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## The performance of socially responsible investment funds: A meta-analysis

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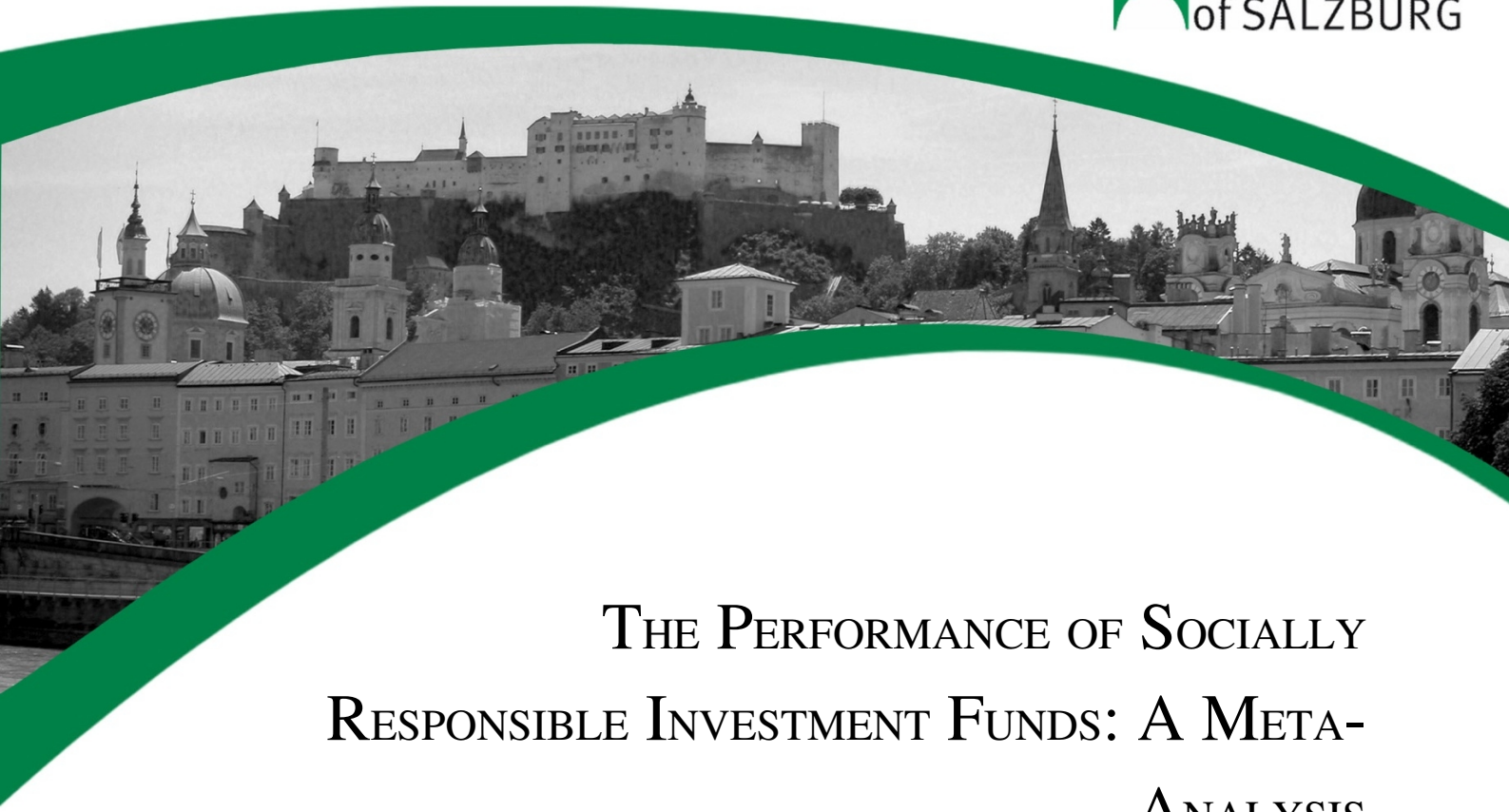
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THE PERFORMANCE OF SOCIALLY  
RESPONSIBLE INVESTMENT FUNDS: A META-  
ANALYSIS

SEBASTIAN RATHNER

WORKING PAPER No. 2012-03

**WORKING PAPERS** IN  
ECONOMICS AND FINANCE

# **The Performance of Socially Responsible Investment Funds: A Meta-Analysis**

Sebastian Rathner\*

March 2012

## **Abstract**

Empirical studies, which analyse the performance of Socially Responsible Investment (SRI) funds relative to conventional funds, find contradictory results. The aim of this paper is to investigate, with the help of a meta-analysis, how selected primary study characteristics influence the probability of a significant under- or outperformance of SRI funds compared with conventional funds. 25 studies with more than 500 observations are included in the meta-analysis. The results of this paper suggest that the consideration of the survivorship bias in a study increases (decreases) the probability of a significant outperformance (underperformance) of SRI funds relative to conventional funds. The focus on United States (US) SRI funds increases (decreases) the probability of a significant outperformance (underperformance) too. The time period influences the probability of a significant under- and outperformance of SRI funds as well, but based on the results of this paper, it is not possible to draw general conclusions on this variable.

*Keywords:* Corporate Social Responsibility (CSR), Ethical Investment, Fund performance, Socially Responsible Investment (SRI), Sustainability

*JEL Codes:* G12, M14

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## 1 Introduction

Socially Responsible Investment (SRI) is an investment process that combines an investor's financial objectives with environmental, social or ethical considerations (Renneboog et al., 2008a; European Sustainable Investment Forum (Eurosif), 2010). Thus, SRI stock funds, for example, use financial screens as well as environmental, social or ethical screens to select their stocks.

Over the last years SRI has seen strong growth. The total SRI assets under management in Europe, for instance, increased from €2.7 trillion in 2007 to €5 trillion in 2009 which is an increase of 87% (Eurosif, 2010). Eurosif divides the SRI market into two segments, a stricter 'core' SRI segment (investments have to apply sophisticated SRI techniques), and a 'broad' SRI segment with less strict requirements.<sup>1</sup> The 'core' segment (€1.2 trillion) is estimated to represent 10% of the asset management industry in Europe in 2009 (Eurosif, 2010). Additionally the number of European SRI retail funds increased from 280 in 2001 to 886 in 2011, which is an increase of 216% (Vigeo, 2011). Furthermore, Eurosif (2010) reports the compound annual growth rates of SRI and conventional funds by asset class between 2007 and 2009. Bond and monetary SRI funds grew strongly (114% and 33%), while conventional bond and monetary funds experienced small growth, respectively, a decrease (4% and -5%). Assets in SRI equity funds decreased by 7% and assets in conventional equity funds by 14%.

One widely studied question in SRI literature is, whether the performance of SRIs differs from the one of conventional investments. This question is addressed in most academic studies by investigating SRI funds and conventional funds. From a theoretical perspective, there are three different hypotheses about performance comparisons of SRI and conventional funds. The 'underperformance-hypothesis' suggests that SRI funds generate weaker financial performance than conventional funds. The main reason for the underperformance can be seen in the fact that the implementation of SRI screens limits the full diversification potential which 'may shift the mean-variance frontier towards less

favorable risk-return tradeoffs than those of conventional portfolios' (Renneboog et al., 2008b, p. 304). An additional reason for the underperformance of SRI funds may be found in the costs of the labour intensive screening process which could partly be passed on to investors (Gil-Bazo et al., 2010).

The 'outperformance-hypothesis' claims superior returns of SRI funds. An outperformance of SRI funds may occur if the SRI screening process, which investigates a company's environmental, social or ethical quality (in empirical studies called Corporate Social Performance (CSP)), generates value-relevant information which would not be available to fund managers otherwise. This 'additional' information may help fund managers to select securities, respectively companies with higher risk-adjusted returns (Renneboog et al., 2008b). Thus, the most pressing question is if there are any reasons why a 'good' company may be a successful company as well?<sup>2</sup>

Heal (2008) mentions amongst others the following reasons: Companies with a good record concerning CSP may have a lower risk of being the target of negative press, NGO actions, consumer boycotts and lawsuits. Another benefit is seen in environmentally responsible actions that may cause cost reductions by reducing waste. In today's competitive world with few possibilities for product differentiation, a product's image is crucial. Good CSP may be a source differentiation and bad CSP may harm a company's brand. A 'good' company may attract a highly educated workforce and may be more successful in motivating the employees than a company with a bad CSP record. Furthermore, SRI may reduce the cost of capital of responsible companies if this type of investment reaches a substantial market share. An important assumption of the 'outperformance-hypothesis' is that the stock market misprices the information on a company's Corporate Social Performance (Renneboog et al., 2008b).

The 'no-effect-hypothesis' suggests that there is no significant difference between the returns of SRI and conventional funds. This hypothesis proposes that the SRI screening

process, respectively the CSP of companies, has neither a positive nor a negative influence on the financial performance (Hamilton et al., 1993; Renneboog et al., 2008b).

Most empirical studies of this extensive body of literature corroborate the ‘no-effect-hypothesis’ but there is some evidence for the other two hypotheses as well. The reasons for the contradictory evidence are largely unexplored. One possibility is that primary study characteristics (e.g. domicile of the studied funds) influence the results.

Therefore, the aim of this paper is to investigate, with the help of a meta-regression, how selected primary study characteristics (the domicile of the investigated funds, the survivorship bias consideration in a study, the sample period) influence the probability of a significant under- or outperformance of SRI funds compared with conventional funds.

The remainder of this paper is organised as follows: Section 2 presents the study selection process of the meta-analysis and a literature overview of the selected studies, which compare the performance of SRI and conventional funds. Section 3 develops the hypotheses and section 4 describes the data and methods. Section 5 presents the empirical results. Section 6 provides a conclusion and various suggestions for future research.

## **2 Study selection process and literature overview**

The starting points for this research were several narrative literature reviews (Chegut et al., 2011; Capelle-Blancard and Monjon, 2010; Hoepner and McMillan, 2009; Renneboog et al., 2008a). Additionally, a computer search in ‘ScienceDirect’ and ‘google scholar’, using the keywords ‘socially responsible investment’ and ‘performance’ was conducted and the references of included studies were explored. For being included in the meta-analysis, a study had to meet the following criteria: First, the study investigated the performance of ‘real’ SRI funds relative to conventional funds quantitatively. A study which focused on SRI funds only or SRI indices was not included. Second, a study needed to provide information on the significance of the observed effects.

A limitation of this study is that it is not possible to guarantee that all relevant studies were found during the searching process, as there is an enormous amount of journals and

## The Performance of SRI Funds: A Meta-Analysis

other web-sources where studies may be published. Nonetheless, from my point of view, the selected studies are representative for this body of literature.

To reduce the publication bias, which suggests that journals tend to publish studies with significant results rather than publishing studies with insignificant results, I included unpublished papers of this research stream in the meta-analysis as well (two master theses and two working papers).<sup>3</sup>

25 studies with 517 effects (= comparisons between SRI and conventional fund performance in primary studies) are included in the meta-analysis. Single studies contain several performance comparisons between SRI and conventional funds; e.g. for funds of different countries. Basic information on the included studies and their results can be found in Table I. Detailed information on the included studies can be found in Appendix I.

TABLE I  
Information on the included studies

Authors	Publica- tion year	Significant under- performance of SRI funds	No significant performance difference	Significant out- performance of SRI funds	Total
Bauer, Derwall, Otten	2007	0	6	0	6
Bauer, Koedijk, Otten	2005	4	22	4	30
Bauer, Otten, Rad	2006	1	8	2	11
Bello	2005	0	6	1	7
Benson, Brailsford, Humphrey	2006	6	36	0	42
Bollen	2007	2	8	5	15
Chang, Witte	2010	10	20	4	34
Derwall, Koedijk	2009	0	23	9	32
Gil-Bazo, Ruiz-Verdu, Santos	2010	6	52	39	97
Goldreyer, Ahmed, Diltz	1999	3	9	0	12
Gregory, Matatko, Luther	1997	1	5	0	6
Gregory, Whitaker	2007	0	4	2	6
Hamilton, Jo, Statman	1993	0	2	0	2
Humphrey, Lee	2011	0	8	0	8
Kempf, Osthoff	2008	0	2	0	2
Koellner, Suh, Weber, Moser, Scholz	2007	0	5	1	6
Kreander, Gray, Power, Sinclair	2005	0	7	0	7
Kryzanowski, Ayadi, Ben-Ameur	2011	0	36	0	36
Liedekerke, Moor, Wallegem	2007	0	5	1	6
Mueller	1991	3	0	0	3
Renneboog, Horst, Zhang	2008	25	107	0	132
Sanchez, Sotorrio	2009	6	2	0	8
Spekl	2009	5	1	0	6
Statman	2000	0	2	0	2
Stenström, Thorell	2007	1	0	0	1
Total		73	376	68	517

## The Performance of SRI Funds: A Meta-Analysis

As shown in Table I, the results of empirical studies that compare SRI and conventional fund performance are contradictory. Both, a significant out- or underperformance of SRI funds as well as no significant performance difference at all can be observed by investigating, for example, the following studies. Bauer et al. (2006) discuss possible performance differences between Australian SRI and conventional funds during 1992-2003. They divide their sample into funds which invest in international and domestic stock markets and do not find any significant performance difference between SRI and conventional funds using a conditional multi-factor model. However, they show that the results are sensitive to the chosen time period. Domestic SRI funds underperformed their conventional peers in the first 3.5 years of the study's time period, outperformed conventional funds in the second 3.5 years and didn't show any significant performance difference in the last 3.5 years. An important contribution of Bauer et al. (2006) is that they consider the survivorship bias in their study by adding back funds to their samples, which were closed at any point during the sample period. Several authors show that the consideration of survivorship bias influences the average fund performance (e.g. Brown et al., 1992). Therefore, it should be an independent variable in the meta-analysis. Humphrey and Lee (2011) do not find any significant performance difference between Australian SRI and conventional fund portfolios. Their study uses the one-factor-model based on Jensen (1968) as well as Carhart's (1997) four-factor-model to evaluate fund performance. As Humphrey and Lee (2011) many studies use several models to evaluate fund performance and models vary from study to study as well. Hence, it is reasonable to include the performance evaluation models as control variables in the meta-analysis. Benson et al. (2006) compare the annual raw returns and sharp ratios of US funds. They do not report any significant performance difference between SRI and conventional funds during 1994-2003, except in 2003, in which conventional funds showed a significant better performance than SRI funds.



## The Performance of SRI Funds: A Meta-Analysis

In a comprehensive study Renneboog et al. (2008b) investigate the performance of SRI funds relative to conventional funds in 17 countries around the globe using one- and multi-factor models to evaluate fund performance. This study eliminates the problem of small SRI fund samples as 440 SRI funds were included. The number of funds varies strongly throughout the studies and therefore, a control variable which accounts for this fact will be included in the meta-analysis. Renneboog et al. (2008b) do not find any significant performance difference for funds of thirteen countries but report that SRI funds of France, Ireland, Sweden and Japan significantly underperformed their conventional peers by 4%-7% per annum during 1991-2003.<sup>4</sup> This suggests that the conclusion about the performance of SRI funds relative to conventional funds may be sensitive to the domicile of the investigated funds. Chang and Witte (2010) compare the average annual returns of US SRI and conventional funds over a three-, five-, ten-, and fifteen-year period ending on March 31, 2008. They report a significant underperformance of SRI funds over the five-, ten-, and fifteen-year period but the results over the three-year period are not significant. Again, the time period seems to influence the observed results. Thus, it is reasonable to include a variable 'time period' in the meta-analysis. Bauer et al. (2005) find a significant underperformance of German and US SRI funds during 1990-1993 relative to conventional funds as well as a significant outperformance of SRI fund portfolios from the UK and the US during the subperiod 1998-2001.

Applying a conditional 4-factor-model, Liedekerke et al. (2007) examine Belgian SRI and conventional funds. Generally, they do not find any significant performance difference but they report a significant outperformance of SRI funds which invested in the international market during 2001-2005. Gil-Bazo et al. (2010) investigate US SRI and conventional funds during 1997-2005 using a wide variety of models. They apply a matching estimator methodology to compare funds with similar characteristics. Several other studies use a matching procedure too (e.g. Kreander et.al., 2005; Statman, 2000).

The aim of such a procedure is to select comparable funds whose main difference is the SRI characteristic. The use of this procedure possibly leads to a different conclusion about the performance comparison between SRI and conventional funds. As a result, a control variable which accounts for the use of a matching procedure in a study should be integrated in the meta-analysis. Gil-Bazo et al. (2010) conclude that the SRI funds of their sample outperform the matched conventional funds but these results are driven by SRI funds which are operated by fund management companies with a specialization in SRI.

### **3 Hypotheses**

This section presents the hypotheses on three selected primary study characteristics, which play a major role in studies on SRI fund performance and may have an impact on the probability of a significant under- or outperformance of SRI funds compared with conventional funds. The following characteristics may contribute to an explanation of the contradictory results of the cited primary studies: survivorship-bias consideration, domicile of the investigated funds, sample period.

#### **3.1 Survivorship bias consideration**

An interesting characteristic, which distinguishes relevant studies, is whether a study considers survivorship bias or if it does not. A survivorship bias appears if fund samples (in a study) contain currently active funds only and do not include 'dead' funds. This bias leads to an overestimation of the average fund performance because the average 'dead' fund performs poorly. Hence, a systematic difference in the attrition rate between SRI and conventional funds would influence the performance comparisons in all studies which ignore the survivorship bias. Interestingly, there is some empirical evidence which suggests that the attrition rates of SRI and conventional funds are dissimilar and therefore, fund samples suffer from survivorship bias to a different degree. Gregory and Whittaker (2007) find that 29.93% of their conventional fund sample died before the end of the sample period. In contrast, only 12.5% of the SRI fund sample did so. Similarly,

Kempf and Osthoff (2008) report an attrition rate of 36% for conventional and 17% for SRI funds. Accordingly, Renneboog et al. (2008b) discover a lower attrition rate for SRI than for conventional funds.

If a study does not consider survivorship bias and the attrition rate of conventional funds is higher than the attrition rate of SRI funds (and therefore, the average performance of conventional funds is biased more upwards than the average performance of SRI funds), there should be a higher (lower) probability of a significant underperformance (outperformance) of SRI funds. In contrast, a study which accounts for survivorship bias (includes dead funds in the samples) should on average have a higher (lower) probability of a significant outperformance (underperformance) of SRI funds (hypothesis 1 (H1)).

### **3.2 Domicile of the investigated funds**

One criterion, which distinguishes funds from each other, is their domicile. Most studies focus on the SRI fund industry of the US which is claimed to be the oldest and most developed SRI fund industry in the world. Louche and Lydenberg (2006) report that the ‘Pioneer Fund’, established in 1928 in the US, was the first SRI fund. Several other authors claim that the ‘PAX World Fund’, established in 1971 in the US, was the first ‘modern’ SRI fund (e.g. Renneboog et al., 2008a). Due to the age and development of the SRI fund industry, I hypothesise that studies which investigate US SRI funds only tend to have, on average, a higher (lower) probability of a significant outperformance (underperformance) of SRI funds compared with studies which focus on funds of other countries (H2).

### **3.3 Sample period**

Another widely studied characteristic is the sample period. Several authors divide their period into subperiods to investigate the influence of study subperiods on the results (e.g. Bauer et al., 2006; Renneboog et al., 2008b; Gil-Bazo et al., 2010). The findings of these studies ‘suggest that different sample periods may lead to different conclusions about the

performance of SRI funds relative to that of conventional funds' (Gil-Bazo et al., 2010, p. 253). Several studies find a 'catching up phase' of SRI funds, which means that studies with a newer sample period show better results for SRI funds (Bauer et al., 2005; Bauer et al., 2006). The main reason may be seen in the steady advancement of the SRI fund industry. In accordance with the mentioned studies, I hypothesise that studies with a(n) newer (older) sample period have, on average, a higher (lower) probability of a significant outperformance and a lower (higher) probability of a significant underperformance of SRI funds (H3).

## 4 Data and methods

### 4.1 Variable description and empirical specification of the meta-analysis

Primary studies use different measures to compare the performance of SRI funds and conventional funds and hence, it is difficult to compare them directly. Thus, I create the categorical variable *performance comparison* (dependent variable of the meta-regression) which takes value 0 if the SRI funds significantly underperform the conventional funds. Value 1 is taken if there is no significant performance difference, and value 2 if the SRI funds outperform their conventional peers significantly. By using logit-models, it will be tested how the selected primary study characteristics (independent variables of the meta-regression) influence the probability of a significant under- or outperformance of SRI funds compared with conventional funds.

In the first approach, which uses binary logit-models, the dependent variable (*performance comparison*) is dichotomised:

*outperformance*=1 if the SRI funds in a study significantly outperform conventional funds; *outperformance*=0 in all other cases

*underperformance*=1 if the SRI funds in a study significantly underperform conventional funds; *underperformance*=0 in all other cases

The independent variables are the three previously discussed primary study characteristics and additional control variables as shown in Table II.

## The Performance of SRI Funds: A Meta-Analysis

TABLE II  
Independent Variables

Survivorship bias consideration	=	1 if a study considers survivorship bias
US funds	=	1 if a study investigates US SRI funds only
Time period 1981-1990	=	1 if the biggest part of a study's sample period is between 1981-1990
Time period 1991-2000	=	1 if the biggest part of a study's sample period is between 1991-2000
Time period 2001-2008	=	1 if the biggest part of a study's sample period is between 2001-2008
Performance evaluation Jensen's Alpha	=	1 if a study uses a one-factor regression model to evaluate fund performance (Jensen's Alpha)
Performance evaluation Carhart's Alpha	=	1 if a study uses a multi-factor regression model to evaluate fund performance (e.g. Carhart's four factor Alpha)
Other performance evaluation	=	1 if a study uses a fund performance evaluation model model, which cannot be assigned to the other two groups
Conditional performance evaluation	=	1 if a study uses a conditional regression approach to evaluate fund performance (e.g. Ferson and Schadt, 1996)
Matching procedure	=	1 if a study uses a matching procedure to match a certain number of conventional funds to SRI funds (based on e.g. fund size and age)
Number of SRI funds	=	number of studied SRI funds
Number of conventional funds	=	number of studied conventional funds

In the second approach, a multinomial logit model is used to conduct a 'robustness check'. Thus, the dependent variable can be used as originally defined with three outcomes (*performance comparison*). In this alternative model, the independent variables remain unchanged.

### 4.2 Descriptive statistics

Table III shows the distribution of the dependent variable. Almost 73% of the effects do not show any significant performance difference between SRI and conventional funds. A significant under- and outperformance of SRI funds is found by approximately 14% and 13% of the effects. The descriptive results of Table III must be treated with caution and should not be interpreted as a 'vote-counting' approach which could often be misleading. 'Vote-counting' approaches count the number of significant and insignificant results in primary studies and pick the category with the largest number of 'votes' as winner. The problem is that these approaches treat nonsignificant results of studies as evidence that a 'true' effect is absent and ignore the possibility that the nonsignificant results occur because of low statistical power (Borenstein et al., 2009).

## The Performance of SRI Funds: A Meta-Analysis

TABLE III  
Distribution of the primary studies' results

	<b>Freq.</b>	<b>Percent</b>	<b>Cum.</b>
Significant underperformance of SRI funds	73	14.12	14.12
No significant performance difference	376	72.73	86.85
Significant outperformance of SRI funds	68	13.15	100.00
<b>Total</b>	<b>517</b>	<b>100.00</b>	

Table IV reports the number of effects which considers survivorship bias and the number which ignores it.<sup>5</sup> 76% of the effects consider survivorship bias while 24% do not. This is consistent with Chegut et al. (2011) who find substantial differences between studies concerning the treatment of survivorship bias too.

TABLE IV  
Frequency of effects (according to the consideration of survivorship bias)

	<b>Freq.</b>	<b>Percent</b>
Survivorship bias considered	381	75.90
Survivorship bias not considered	121	24.10
<b>Total</b>	<b>502</b>	<b>100.00</b>

Table V shows how often individual countries/regions are investigated. US funds are by far studied the most. This is consistent with, for example, Cortez et al. (2009) who suggest that most studies were conducted in the US market. It is remarkable that four Anglo-Saxon countries, namely, the US, Canada, the UK and Australia are considered most in this research, although Europe has the largest share of the global SRI market today (Eurosif, 2010).

## The Performance of SRI Funds: A Meta-Analysis

TABLE V  
Frequency of effects (according to the domicile of the funds)

	<b>Freq.</b>	<b>Percent</b>	<b>Cum.</b>
Australia	27	5.22	5.22
Belgium	14	2.71	7.93
Canada	49	9.48	17.41
Europe	14	2.71	20.12
France	8	1.55	21.66
Germany	14	2.71	24.37
Germany/Austria/Switzerland	6	1.16	25.53
International	3	0.58	26.11
Ireland	8	1.55	27.66
Italy	7	1.35	29.01
Japan	8	1.55	30.56
Luxembourg	7	1.35	31.91
Malaysia	8	1.55	33.46
Netherlands	8	1.55	35.01
Norway	7	1.35	36.36
Singapore	7	1.35	37.72
Sweden	9	1.74	39.46
Switzerland	8	1.55	41.01
UK	33	6.38	47.39
UK/Sweden/Germany/Netherlands	4	0.77	48.16
US	268	51.84	100.00
<b>Total</b>	<b>517</b>	<b>100.00</b>	

Table VI provides information on the sample periods of the effects of primary studies.<sup>6</sup> I create three dummy variables which divide the sample period throughout all 25 primary studies, lasting from 1981-2008, into the following three subperiods (almost decades) 1981-1990, 1991-2000 and 2001-2008.<sup>7</sup> A dummy variable takes value 1 if the biggest part of the sample period of an effect is in this subperiod. The first period reflects the beginning of the SRI movement. Eleven effects investigate funds in this period. The small number seems reasonable because in this early period only some SRI funds existed. All over the world the SRI fund industry started to expand in the early 1990s (Renneboog et al., 2008a). Since the early 2000s the growth of the SRI industry has accelerated as large institutional investors, in particular pension funds, increasingly entered the market. The adoption of SRI techniques by large institutional investors is regarded as a kind of ‘mainstreaming’ of SRI as well as an important step in the maturity of SRI (Sparkes and Cotwon, 2008; Bengtsson, 2008). As a result, most effects study SRI funds in the periods 1991-2000 and 2001-2008.

## The Performance of SRI Funds: A Meta-Analysis

TABLE VI  
Frequency of effects (according to the sample period)

	Freq.	Percent	Cum.
1981-1990	11	2.29	2.29
1991-2000	287	59.79	62.08
2001-2008	182	37.92	100.00
Total	480	100.00	

## 5 Results and discussion

Recall that in the first approach the dependent variable is dichotomised. The dummy variables *outperformance* and *underperformance* represent a significant outperformance, respectively underperformance, of SRI funds compared with conventional funds.

Table VII and VIII present the results of the logit models with *underperformance* and *outperformance* as dependent variables and the independent variables as stated in Table II. The coefficients represent average marginal effects.<sup>8</sup> The standard errors are clustered by study, so I am adjusting for the fact that effects of the same study may be correlated.<sup>9</sup> In the following tables the first models do not include the variables on the number of funds in the primary studies because their inclusion reduces the number of meta-regression observations strongly. The second models include all independent variables.

TABLE VII  
Results of the meta-regression with the dependent variable *underperformance* (logit model)

	(1)		(2)	
	Coef.	Std. Err.	Coef.	Std. Err.
Performance evaluation Jensen's Alpha	-0.012	0.048	-0.016	0.027
Performance evaluation Carhart's Alpha	-0.022	0.046	-0.039	0.028
Conditional performance evaluation	-0.053***	0.017	-0.031***	0.011
Matching procedure	-0.050*	0.030	-0.095***	0.024
Survivorship bias consideration	-0.061*	0.032	-0.063***	0.021
US funds	-0.091**	0.038	-0.214***	0.027
Time period 1981-2000	-0.042	0.042	-0.055***	0.021
Number of SRI funds			0.001***	0.000
Number of conventional funds			0.000*	0.000
Obs	477		376	
Log pseudolikelihood	-177.047		-107.482	
Pseudo R2	0.049		0.2196	

This table shows the average marginal effects of the independent variables in decimal notation and standard errors (clustered by study). The dependent variable is *underperformance*, which takes the value 1 if the SRI funds in a study significantly underperform the conventional funds, *underperformance*=0 in all other cases.

\* Coefficient is statistically significant at the 10% level.

\*\* Coefficient is statistically significant at the 5% level.

\*\*\* Coefficient is statistically significant at the 1% level.

Concerning the consideration of survivorship bias the results of Table VII are consistent with H1. Model (1) and (2) find a (significant) lower probability of a



significant underperformance of SRI funds if a study accounts for survivorship bias. The probability of a significant underperformance is on average approximately 6% (model (1) and (2)) smaller if a study considers survivorship bias in comparison to not considering this bias (everything else being equal). Accordingly, Table VIII shows a (significant) higher probability of a significant outperformance of SRI funds if a study accounts for survivorship bias. Strictly explaining, based on these models, the consideration of survivorship bias influences the probability of an out- or underperformance of SRI funds. From the author's perspective the most important implication of these findings is that all future studies should give at least an explicit statement on how they deal with the survivorship bias. The best option would be to eliminate survivorship bias by using survivorship bias free data or by adding back closed funds to the sample. Moreover the evidence of this paper may help interpreting the results of existing studies.

The results of Table VII and VIII support H2 as well. Effects, which investigate US SRI funds only, have, on average, a 9%, respectively 21%, lower probability of a significant underperformance and a 14%, respectively 25%, higher probability of an outperformance of SRI funds compared with effects that focus on funds of other countries. As approximately half of the primary study effects focuses on SRI funds of the US and their results appear to be sample-specific, it seems to be necessary to investigate SRI funds of single non-US countries in more detail. Additionally, an interesting topic for future research may be the empirical investigation of possible differences between US and non-US SRI funds.<sup>10</sup> Differences may exist as far as performance, screening type and intensity, fund size, fund age etc. are concerned.

Regarding H3, mixed evidence is found. The variable *time period 2001-2008* was chosen to be the benchmark category.<sup>11</sup> As can be observed from Table VII, model (1) does not show any significant difference in the average probability of an underperformance between effects which have the biggest part of their sample period in 1981-2000 compared with effects that investigate the period 2001-2008. Model (2)

## The Performance of SRI Funds: A Meta-Analysis

reports a lower probability of an underperformance if an effect belongs to an earlier sample period. Table VIII shows significant differences as well. The average probability of a significant outperformance of SRI funds is 7% lower for effects that have the biggest part of their sample period in 1981-2000 compared with effects that have the biggest part of their sample period in 2001-2008. The results of Table VIII are consistent with H3. However, the results of Table VII are not. In order to support H3, Table VII should show a significant higher probability of an underperformance of SRI funds for effects with an older sample period.

TABLE VIII  
Results of the meta-regression with the dependent variable *outperformance* (logit model)

	(1)		(2)	
	Coef.	Std. Err.	Coef.	Std. Err.
Performance evaluation Jensen's Alpha	-0.036	0.060	-0.041	0.046
Performance evaluation Carhart's Alpha	-0.015	0.044	0.005	0.068
Conditional performance evaluation	0.076	0.105	0.154	0.121
Matching procedure	0.104	0.081	0.057	0.087
Survivorship bias consideration	0.170*	0.093	0.157**	0.068
US funds	0.139**	0.070	0.247*	0.128
Time period 1981-2000	-0.070***	0.013	-0.071**	0.029
Number of SRI funds			0.001	0.001
Number of conventional funds			-0.000	0.000
Obs	477		376	
Log pseudolikelihood	-152.698		-109.136	
Pseudo R <sup>2</sup>	0.211		0.310	

This table shows the average marginal effects of the independent variables in decimal notation and standard errors (clustered by study). The dependent variable is *outperformance*, which takes the value 1 if the SRI funds in a study significantly outperform the conventional funds, *outperformance*=0 in all other cases.

\* Coefficient is statistically significant at the 10% level.

\*\* Coefficient is statistically significant at the 5% level.

\*\*\* Coefficient is statistically significant at the 1% level.

Additional interesting results concerning the variable *matching procedure* are found in the binary logit models. If an effect uses a matching procedure to match a certain number of conventional funds to the SRI fund sample (based on criteria such as fund age or fund size), there is, on average, a 5%, respectively 10%, lower probability of an underperformance of SRI funds (Table VII). Possibly, the underperformance of SRI funds in studies, which do not use a matching procedure, is not caused primarily by the SRI characteristics but by other fund characteristics (like fund size or fund age).

Another result is that there is, on average, a significant lower probability of an underperformance of SRI funds if a conditional regression model is used to evaluate fund

performance. By using a conditional approach it can be assumed that the risk exposure of funds may be systematically changed by fund managers according to macroeconomic conditions. The most prominent approach in SRI fund literature is the conditional performance evaluation model introduced by Ferson and Schadt (1996). It suggests the inclusion of several lagged macroeconomic variables into single- or multi-factor regression models.

The second approach, which can be seen as 'robustness check', uses the dependent variable in its original form. Value 0 is taken if the SRI funds significantly underperform the conventional funds. Value 1 is taken if there is no significant performance difference, and value 2 if the SRI funds outperform their conventional peers significantly. Table IX shows the results of the multinomial logit model for the outcomes 'significant under- and outperformance of SRI funds' and 'no significant performance difference'. Once again, the first model does not include the variables on the number of funds in the primary studies because their inclusion reduces the number of the meta-regression observations strongly. The second model includes all independent variables. The results regarding the survivorship bias consideration (H1) and domicile of the funds (H2) are in accordance with the results of the logit models. Again, a lower probability of an underperformance and a higher probability of an outperformance of SRI funds occur if a study considers survivorship bias or focuses on US funds only. The magnitudes of all coefficients are comparable to the ones found in the binary logit-models. There is mixed evidence in the binary logit models concerning H3. The 'robustness check' does not reveal any clear evidence in favour of H3. The probability of an underperformance of SRI funds for effects with a sample period between 1981-2000 is statistically not different from effects with a sample period between 2001-2008 in model (1). In model (2) the sign of the coefficient is in accordance with the results of the binary logit model but not as expected by H3 negative and significant. A lower probability of an outperformance of

SRI funds is found in both models for effects with an earlier sample period. These latter results are in accordance with the evidence of the binary logit models and H3.

There are only some significant results concerning the third possible outcome of the dependent variable 'no performance difference'. Studies, which have the biggest part of their sample period between 1981-2000 have, on average, a 12%, respectively 13%, higher probability of the outcome 'no performance difference'. This additional evidence contributes to the overall picture that an older sample period leads to a higher probability of insignificant results while a newer sample period leads to a higher probability of significant results, either an out- or an underperformance of SRI funds. These results are obviously not easy to interpret. One reason for the observed evidence may be that at the beginning of the SRI movement SRI funds used less strict screens to select their stocks. One may think of US SRI funds which decided to divest from companies that operated in South Africa during the apartheid regime. Their investment universe may differ only to a small degree from the one of conventional funds and therefore, these funds possibly delivered similar returns.

## The Performance of SRI Funds: A Meta-Analysis

TABLE IX

Results of the meta-regression with the dependent variable *performance comparison* (multinomial logit model)

	(1)		(2)	
	Coef.	Std. Err.	Coef.	Std. Err.
<b>Underperformance</b>				
Performance evaluation Jensen's Alpha	-0.006	0.049	-0.012	0.027
Performance evaluation Carhart's Alpha	-0.015	0.047	-0.036	0.028
Conditional performance evaluation	-0.056***	0.018	-0.038***	0.012
Matching procedure	-0.047	0.032	-0.092***	0.024
Survivorship bias consideration	-0.062**	0.029	-0.062***	0.019
US funds	-0.086**	0.039	-0.210***	0.028
Time period 1981-2000	-0.045	0.040	-0.057***	0.021
Number of SRI funds			0.001***	0.000
Number of conventional funds			0.000*	0.000
<b>No performance difference</b>				
Performance evaluation Jensen's Alpha	0.043	0.075	0.058	0.048
Performance evaluation Carhart's Alpha	0.031	0.075	0.032	0.071
Conditional performance evaluation	-0.018	0.098	-0.105	0.117
Matching procedure	-0.058	0.076	0.022	0.089
Survivorship bias consideration	-0.103	0.100	-0.088	0.075
US funds	-0.052	0.069	-0.028	0.110
Time period 1981-2000	0.116***	0.045	0.128***	0.042
Number of SRI funds			-0.002**	0.001
Number of conventional funds			0.000	0.000
<b>Outperformance</b>				
Performance evaluation Jensen's Alpha	-0.037	0.060	-0.046	0.045
Performance evaluation Carhart's Alpha	-0.016	0.044	0.004	0.069
Conditional performance evaluation	0.074	0.105	0.143	0.121
Matching procedure	0.105	0.081	0.070	0.087
Survivorship bias consideration	0.165*	0.092	0.150**	0.068
US funds	0.138**	0.070	0.238**	0.115
Time period 1981-2000	-0.071***	0.013	-0.071**	0.030
Number of SRI funds			0.001	0.001
Number of conventional funds			-0.000	0.000
Obs	477		376	
Log pseudolikelihood	-322.416		-213.948	
Pseudo R2	0.127		0.258	

This table shows the average marginal effects of the independent variables in decimal notation and standard errors (clustered by study). The dependent variable is used in its original form (*performance comparison*) as described in the text.

\* Coefficient is statistically significant at the 10% level.

\*\* Coefficient is statistically significant at the 5% level.

\*\*\* Coefficient is statistically significant at the 1% level.

## 6 Conclusion

The aim of this paper is to investigate, with the help of a meta-regression, the influence of selected primary study characteristics on the observed results.

Almost 75% of the performance comparisons (SRI with conventional funds) do not find any significant performance difference. A significant out- and underperformance is virtually found to the same degree (13%-14%). Furthermore, the most studied time period

in primary studies is 1991-2000. Additionally, approximately 50% of the effects investigate funds of the US.

Significant evidence is found that the consideration of survivorship bias increases (decreases) the probability of a significant outperformance (underperformance) of SRI funds. Therefore, on the one hand, it is necessary for future studies to report on the treatment of the survivorship bias in detail. On the other hand, the evidence of this study can be used to interpret the results of existing studies. Further evidence reveals that effects, which investigate US SRI funds only, have a higher (lower) probability of an outperformance (underperformance) compared with effects which focus on funds of other countries. The most important implication of this evidence is that if the results of the US studies are sample-specific, it is reasonable to investigate SRI funds of other countries in more detail. Some studies started to investigate SRI funds around the globe (e.g. Renneboog et al., 2008b) but further evidence is needed to cope with special circumstances of national SRI markets. This could be particularly interesting for European countries, as they have the largest share of the global SRI market (Eurosif, 2010). The results of primary studies are sensitive to the time period of an effect as well but based on the results of the binary logit models it is difficult to draw general conclusions on this variable. Additional evidence from the multinomial logit model on the time period suggests that an older sample period leads to a higher probability of the outcome 'no performance difference', while a newer sample period has a higher probability of significant results, either an out- or an underperformance of SRI funds.

Regarding the meta-level, future research might explore the influence of additional study characteristics. On the level of primary studies, it may be reasonable to investigate differences between US and non-US SRI funds empirically. A further interesting topic could be the dissimilar attrition rates of SRI and conventional funds.

The Performance of SRI Funds: A Meta-Analysis

Appendix

Appendix I

Detailed information on the included studies

Study	Survivor -ship bias consider- ation	US fu- nds	Time period 1981- 1990	Time period 1991- 2000	Time period 2001- 2008	Perfor- mance evaluation Jensen's Alpha	Perfor- mance evaluation Carhart's Alpha	Other perfor- mance evalu- ation	Conditional perfor- mance evaluation	Matching procedure	Number of SRI funds	Number of conven- tional funds
Bauer, Derwall, Otten (2007)	0	0	0	1	0	1	1	0	0/1	0	8	267
Bauer, Koedijk, Otten (2005)	1	0/1	0	1	0	1	1	0	0	1	50	150
Bauer, Otten, Rad (2006)	1	0	0	1	1	0	1	0	0/1	0	15	195
Bello (2005)	0	1	0	1	0	1	0	1	0	1	42	84
Benson, Brailsford, Humphrey (2006)	0	1	0	1	1	0	1	1	0	0	184	6074
Bollen (2007)	1	1	1	1	1	1	1	1	0	0	187	9189
Chang, Witte (2010)	0	1	0	0	1	1	0	1	0	0	164	11913
Derwall, Koedijk (2009)	1	1	0	1	0	1	1	1	0	1	15	75
Gil-Bazo, Ruiz-Verdu, Santos (2010)	1	1	0	1	1	1	1	1	0	0/1	86	1761
Goldreyer, Ahmed, Diltz (1999)		1				0	0	1	0	1	29	20
Gregory, Matatko, Luther (1997)	1	0	1	1	0	0	1	1	0	0/1	16	92
Gregory, Whitaker (2007)	1	0	0	1	0	0	1	0	0/1	1	20	100
Hamilton, Jo, Statman (1993)	0	1	1	0	0	1	0	0	0	1	17	170
Humphrey, Lee (2011)	1	0	0	0	1	1	1	0	0	0/1	27	514
Kempf, Osthoff (2008)	1	1	0	1	0	0	1	0	0	0	72	3906
Koellner, Suh, Weber, Moser, Scholz (2007)	0	0	0	0	1	0	0	1	0	1	13	13
Kreander, Gray, Power, Sinclair (2005)	0	0	0	1	0	1	1	1	0	1	30	30
Kryzanowski, Ayadi, Ben-Ameur (2011)	1	0	0	1	0	1	1	1	0/1	0	67	517
Liedekerke, Moor, Walleghem (2007)	1	0	0	1	1	0	1	0	1	0	28	725
Mueller (1991)		1	1	0	0	0	0	1	0	0	10	
Renneboog, Horst, Zhang (2008)	1	0/1	0	1	1	1	1	1	0/1	0/1	340	680
Sanchez, Sotorrio (2009)	0	0	0	0	1	0	0	1	0	1	103	103
Spekl (2009)	0	0	0	0	1	1	1	1	0	1	133	133
Statman (2000)	0	1	0	1	0	1	0	1	0	1	31	62
Stenström, Thorell (2007)	0	0	0	0	1	1	0	0	0	0	23	42

This table presents dummy variables with detailed information on the independent variables of the meta-regression, respectively on the included studies. Value 1 is taken if the effects of a study, for example, consider survivorship bias (second column). Value 0 is taken if the effects of a study do not consider survivorship bias. The last two columns show the numbers of investigated funds of the effect of a study (recall that most studies contain several effects) with the highest number of investigated funds.

## Notes

<sup>1</sup> For more information on the definition of ‘broad’ and ‘core’ SRI, see Eurosif (2010), p. 9.

<sup>2</sup> This topic is investigated empirically by a vast amount of studies. For example, the often cited meta-analysis of Orlitzky et al. (2003) finds a positive relationship between CSP and Corporate Financial Performance. Furthermore, a recent literature review was conducted by Van Beurden and Goessling (2008).

<sup>3</sup> The influence of the publication bias on this body of literature seems to be rather small, because lots of studies with insignificant results were published. Table III reports that almost 75% of the primary studies’ results are insignificant.

<sup>4</sup> Renneboog et al. (2008b) do not find significant performance differences for the following countries: Belgium, Germany, Italy, Luxembourg, Netherlands, Norway, Switzerland, UK, US, Canada, Australia, Malaysia and Singapore.

<sup>5</sup> Some studies do not provide information on the consideration of survivorship bias.

<sup>6</sup> Unfortunately, not every study provides information on the sample period of all effects.

<sup>7</sup> A similar procedure to divide the sample period is used, for example, by Bauer et al. (2005) and Bauer et al. (2006) who divide their sample periods into three equal and non-overlapping subperiods.

<sup>8</sup> Average marginal effects are calculated by computing individual marginal effects at every observation and by averaging these individual marginal effects across the sample.

<sup>9</sup> For instance, some studies use several models to evaluate the performance of their fund samples. The results of the models of one study may be correlated to a certain degree because all models use the identical data set.

<sup>10</sup> Louche and Lydenberg (2006) investigate this issue from a historic perspective.

<sup>11</sup> For the empirical estimation, the dummy variables *time period 1981-1990* and *time period 1991-2000* are taken together because there are only eight observations in the first subperiod with information on all variables of the logit models. All of these observations have the identical outcome in the dependent variable and hence, *time period 1981-1990* would predict the dependent variable perfectly.



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