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An assessment of variances and covariances of European SRI funds returns : does the intensity of extra-financial negative screening matter?

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Abstract

Social responsible investment is surging in all industrial countries, de-

spite the conventional wisdom that the inclusion of extra-.nancial criteria

in the stock selection process should arm the .nancial performance of these

funds. As a consequence, many papers attempted to measure the .nancial

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 di¤erences in the intensity of extra-.nancial 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 signicantly differ from the returns of conventional funds if this latter criteria is taken into account.

Keywords: Socially responsible investment, International asset pricing, volatility

JEL classification: C53, G15, G12.

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 has reached in Europe 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 best-in-class approach conducts to consider any economic sector as eligible for the investment porfolio and to overweight, within each economic sector considered, companies with higher environmental, social or corporate governance standards. As a matter of fact, SRI universe cannot be considered as homogeneous. Yet, academic literature often opposes SRI funds to conventional funds, regarless of the specific nature of SRI criteria used by fund managers and traditionaly conclude that risk-adjusted returns of both type of funds are close. By agregating 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. Therefore, this paper considers the number of excluding criteria adopted by each fund as a measure of the intensity of screening and then re-examines their relative financial performance. We more precisely investigate to what extent the investment style of 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. The paper is organized as follows:

a review of literature is proposed in section 2 ; section 3 presents both the CAPM and the Carhart-Fama-French model implemented in our analysis; section 4 reports data and results. Finally, section 5 concludes.

2. Review of literature

A growing literature exists on the evaluation of SRI funds 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 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 funds 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 that SRI funds in the US, the UK, but also in many European and Asia-Paci.c 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" e¤ect 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 is higher than conventional funds and that these funds are less sensitive to changes in returns. Accordingly to previous literature, the authors have also underlined that SRI funds exhibit the same asymetric relationship between performance and fund flows observed in conventional funds. They have finally hightlighted that ethical investors are less likely to switch funds than conventional investors since they are constraint by the limited number of SRI funds available. Surprisingly, the fact that non-fi.nancial criteria signi.cantly di¤er from one SRI fund to another has not much been taken into account in previous studies. Most studies indeed de.ne social responsible investment as the inclusion of ethical criteria regardless of the speci.c nature of ethical screenings (best in class approach vs exclusion) or their intensity. However, Ronneboog et al. (2008) 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 and reached interesting conclusions. They have particularly shown that returns are negatively correlated with screening intensity on social and corporate governance. Any additional screen is indeed associated with a 1% lower return per annum. Furthermore, the authors has underlined that employing an in-house SRI research team fosters returns. Finally, on the contrary to SRI funds, returns of conventional funds have appeared to be negatively correlated with their size.

3. Methodology

3.1 The CAPM framework

In order to measure the impact of both the nature and the intensity of ethical screenings, we use the international version of the capital asset pricing model (ICAPM) as proposed by Solnik (1974), Agmon (1974) and Lessard (1974).

In integrated capital markets, the expected return of a security i can be written in terms of the IACPM as:

$$\begin{aligned}(r_i^* - r_f) &= \beta_i (r_w^* - r_f) \qquad (1)\\ \text{with } \beta_i &= \frac{Cov(r_i^*, r_w^*)}{Var(r_w^*)}\end{aligned}$$

where r_i^* is the expected real return on the asset i, r_w^* is a world wide risk-free interest rate, rw is the expected real return on a value weighted portfolio of global assets (hereafter the benchmark) and β_i is the world beta of the asset i that measures its covariance with the world market return standardized by the variance of the world market return. If we add a further hypothesis, that is the absence of exchange rate risk (which is the case in the euro area), the first empirical studies are based on the following regression:

$$\begin{aligned}R_i &= \alpha_i + \beta_i R_i^* + \varepsilon_i \qquad \varepsilon_i \sim N(0, \sigma^2) \qquad (2)\\ \text{with } R_i &= (r_i^* - r_f)\\ \text{and } R_i^* &= (r_w^* - r_f)\end{aligned}$$

3.2 The Carhart-Fama-French model in a e-garch perspective

In order to overcome the simplicity of single index models and give a better explanation of funds. behavior, more recent empirical studies on mutual funds. Financial performance use a multi-factor model, known as the Carhart-Fama-French model (hereafter CFF model), where excess return can be defined as:

$$R_i = \alpha_i + \beta_{1,i} R_i^* + \beta_{2,i} SMB + \beta_{3,i} HML + \beta_{4,i} UMD + \varepsilon_i \qquad \varepsilon_i \sim N\left(0, \sigma^2\right)$$

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)).

As financial time series are characterized by a time-varying volatility (see Engle, 1982), recent papers on financial performance use the Generalized autoregressive conditional heteroscedasticity (GARCH) specification. Indeed, this model takes into account the fact that financial series change over time by explicitely modelling the variance as a function of past variances and past square disturbances. More precisely, they mainly use the GARCH(1,1) model:

$$\begin{aligned} R_i &= \alpha_i + \beta_i R_i^* + \varepsilon_i \qquad (3) \\ \text{with } \varepsilon_{i,t} &\mid I_{t-1} \sim N\left(0, h_t\right) \\ \text{and } h_t &= a_0 + a_1 \varepsilon_{i,t-1}^2 + b_1 h_{i,t-1} \end{aligned}$$

where the errors, conditional on the information set I_{t-1}; follow a Normal distribution with mean zero and variance h_t. Surprisingly, empirical studies on SRI funds using a CAPM or a multi-factor model framework do not consider the time-varying volatility to our knowledge (see Bauer et al., 2005).

Hence, we first consider an EGARCH(1,1) model as proposed by Nelson (1991) where possible asymmetric effects of negative information on β_i are incorporated.

$$\begin{aligned} R_i &= \alpha_i + \beta_{1,i} R_i^* + \beta_{2,i} SMB + \beta_{3,i} HML + \beta_{4,i} UMD + \varepsilon_i \qquad (4) \\ \text{with } \varepsilon_{i,t} &\mid I_{t-1} \sim N(0, h_t) \\ \text{and } h_t &= a_0 + a_1 \left| \frac{\varepsilon_{i,t-1}}{\sqrt{h_{i,t-1}}} \right| + b_1 \log(h_{i,t-1}) + c_1 \frac{\varepsilon_{i,t-1}}{\sqrt{h_{i,t-1}}} \end{aligned}$$

As shown by equation (4), a further interesting characteristic of the EGARCH model is that it does not impose non-negative constraints on the parameters, a_1; b_1 and c_1; which is the case for a GARCH.

4. Data and Results

Our weekly data are extracted from Datastream International. The data cover the period 3/25/1998-4/01/2008. Our database is constituted 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 to 16) of negative criteria adopted by each fund as defined by the Eurosif database. This allows us to 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 constituted 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)[1]. However, load fees and management fees are not considered. 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 favour of sustainable development and corporate social responsibility". In order to sthrengthen 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 substract from the raw returns, the weekly Euribor 1 month. The maximum number of observations for each series raises 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 capitalisations and the biggest ones. We then consider the return on an equiponderate portfolio based on these two portofolios. In our paper, each porfolio is rebuilt every week according to the median of capitalisation. The HML factor is the resullt 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 test 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 and alternative hypotheses for considered series. Table 1 displays the results.

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 : Eurosil

Table 2 reports univariate statistics of funds weekly returns. As we may expect, skewness and kurtosis suggest that data are 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 reveals autocorrelation. Moreover our series seem to be characterised by conditional heteroscedasticity. Hence, the choice of GARCH representation appears to be accurate.

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-adjusted return	_	-6.63***	-5.49***
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.**

In table 3, we estimate the CAPMof section 3 for each portfolio with two methods. First, we implement standard OLS and second, as our series are characterised by conditional heteroscedasticity, we use an EGARCH model.

Table 3. **Descriptives statistitics 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.**

Our results show that the number of negative screens worsens the performance of portfolio but diminishes market risk, which is consistent with Renneboog et al. (2008) results. Indeed, the Jensen.s alpha associated with the first portfolio is larger than the alpha of the second and third portfolios whatever the method of regression. It also appears that higher screening intensity is associated with lower betas. Funds based on many exclusion criteria seem to adopt a more defensive investment strategy. This model is now be extended to the Fama-French-Carhart model (table 4).

Table 4. **Sri funds 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.

The financial performance of SRI funds is below the performance of our benchmark but appears to be higher than the alphas obtained with the traditional CAPM. However, as in table 3, the number of negative screens still worsens the performance of porfolios. As pionnering studies bringing to the fore that is no empirical evidence that SRI funds underperform traditional ones. we show that restrictions on SRI funds erode their .nancial performances. This result is consistent with Renneboog and alii (2008). It should also be noted that the number of negative screens is associated with lower betas.

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. Whereas previous studies explain the eventual underperformance of ethical funds by higher management fees, our results indeed show that the number of restrictions on SRI funds universe do impact on risk-adjusted returns. Higher numbers of excluding criteria are associated with lower Jensen's alphas. Risk-return optimization appears therefore to be constrained for SRI funds with high social and environemental standards. However, as shown by differences in exposure to market betas, the higher the number of ethical screens, the less the exposure to market risk.

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