taking into account of HML, SMB, and UMD is not significant at the 5% level.
In order to confirm the existence of a negative relationship between the number of excluding criteria and risk-adjusted returns of SRI funds, we then run a statistical analysis on the equality of alphas (table 4b).

Table 4a: SRI fund performance according to the number of negative screens in a multifactorial model

Negative screens	Benchmark	α	β_1	β_2(HML)	β_3(SMB)	β_4(UMD)	Adjusted R^2

1 to 4 (k=1)	ASPI Eurozone	0.18	0.46***	-0.05	-0.03	-0.03	0.360
		(0.95)	(20.32)	(-0.66)	(-0.89)	(-0.79)	
	MSCI Europe	1.23***	0.47***	-0.08	0.04	0.02	0.342
		(6.32)	(19.14)	(-1.12)	(1.18)	(0.37)	
5 to 8 (k=2)	ASPI Eurozone	0.20	0.45***	-0.04	-0.04	-0.01	0.249
		(0.99)	(17.49)	(-0.45)	(-1.05)	(-0.21)	
	MSCI Europe	1.24***	0.45***	-0.07	0.02	0.04	0.245
		(5.75)	(16.79)	(-0.87)	(0.72)	(0.80)	
9 to 16 (k=3)	ASPI Eurozone	0.19	0.40***	-0.02	-0.03	-0.03	0.246
		(1.01)	(16.32)	(-0.27)	(-1.06)	(-0.60)	
	MSCI Europe	1.12***	0.41***	-0.05	0.02	0.02	0.240
		(5.72)	(15.70)	(-0.60)	(0.69)	(0.35)	

Note: *, **, * respectively indicates rejection of the null at 1%, 5% and 10% significance levels. The number of observations is equal to 466 for each system.**

Table 4b: Test of the equality of portfolios performances according to the intensity of negative screening

Benchmark	H_0	χ^2
ASPI Eurozone	$\alpha_1 = \alpha_2 = \alpha_3$	0.23
	$\alpha_1 = \alpha_2$	0.22
	$\alpha_1 = \alpha_3$	0.08
	$\alpha_2 = \alpha_3$	0.08
MSCI Europe	$\alpha_1 = \alpha_2 = \alpha_3$	9.44***
	$\alpha_1 = \alpha_2$	0.01
	$\alpha_1 = \alpha_3$	3.86**
	$\alpha_2 = \alpha_3$	7.85***

Note: *, **, * respectively indicates rejection of the null at 1%, 5% and 10% significance levels.**

We show that the hypothesis of the equality between the alphas can clearly be rejected at the 1% level for the MSCI Europe index, but also that a threshold exists between SRI funds regarding the number of excluding criteria that leads to an erosion of their financial performance: α_1 is not significantly different from α_2, but both α_1 and α_2 are, with respect to α_3.

In order to consider further the impact of investment universe on SRI funds' financial performance and check the effective influence of negative screening intensity, we constitute two categories of SRI funds within our sample: those with negative screening based on sectoral criteria (weapons, alcohol, pornography, furs...) and those with transversal criteria (violations of human and labour rights, oppressive regimes...). We then renew our econometric analysis to compare alphas of these two categories (Table 5a and 5b).

Table 5a: SRI fund performance according to sectoral vs. transversal screening

Negative screens	**Benchmark**	**α**	**β_1**	**β_2(HML)**	**β_3(SMB)**	**β_4(UMD)**	**Adjusted R^2**
Sectoral (k=S)	ASPI Eurozone	0.17	0.39***	-0.05	-0.02	0.02	0.308
		(0.95)	(16.55)	(-0.67)	(-0.71)	(0.55)	
	MSCI Europe	1.00***	0.39***	-0.08	0.04	0.03	0.295
		(5.13)	(15.51)	(-1.01)	(1.46)	(0.58)	

Transversal (k=T)	ASPI Eurozone	0.20	0.45***	-0.09	-0.02	0.03	0.256
		(1.09)	(17.45)	(-1.16)	(-0.60)	(0.59)	
	MSCI Europe	1.12***	0.43***	-0.14*	0.05	0.04	0.236
		(5.59)	(15.99)	(-1.71)	(1.64)	(0.78)	

Note: *, **, * respectively indicates rejection of the null at 1%, 5% and 10% significance levels. The number of observations is equal to 466 for each system.**

Table 5b: Test of the equality of portfolios performances according to the type of negative screening

Benchmark	H_0	χ^2
ASPI Eurozone	$\alpha_S = \alpha_T$	0.36
MSCI Europe	$\alpha_S = \alpha_T$	4.66**

Note: *, **, * respectively indicates rejection of the null at 1%, 5% and 10% significance levels.**

These latter analyses bring an interesting result with respect to the MSCI Europe index: according to traditional financial portfolio theory, SRI funds with negative screening based on sector exclusion appeared to have a worse performance than SRI funds with transversal criteria. The null hypothesis that α_S equals α_T can indeed be rejected at the 5% significance level. We also show that these transversal ethical funds outperform their benchmarks (MSCI EURO). As a consequence, the question whether SRI funds under or outperform conventional funds is not a proper way to analyse the influence of ethics on financial performance. How the nature of screenings (sectoral vs transversal) affects the ability to generate performance appears to be a more suitable way to address this question.

5 Conclusion

This paper contributes to the current debate on SRI financial performance. We have indeed developed a multi-factor model that allows us to take into account SMB, HML and momentum effects, as well as time-varying volatility in order to consider the influence of the intensity of extra-financial screenings on ethical funds' performance. We show that considering SRI funds universe as homogeneous creates a bias that mitigates the potential impact of negative screening on the size of the investment universe and, as a consequence, may mislead on their effective financial performance. On the contrary to previous studies that posit a functional relationship, either linear or u-shaped, our results show that the number of restrictions on SRI funds universe does impact risk-adjusted returns. Higher numbers of excluding criteria are associated with lower Jensen alphas. However, as shown by differences in exposure to market betas, the higher the number of ethical screens, the less the exposure to market risks. If the link between risk-adjusted returns and screening intensity appeared to be non-linear, we suggest that the Barnett and Salomon [2006] curvilinearity hypothesis remains controversial for European SRI funds. A break can nevertheless be observed: the financial performance of funds with more than eight excluding criteria is significantly lower. Further studies should be undertaken to consider more deeply the existence of this threshold.

As a conclusion, we confirm at first stage that risk-return optimization appears to be constrained for SRI funds with high social and environmental standards. This conclusion should nevertheless be nuanced. In order to confirm the robustness of our results, we indeed considered the specific nature of excluding criteria. We identified two families of SRI funds and showed that the intensity of negative screening is not a sufficient condition to explain

under or outperformance of ethical funds. Indeed, if the nature of negative screening (sectoral vs. transversal) is considered for SRI funds with approximately equivalent numbers of excluding criteria, interesting results could be found: transversal SRI funds appear to outperform the market with a positive alpha, whereas SRI funds with negative screening based on sectoral exclusion criterion largely underperform their benchmark. Hence, if the intensity of negative screening does impact on SRI funds' financial performance, the specific nature of excluding criteria (sectoral vs transversal) should also be taken into account.

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