PERFORMANCE OF EUROPEAN SRI FUNDS VS. CONVENTIONAL FUNDS

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Abstract

The aim of this study is to evaluate the performance of a sample of European equity funds and to examine whether there is any relationship between investment in socially responsible firms (social factor of the investment) and the financial performance of the funds. Two kinds of analysis are proposed to compare the results: one classical commonly used in empirical research into the subject based on the bivariate testing of difference in means (Mann-Whitney test), and another, more innovative approach, based on the multivariate technique of structural equation models (SEM). The main conclusion of this study is that the application of social criteria in investment decisions carries a cost to the investor in terms of lower return.

1. INTRODUCTION

Over the last decade, corporate social responsibility (CSR) has become the subject of considerable research and debate involving opposing theories. On one hand there are those for which firms are confined to purely economic aspects and on the other those that seek to introduce environmental and socio-laboral issues closely grouped around the concept of sustainability. Independently of the theoretical position, there are two facts that cannot be ignored: the growing implantation of socially responsible actions by firms and the greater availability of funds that, in some way, apply ethical, social and/or environmental criteria to their investment strategies, the so-called socially responsible investment (SRI) funds. Thus, the market for funds of this nature has grown spectacularly in the last five years, by 40% in Europe and 30% in the United States.

The main point of this debate is to test whether a change has taken place in the economic rationale by which economic agents make their decisions, particularly consumers and investors, towards a rationale that takes into consideration ethical, social and/or environmental aspects in addition to classical economic criteria. Such a change would imply a substantial shift in society's demands on firms and markets, which will undoubtedly draw the attention of regulatory institutions, thus marking a reference point in the development of the economy. The effect of the social factor can be analyzed from different viewpoints, but investment is one of the most relevant insomuch as it may be the way this change is financed. In this respect it is a question of discerning whether investment using ethical or social criteria really involves the acceptance on the part of the investor of a lower return, and if this is not so, then why not. Empirical testing of the influence of the social factor of the investment (Kurtz, 1997; diBartolomeo and Kurtz, 1999) on the financial performance of funds, far from narrowing the debate among the confronting theoretical lines of thought, the inconclusive and, on occasion, contradictory results obtained to date have raised the debate among these theories.

The financial portfolio theory and the classical theory of the firm propose a negative relationship between the application of social criteria to investment decisions and the financial performance of funds. The former of these theories suggests that the application of criteria constraining the fund's investment possibilities leads to a penalty in terms of worse performance, owing to less diversification and the consequently greater risk exposure of the portfolio and/or an extra cost that must be borne by the fund for not investing in more profitable potential assets beyond the scope of the fund's social investment policy. The latter theory states that SRI funds are less financially efficient than other funds since they invest in firms that incur higher costs, thus making them less profitable. The opposing position rests on the social theory of the firm, according to which the financial performance of SRI funds is better than that of conventional funds due to the fact that the former incorporate considerably more information in their investment decisions, since SRI fund managers target firms that manage their economic, social and/or environmental risks better, resulting in an improved selection of the fund's portfolio.

So far, most of the empirical studies carried out in this line of research have not rejected the null hypothesis of equality of performance between social and conventional funds (Hamilton *et al.*, 1993; Mallin *et al.*, 1995; Gregory *et al.*, 1997; Goldreyer *et al.*, 1999; Statman, 2000; Matallín and Fernández, 2002; Bauer *et al.*, 2005; Fernández and Luna, 2006). If the empirical results do not support any of the arguments above, the question is posed of why the results obtained are not in agreement with the theoretical propositions. This opens up two further questions, which follow: If there are no significant differences between the two types of funds, are SRI funds really social or are they simply a marketing product of their managing institutions; and if the performance is the same, why is more not invested in SRI funds?

The aim of this study is to evaluate the financial performance of a sample of European equity funds and to examine whether there is any relationship between investment in socially responsible firms (social factor of the investment) and the financial performance of the funds while introducing improvements in the methodology regarding sample size, the measure of performance and monitoring of variables affecting them. Two kinds of analysis are proposed to compare the results: the classic one commonly used in empirical research into the subject based on the bivariate testing of difference in means (Mann-Whitney test), and another, more innovative approach based on the multivariate technique of structural equation models (SEM). The application of SEM methodology can break the fund's financial performance down into its components of return and risk, while monitoring the factors affecting it, which allows the analysis of the direct and indirect effects that may arise among all the variables in the model.

This study begins with a theoretical part in which an exhaustive review is made of the literature on the subject. This leads on to the formulation of the hypothesis to be tested before moving on to an empirical second part describing the methodology applied and presenting the results and conclusions of this research.

2. REVIEW OF LITERATURE

Numerous empirical studies have been published in recent years to test whether financial performance of SRI funds is significantly better or worse than that of conventional funds. The discussion of whether levels of return are lower or risk higher for SRI funds, usually involves two arguments related to the financial portfolio theory and the classical theory of the firm:

− Reducing the range of possible investments by including ethical or social considerations in the investment policy of the portfolio increases total portfolio risk, transaction costs and management fees (Rudd, 1981; Hickman *et al.*, 1999; Tippet, 2001).

− The firm's need to supply information to SRI funds and to adapt its management to the social requirements of these funds involves costs (agency costs and opportunity costs) that have no economic aim and so there must be an adverse effect on the profitability of the firm (Belkaoui and Karpik, 1989). This lower profitability of socially responsible firms must negatively affect the returns of SRI funds.

On the other hand, the reasons given by the social theory of the firm to explain how SRI funds might achieve financial performance as good as or better than that of conventional funds, despite constraining their range of possible investments by applying ethical or social considerations in addition to purely economic ones, are the following:

− Firms acting in accordance with certain ethical criteria are more efficient and better managed, leading to their outperformance in the market (Hamilton *et al.*, 1993; Guerard, 1997a,b; Goldreyer *et al.*, 1999; Guardado, 2001; Tippet, 2001).

− SRI fund managers need more knowledge about the firms they invest in than do those of conventional funds and so base their decisions on more detailed, fuller and higher quality information, thus reducing the risk of their decisions (Kurtz, 1997; Goldreyer *et al.*, 1999).

− SRI funds must invest in smaller firms, which adapt more easily to changing market conditions (Luther *et al.*, 1992; Gregory *et al.*, 1997).

Nevertheless, the empirical evidence obtained in studies carried out to date has failed to confirm any of the arguments or theories described above. In a summarized form, Table 1 shows this empirical research, which can be divided into two stages. The first includes studies carried out in the nineties centred on the markets of the United States and the United Kingdom. The second took place in the following decade and were more concerned with the European market. The explanation for this lies in the later development of the market for SRI funds in Europe (Germany, France, Belgium and Spain) compared with the more advanced Anglo-Saxon markets.

The following are possible explanations for the failure to find significant differences in performance between SRI and conventional funds:

− Although a great variety of methodologies, periods of time or countries have been used to test the hypothesis of equality-inequality of performance between the two types of fund, the sample sizes of SRI funds used in most of these studies were small (less than 100 observations), which reduces the power of the statistical tests.

− Another possibility may lie in problems of coherence or the limitations of the different measures of performance used. Although in recent years different types of measure have been mixed, from the simplest (Sharpe, Treynor or Jensen) to the more complex and more suitable for monitoring management and investment styles (APT models, Sharpe investment styles or conditional evaluation), the results obtained have still been similar.

− A third possible explanation is the set of factors common to all the funds (size, commissions, age, investment or management style), which may affect the performance of the different funds and which, therefore, must be monitored somehow in the research.

− Finally, another possible reason behind these unsatisfactory results, though with little support for the moment, is that put forward by Kurtz (1997), who views the opposing theoretical positions, portfolio theory and social theory of the firm, as being compensatory. According to this author, the negative effects of non-diversification are compensated by the positive effects of using relevant information in investment decisions, leading to a null effect on the performance of SRI funds.

To solve all these problems, this research introduces improvements in the methodology regarding sample size, the measure of performance and monitoring of variables affecting them.

Table 1 Empirical studies on the financial performance of SRI funds vs. conventional funds

Author	Country	Period	Methodology	Measure of performance	Monitoring variables
Hamilton *et al.* (1993)	US	1981-1990	Difference in means	Jensen	(3)
Mallin *et al.* (1995)	UK	1986-1993	Rank test	Sharpe, Treynor and Jensen	(1) (3)
Gregory *et al.* (1997)	UK	1986-1994	Difference in means and linear regression	Jensen	(1) (3) (5)
Goldreyer *et al.* (1999)	US	1990-1997	Difference in means	Sharpe, Treynor and Jensen	(1) (4) (6)
Statman (2000)	US	1990-1998	Difference in means	Jensen and Statman	(1)
Matallín and Fernández (2002)	Spain	1998-2001	Difference in means	Jensen, Graham-Harvey 1 and analysis by investment style	(1) (4)
Bauer, Derwall and Otten (2003)	Canada	1994-2002	Difference in means	Jensen, APT of Carhart and conditional evaluation	(4) (5)
Bauer, Otten and Rad (2003)	Australia	1992-2003	Linear regression	Jensen, APT of Carhart and conditional evaluation	(1) (2) (3) (4) (5)
Bauer *et al.* (2005)	Germany, UK and US	1990-2001	Linear regression	Jensen and APT of Carhart	(2) (5)
Bello (2005b)	US	1994-2001	ANCOVA	Jensen, Excess Return of Sharpe and Statman	(1)
Kreander *et al.* (2005)	UK, Sweden, Germany and The Netherlands	1995-2001	Linear regression	Sharpe, Treynor and Jensen	(1) (2) (3) (4)
Scholtens (2005)	The Netherlands	2001-2003	Difference in means	Jensen and APT of Carhart	(4) (5)
Benson *et al.* (2006)	US	1994-2003	Difference in medians	Sharpe	(2)
Fernández and Luna (2006)	Spain	2000-2004	Difference in means and linear regression	Jensen	(1) (4) (7)
Mill (2006)	UK	1982-2004	Longitudinal analysis	Jensen	(1) (3) (4)
Gregory and Whittaker (2007)	UK	1989-2002	Difference in means	Sharpe	(3) (4)
Fernández and Matallín (2008)	Spain	1998-2001	Difference in means	Sharpe and Jensen	(1) (2) (4)

Notes: (1) Size, (2) Commissions/Costs, (3) Age, (4) Investment style, (5) Management style, (6) Type and/or intensity of screening, (7) Type of monitoring.

In response to the objective of this research, the following hypothesis is put forward for testing:

Hypothesis: *The social factor of the investment is related to performance of the fund.*

As it has already seen in the review of the literature, this hypothesis has been amply analyzed by other authors. Nonetheless, most of the studies have not rejected the null hypothesis as they did not find significant differences in performance between SRI and conventional funds.

3. METHODOLOGY

(i) Sample selection

The period of analysis for this study was from January 2003 to December 2007 (a total of 60 monthly periods or 5 years). This choice of time period reflects an attempt to use as many SRI funds as possible within a relatively stable macroeconomic situation, since a great number of such funds were set up in the years following 2000. In order to carry out the research, first a list was drawn up of all equity SRI funds operating in Europe during the period of analysis using the database that the rating company *Vigeo/Avanzi SRI Research* maintains on European SRI funds. This database includes all the funds that apply ethical, social and/or environmental screens to their investment decisions and which also trade as suppliers of socially responsible investments for the individual investor in general (retail funds). Therefore, the database does not include those funds which simply donate part of their commissions or profits to charity or other good causes (charitable funds), which were considered to be conventional funds.

The total number of equity SRI funds in the database was 238, from 14 European countries. Of these, 60 were excluded from the analysis either because they were created after 2003 and did not present return data for the entire study period,[1] or because they were different issues or categories (A, B, C, an so on) of the same fund and were omitted in order to avoid duplication. In the latter case, the most recent issues or those of smaller size were excluded.[2] Finally, 178 European equity SRI funds were included in the analysis.

Having identified the population of European SRI funds, conventional funds whose domicile and investment style coincided with those of the SRI funds were then selected in a general database of European funds supplied by the company Morningstar. From this database a sample was extracted of 178 conventional funds with similar characteristics of size, age and fees to those of the SRI funds selected.[3] In the case of several conventional funds with similar characteristics or where information on their characteristics was unavailable, sample selection was random.

For this first selection, Lipper supplied information on net and gross monthly returns, estimated from the total expense ratio (TER) of each fund, TNA values (in euros) and management fees (as a percentage) up to the end of the period of analysis (31 December 2007), and funds' launch dates. Nevertheless, Lipper did not supply the gross return (as this information was not available) of 72 SRI funds from Denmark, France, The Netherlands, Luxembourg, Norway and Sweden. To solve this problem, only those funds that presented complete information of gross and net monthly returns were included in the final selection. The sample was adjusted to maintain homogeneity between the SRI and conventional funds, whose number was thus reduced to 206, half of them SRI funds from 10 European countries (Austria, Belgium, Switzerland, Germany, Spain, France, UK, Ireland, Italy and Luxembourg).

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[1] Several authors (Plantinga and Scholtens, 2001; Geczy *et al.*, 2003; Matallín and Gil de Albornoz, 2005; Benson *et al.*, 2006) homogenize their databases with the aim of bringing consistency to the analysis, while excluding funds not operating throughout the study period. According to Benson *et al.* (2006), annualizing the small number of observations may distort the calculations made using them, particularly standard deviation.

[2] Statman (2000) and Bello (2005) apply this type of filter similarly in their studies.

[3] This procedure is similar to the matched pair analysis used by other authors such as Diltz (1995), Mallin *et al.* (1995), Gregory *et al.* (1997), Statman (2000), Bello (2005), Kreander *et al.* (2005) or Gregory and Whittaker (2007).

(ii) Specification of the risk-return model

With the aim of analyzing in greater detail the effect of the social factor while at the same time monitoring the effects other factors might have on the portfolio performance, Structural Equation Modeling (SEM) was used, in which the variable performance is broken down into two different endogenous variables: return and risk, where risk is an endogenous variable explaining the fund return. A structural equation model attempts to reflect the different causal relationships revealed by the theoretical analysis, thus avoiding rigidity in the relationships or possible problems with the starting hypotheses of the model (multicollinearity, heterocedasticity, autocorrelation or endogeneity) that other methodologies may have, such as multiple covariance analysis, multiple regression, panel data treatment or simultaneous equations. Moreover, the specification of a structural equation model also permits the analysis of the different effects (direct and indirect) the social factor might have on fund performance (return and risk), but which allows monitoring of another series of factors that theory and empirical evidence have shown to be possibly relevant in explaining the performance differentials between the two types of funds.

Given that the aim of this research is to evaluate the overall financial performance of the fund and not the ability of its managers to beat the market, Sharpe and Omega ratios were used to measure the relative performance of equity funds. Analytical formulas to calculate both ratios and the absolute measures of performance (return and risk) are presented in Table 2.

Table 2 Absolute and relative measures of financial performance

Measures of relative performance	Measures of absolute performance	
	Return	*Risk*
Sharpe ratio: $S_p = \dfrac{\overline{R}_p - \overline{R}_f}{\hat{s}_p}$ (1)	Mean return: $\overline{R}_p = \dfrac{\sum\limits_{t=1}^{T} R_{pt}}{T}$ (3)	Volatility: $\hat{s}_p = \sqrt{\dfrac{\sum\limits_{t=1}^{T}\left(R_{pt} - \overline{R}_p\right)^2}{T-1}}$ (5)
Omega ratio: $\Omega_p = \dfrac{\sum\limits_{t=1}^{T} R_{pt}^{+}}{\sum\limits_{t=1}^{T} R_{pt}^{-}}$ (2)	Cumulative gain: $G_p = \sum\limits_{t=1}^{T} R_{pt}^{+}$ (4)	Cumulative loss: $P_p = \sum\limits_{t=1}^{T} R_{pt}^{-}$ (6)

where $\overline{R}_p$ is the average of the annualized monthly returns of the fund p for the period T (60 months), $\hat{s}_p$ the estimate of the standard deviation of the annualized monthly returns of the same fund for the same time period, and R_{pt}^{+} (R_{pt}^{-}) the return obtained above (below) the risk-free return obtained for month t (1-month Euribor rate). Moreover, all the monthly returns have previously been homogenized in euros by Lipper.

The exogenous variables that explain fund performance (return and risk), besides social factor, are the following:

− *Fund characteristics*: size (Gorman, 1991; Chen *et al.*, 1992; Grinblatt and Titman, 1994; Collins and Mack, 1997; Philpot *et al.*, 1998; Ang *et al.*, 1999; Indro *et al.*, 1999; Dahlquist *et al.*, 2000; Beckers and Vaughan, 2001; Zera and Madura, 2001; Annaert *et al.*, 2003; Matallín,

2003a; Dowen and Mann, 2004; Otten and Bams, 2004), commissions (Chen *et al.*, 1992; Grinblatt and Titman, 1994; Philpot *et al.*, 1998; Dahlquist *et al.*, 2000; Zera and Madura, 2001; Dowen and Mann, 2004; Otten and Bams, 2004) and age (Zera and Madura, 2001; Annaert *et al.*, 2003; Otten and Bams, 2004).

− *Fund investment strategies*: investment style (Grinblatt and Titman, 1994; Indro *et al.*, 1999; Dahlquist *et al.*, 2000; Zera and Madura, 2001) and management style (Chen *et al.*, 1992; Rubio, 1992; Grinblatt and Titman, 1994; Zheng, 1999; Matallín, 2001; Matallín, 2003a).

In order to monitor fund characteristics the following measures were used:

− Fund size (X_1) was established by using the total net asset value, in millions of euros, the fund had on 31 December 2007.

− To measure variable commissions (X_2) the management fees was used, as a percentage, applied by each fund as at 31 December 2007.

− The age of the fund (X_3) was measured by calculating the number of years from the date the fund was set up until 31 December 2007.

The investment strategy of the fund was monitored using the following measures:

− Investment style of the fund was determined using the investment aim of the fund from the classification supplied by the company Morningstar. Two dichotomic variables were used for this, the capitalization of the investment (X_4): large or medium-small, and the type of market the fund invested in (X_5): domestic-regional or international.

− Monitoring the management style of the fund is too complex to be dealt with given the kind of data used in the research (it would be necessary to have data on portfolio makeup, which are difficult to obtain). One way of overcoming this problem is that used by other authors (Matallín and Fernández, 1999c; Matallín and Fernández, 2002; Matallín, 2003a; Matallín and Gil de Albornoz, 2005), in which the exposure of the fund to short-term interest rates is calculated, since the fund manager must maintain a more liquid portfolio in order to exercise better market timing, and the fund is therefore more influenced by the short-term interest differentials (Bauer, Otten and Rad, 2003). Thus, a factor (X_6) was introduced into the model which measured the fund's fixed-income exposure.[4]

Finally, the social factor was measured using the dichotomic variable X_7, which takes the value 0 when the fund is conventional and 1 when it is a SRI fund.
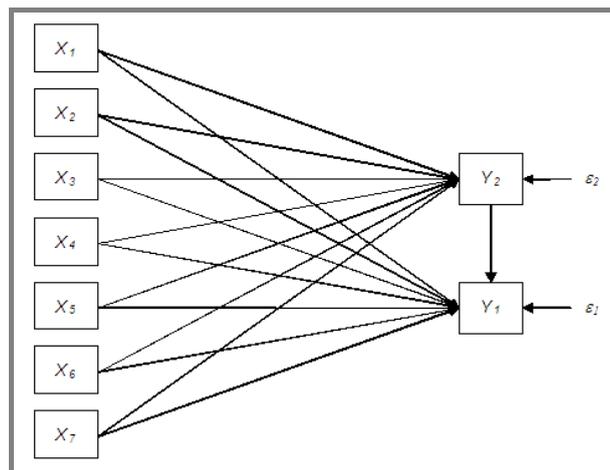

Figure 1 Relationships among variables in the structural model

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[4] This factor was obtained by estimating by ordinary least squares the coefficient ***b*** of the function $(R_{pt} - R_{ft}) = a + b (I_t - R_{ft}) + e_{pt}$ where R_{pt} is annualized monthly return of the fund *p*, I_t the monthly interest rate of the Euribor at one year, and R_{ft} the monthly interest rate of the Euribor at one month (both interest rates are annualized and were supplied by the Central European Bank).

The relationships put forward among all the variables in the model are shown in Figure 1. The model proposed corresponds to a path model with two levels of dependence. As a result, this model is specified analytically as follows:

$$Y_{1i} = a_1 + b_{11} \cdot X_{1i} + b_{12} \cdot X_{2i} + b_{13} \cdot X_{3i} + b_{14} \cdot X_{4i} + b_{15} \cdot X_{5i} + b_{16} \cdot X_{6i} + b_{17} \cdot X_{7i} + g_{12} \cdot Y_{2i} + e_{1i}$$

$$Y_{2i} = a2 + b_{21} \cdot X_{1i} + b_{22} \cdot X_{2i} + b_{23} \cdot X_{3i} + b_{24} \cdot X_{4i} + b_{25} \cdot X_{5i} + b_{26} \cdot X_{6i} + b_{27} \cdot X_{7i} + e_{1i}$$

(7)

in which exogenous variables correspond to the different X's; the endogenous variables are the Y's; and the variables e's are the errors of the endogenous variables.[5] As regards the different beta coefficients, they indicate the relationship between the exogenous variables and the endogenous variables, and the gamma coefficient the effect of the explicative endogenous variable (risk) on the other endogenous variable (return), i.e. the beta and gamma coefficients measure the direct effects of some variables on others. Therefore, in order to accept or reject the hypothesis of this research the following null hypothesis must be tested: $b_{17} = b_{27} = 0$, against the alternative hypothesis: $b_{17} \neq 0$ and/or $b_{27} \neq 0$. The estimation of parameters is to be performed using the program AMOS 7.0 and to do so the sample of funds described in the previous section will be used. Table 3 summarizes the definition of the explicative variables, as well as the endogenous variables to explain.

Table 3 Definition of the variables of the structural model

Variable	Nom.	Measure	Type of measure
Return	Y_1	Annualized monthly return obtained through analytical expressions 3 and 4 (%)	Scale
Risk	Y_2	Annualized monthly risk obtained through analytical expressions 5 and 6 (%)	Scale
Size	X_1	Total net assets (millions €)	Scale
Commissions	X_2	Management fees (%)	Scale
Age	X_3	Years of operation of the fund	Scale
Capitalization of the investment	X_4	Size of assets in which the fund mainly invests: medium-small = 0 and large = 1	Dichotomic
Investment market	X_5	Market in which the fund mainly invests: domestic-regional = 0 and international = 1	Dichotomic
Exposure to short-term interest rates	X_6	Correlation between the yield of the fund and the short-term interest rate differential (beta)	Scale
Social factor	X_7	Social investment of the fund: conventional fund = 0 and SRI fund = 1	Dichotomic

(iii) Sample description of the exogenous variables
Table 4 shows the linear correlation coefficients between the exogenous variables. This table reveals a high correlation between certain explicative variables of the structural model (multicollinearity). Consequently, all the correlations that are significantly different from zero, with significance levels less than or equal to 10%, were taken into account when estimating the parameters of the structural model. The exogenous variables have the following significant correlations:

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[5] The model considers that: (i) the errors are not correlated between them nor with the exogenous variables, (ii) their mean is zero, and (iii) their variance is constant. These are restrictions taken into account when estimating the parameters of the model.

- Size is positively correlated with fund age (larger funds correspond to those with more years in operation). However, size is negatively correlated with the capitalization of the investment (larger funds tend to invest more in small or medium-sized companies than the other funds).
- The commission rate variable is positively correlated with investment market (funds with higher management fees are those that invest mainly in international markets). Moreover, this variable is positively correlated with the social factor of the investment (SRI funds have higher management fees than the rest of the funds). On the contrary, this variable is negatively correlated with exposure of the fund to short-term interest rates (funds with a more active portfolio management tend to have lower management fees).
- In investment strategy a significant positive association is found with the variables capitalization and exposure to short-term interest rates (funds that invest in large companies tend to be managed more actively). Finally, the market the fund invests in is negatively correlated with exposure to short-term interest rates (funds that invest in domestic or regional markets tend to have a more active portfolio management than funds investing in the international market).

Table 4 Correlation coefficients among the exogenous variables

Variable	X_1	X_2	X_3	X_4	X_5	X_6	X_7
X_1	-						
X_2	-0.06	-					
X_3	**0.21**	0.00	-				
X_4	**-0.27**	-0.08	-0.05	-			
X_5	-0.05	**0.25**	-0.04	0.09	-		
X_6	-0.04	**-0.15**	-0.07	**0.18**	**-0.38**	-	
X_7	-0.06	**0.14**	-0.09	0.00	0.00	**0.17**	-

Notes: X_1 = Size. X_2 = Commissions. X_3 = Age. X_4 = Capitalization. X_5 = Market. X_6 = Exposure to short-term interest rates. X_7 = Social factor. Bold figures are significant up to the 10% level. Two-tailed test.

To conclude the descriptive analysis, an analysis of the exogenous variables according to the type of fund (social or conventional), in which the most relevant statistics are analyzed in order to reveal the distribution of each variable (see Table 5). The tests used to determine whether the distributions of the exogenous variables of the model were different for each type of fund were the non-parametric Mann-Whitney test. As was to be expected owing to the procedure by which the funds were selected for the sample, the differences observed in the distributions of the different exogenous variables, according to the type of fund, were minimal and mostly non-significant.

Table 5 Distribution of exogenous variables

Type of fund	Statistic	Exogenous variables					
		X_1	X_2	X_3	X_4	X_5	X_6
Conventional	n	91	83	103	103	103	103
	Mean	144.64	1.33	10.33	0.85	0.50	-9.31
	Stand. Dev.	281.33	0.43	5.87	0.35	0.50	11.29
Social	n	97	81	103	103	103	103
	Mean	116.51	1.44	9.37	0.85	0.50	-5.26
	Stand. Dev.	189.77	0.35	4.65	0.35	0.50	12.01
	Mann-Whitney test	0.33	1.75[*]	1.35	0.00	0.00	2.62[***]

Notes: n = number of observations. [***] Significant at the 1% level. [**] Significant at the 5% level. [*] Significant at the 10% level. Two-tailed test.

According to Table 5, SRI funds present marginally significant differences (at the 10% level) in the sample distribution of management fees with respect to conventional funds. Thus, the mean of management fees applied by the SRI funds is 1.44% against 1.33% by the conventional funds. Moreover, these funds also present very significant differences in the sample distribution of exposure to short-term interest rates (SRI funds present greater beta with the short-term interest differential than the rest of the funds), which implies more active portfolio management of SRI funds compared with conventional funds.

4. ANALYSIS OF RESULTS

(i) Results of the bivariate analysis

The results obtained to test the hypotheses of this study using the traditional non-parametric method of difference of means (Mann-Whitney test) are shown in Table 6. These results reveal that the return of the conventional funds is, on average, greater than that of the SRI funds independently of the measure of return used (mean return or cumulative gain and gross or net return). This difference in return in favour of the conventional funds is only statistically significant (at the 10% level) when the fund return is measured by its mean return, and it is greater when net returns are used (difference of –0.80% with gross returns and –0.92% with net returns). If the cumulative gain is taken, the difference in performance in favour of these conventional funds is maintained but falls short of statistical significance (the non-significance of this difference can be explained by an indirect effect of risk on the cumulative gain of the fund). Also, if the portfolio risk is analyzed, SRI funds consistently present greater overall risk than conventional funds independently of the measure used (volatility or cumulative loss). These differences are not generally statistically significant, except when using net returns and for the measure of cumulative loss (marginal significance at the 10% level).

Table 6 Differences of means in performance (Mann-Whitney test)

Performance measures	Gross return		Net return	
	Sharpe	*Omega*	*Sharpe*	*Omega*
Risk	0.35	14.70	0.35	18.82[*]
Return	-0.80[*]	-33.28	-0.92[*]	-36.67
Ratio	-0.02[**]	-0.09[**]	-0.03[**]	-0.10[**]

Notes: Figures are monthly % points (annualised). [***] Significant at the 1% level. [**] Significant at the 5% level. [*] Significant at the 10% level. Two-tailed test.

Regarding the values of relative performance, on average all the indicators show highly significant differences (significance levels of 1% and 5%) in favour of the conventional funds. Similarly, these differences in performance are very similar for the two ratios, independently of whether the returns used are gross or net: between –0.02% and –0.03% for the Sharpe ratio, and between –0.09% and –0.10% for the Omega ratio, the difference being greater for the net returns owing to the higher management costs SRI funds generally incur. As a result, the differences in relative performance found would be due to both the fall in the return because of the social factor of the investment and to the increase in total portfolio risk (this effect is more significant on return than on risk and stronger when the returns analyzed are net). The explanation of why the difference in the Omega ratio is significant (at the 5% level) despite not finding a significant difference in return (cumulative gain) and risk (cumulative loss), is due to the existence of an indirect effect of risk on the return of the SRI funds to be analyzed in the following section.

(ii) Results of the multivariate analysis
The estimated model presents a good fit independently of the type of measure applied, since all the indices of the goodness of the fit analyzed show values within the limits recommended (see Table 7). The values of the absolute measures of fit, chi-square (not significant in any case), normed chi-square (less than 1) and RMSEA (less than 0.08 in all cases) are all very low and close to zero, and so the null hypothesis of equality between the model proposed and the sample data used would be accepted. Also, the result obtained with the incremental measures of fit are also good, since the CFI and NFI also reach values very close to 1 in all cases. Lastly, the measure of the quality of the fit used in the bayesian estimation (posterior predictive p-value) gave similarly good results, in all cases its value being equal or very close to the ideal value of 0.5.

With respect to the percentage of explained variance of each of the endogenous variables of the model, the analysis of the determination coefficients (R^2) permits us to observe that the values obtained are very similar, independently of the absolute performance measure of return or risk used and of whether they were gross or net returns, although these values are not very high. It must be remembered that the analysis of this paper is based on cross-section data and low determination coefficients are usually obtained with this type of data (Dhrymes, 1998; Kreander *et al.*, 2005).

Table 7 Effects of the social factor on return and risk and model fit

Type of effect	Absolute performance measure	Gross return		Net return	
		Sharpe	*Omega*	*Sharpe*	*Omega*
Direct	Risk	1.03	30.89[**]	1.00	31.93[*]
	Return	-1.22[***]	-52.06[*]	-1.24[***]	-53.72[*]
Indirect	Risk	0	0	0	0
	Return	0.32	29.89[**]	0.31	29.28[*]
Total	Risk	1.03	30.89[**]	1.00	31.93[*]
	Return	-0.91[*]	-22.16	-0.94[*]	-24.44
Model fit	Recommended values	*Sharpe*	*Omega*	*Sharpe*	*Omega*
Chi-square	Low	10.09	10.10	10.23	10.28
P-value	> 0.10	0.69	0.69	0.68	0.67
Normed chi-square	< 3	0.78	0.78	0.79	0.79
CFI	> 0.90	1	1	1	1
NFI	> 0.90	0.96	0.96	0.96	0.96
RMSEA	< 0.08	0	0	0	0
Posterior predictive p-value	0.50	0.50	0.50	0.50	0.50
R^2 (risk function)	High	0.19	0.22	0.19	0.23
R^2 (return function)	High	0.38	0.33	0.39	0.33

Notes: Pair of endogenous variables *Sharpe* ratio = Mean return and Volatility. *Omega* ratio = Cumulative gain and Cumulative loss. Figures are monthly % points (annualised). [***] Significant at the 1% level. [**] Significant at the 5% level. [*] Significant at the 10% level. Two-tailed test.

Once the suitability of the fit to the model has been checked, the next step is to analyze the direct, indirect and total effect estimated of the explicative variable that take into account social factor of the investment on the endogenous variables return and risk. The analysis of the results obtained on the effects the social factor of the investment has on return and risk of the funds reveals the following:

- *Direct effect on risk*. The fact that a fund is social, *ceteris paribus*, affects it by increasing its overall risk as measured by both volatility and cumulative loss. This effect is consistent independently of the returns, gross or net, used. Nevertheless, the effect is only statistically significant (at the 5% and 10% levels) when risk is measured by cumulative loss. This result is entirely in agreement with that obtained on applying the bivariate methodology. Also, the estimated intensites of the effect are, for the two measures of risk, clearly higher than those obtained with the difference in means.
- *Direct effect on return*. The fact that a fund is social, *ceteris paribus*, affects its return negatively, independently of whether it is measured by its mean return or cumulative gain (significance at the 1% and 10% levels respectively). This negative effect is of 1.22 points and 1.24 points lower for the gross and net mean return respectively. Regarding the cumulative gain (in a period of 5 years), the evaluated fall in return would be of 52.06 points if the returns used are gross and 53.72 points if they are net. This fall in net return of the SRI funds is greater than that obtained with the gross return due to the higher management costs incurred by SRI funds. Moreover, the intensity of this effect is, independently of the measure of return used, clearly higher than that obtained with the method of difference in means.
- *Indirect effect on return*. The social factor of the investment also affects the return of the fund indirectly through its direct relationship with risk, increasing the return, and attenuating the direct negative effect that the social factor exerts on the return of the fund. Nevertheless, this indirect effect is only statistically significant (at the 5% and 10% levels) when the cumulative gain is analyzed.
- *Total effect on return*. Although the indirect effect reduces the negative effect of the social factor on return, the total effect remains negative and statistically significant, but with less intensity and significance. In the case of the cumulative gain, the difference in return is no longer significant, which agrees with the result obtained with the bivariate method. Therefore, the effect the social factor of the investment has on the relative performance of the fund (risk-adjusted return) is negative, which means the investor must accept a financial cost of investing in SRI funds.

Therefore, the results obtained confirm that the social factor of the investment reduces the performance of funds, as it significantly diminishes both its gross and net return, to a greater extent in the latter because SRI funds incur higher management costs. Similarly, there is evidence that the social factor may have an indirect influence on return through risk by producing net effects that may significantly affect the results obtained by traditional testing methods. Consequently, according to these evidences, the hypothesis of this research must be accepted, that the social factor of the investment is negatively related to the performance of the funds. This result contradicts the thesis of social theory of the firm, in which the application of social criteria in portfolio selection increases return and reduces risk, and supports the opposing thesis of the classical theory of the firm, in which investment in socially responsible companies is less profitable because this type of company is less efficient (thus, SRI funds have a lower gross return than conventional funds), and of the financial portfolio theory that a greater restriction on portfolio selection leads to greater risk and lower net return (management costs incurred by SRI funds are higher but fail to provide higher gross returns).

5. CONCLUSION

This last section summarizes the main results of the empirical analysis of differences in the performance of social and conventional funds from a sample of European equity funds. Methodologically, the results obtained using traditional methods such as difference in means may be influenced by the significant effects of different variables, and consequently may be distorted. The use of more sophisticated methods (multivariate) is to be recommended in order to take into account the characteristics of the funds and the direct and indirect effects on the components (return and risk) of the relative performance measures.

From the analysis of these results it can be deduced that, on average and in the long-term (5 years), the social factor of the investment affects relative performance (risk-adjusted return) negatively, and so it can be concluded that socially responsible investment carries a cost to the investor. This result is consistent independently of the method of testing, the measure of performance or the use of gross or net returns in the analysis. The negative effect on return is more significant than on the overall portfolio risk. One of the reasons for the significantly lower return of SRI funds against conventional funds lies in the lower return of the assets the fund invests in, since the rest of the main factors affecting fund return are taken into account in the model. This means that the investment made by managers in more socially responsible firms (social rationale of the investment) is less profitable than the investment made by the managers of conventional funds, who are unrestricted in their investment choices (economic rationale of the investment), as confirmed by the lower gross returns of SRI funds. Another of the reasons behind the lower profitability of SRI funds is their higher management costs. Thus, socially responsible investment funds present greater differences in gross and net returns than do conventional funds. The higher management costs of SRI funds are also related to their higher management fees. This same result has also been found in other empirical studies referring to other periods and geographical areas (Bauer, Derwall and Otten, 2003; Bauer, Otten and Rad, 2003; Geczy, 2003; Bauer *et al.*, 2005; Burlacu *et al.*, 2007). This result leads to the conclusion that a change is taking place in the decision-making criteria of some investors, who are willing to accept lower returns on their investments and to incur higher management costs and fees in order to invest more sustainably, which constitutes a shift from a purely economic rationale to a socio-economic rationale, a change that is still quite limited given the small percentage of investment in social funds compared with traditional ones, but which has continued to grow in recent years marking a steadily rising trend.

To sum up, there is clear evidence to suggest that the application of social criteria in investment decisions carries a cost to the investor in terms of lower return, the origin of which lies in the intrinsic characteristics of the assets the fund invests in (socially responsible firms). The results obtained in this study provide evidence supporting the premises of the classical theory of the firm and the financial portfolio theory, while no evidence is found to support the thesis of the social theory of the firm.

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